Where does packaging impact on the environment?

All manufactured products, including their packaging, have impacts on the environment that are not sustainable in the long term. These include:

- Consumption of non-renewable resources (e.g. materials and energy);
- Generation of air emissions in production, transport and use that contribute to air pollution, including ozone layer depletion and global warming;
- Generation of waterborne emissions that contribute to pollution of waterways; and
- Production of solid waste requiring disposal in landfill.

An estimated 3 million tonne of packaging is used each year in Australia[1]. Approximately 800,000 tonne of domestic packaging waste is recycled from kerbside (Nolan ITU et al 2001). In addition some unknown amount of commercial and industrial packaging waste is recycled.

Some primary packaging products have relatively high recycling rates, for example (Williams undated):

- Aluminium Cans - 65%
- Glass Containers - 45%
- Steel Cans - 41%
- HDPE Milk Bottles - 50%
- PET Containers - 32%
- Packaging Paper - 75%
- Liquidpaperboard Cartons - 20%.

A substantial part of packaging materials are not currently recycled, for example flexible plastics and laminates used for food packaging.

What is sustainable packaging?

Packaging products are generally short cycle products and are used in combination with other products. Their main function is to (help) efficiently protect, distribute and market products and to provide safe and convenient use of its content. In doing so the packaging adds value to the product. This added value combines economic, environmental (in preventing product spoilage) and social values.

In order to be able to evaluate these values, including environmental benefits and impacts, and to identify opportunities for improvements, we need to consider:

1. The entire **life cycle** of a packaging system – from the production or mining of raw materials through to disposal or recycling; and

[1] Based on an estimated value of $7.3 billion per annum, and an average value of $2,500 per tonne.

2. How the **packaging system** interacts with the **product system** (e.g. food or beverage) it contains, and how this interacts with systems in the ambient and macro environment (Figure 1).

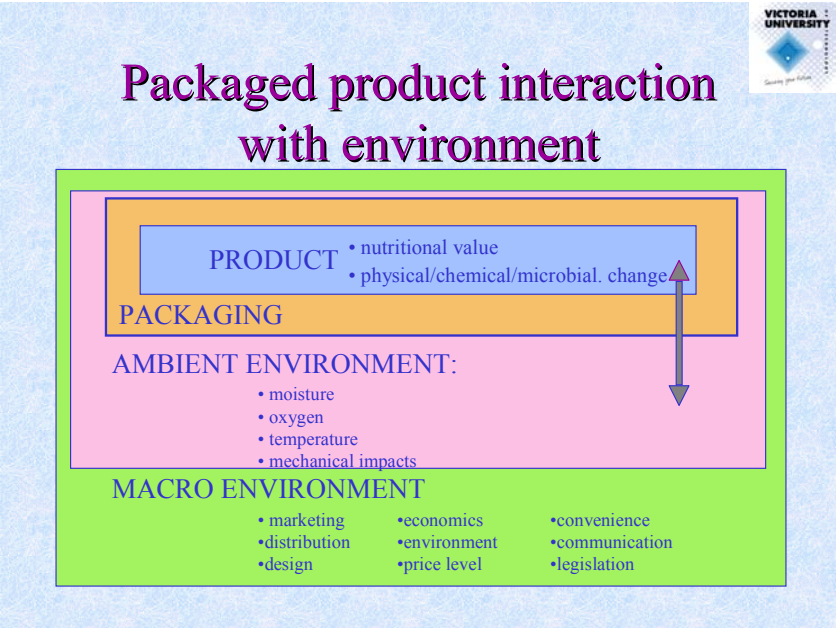

Figure 1: Interaction of Packaging System with Product, Physical and Macro Environment (Kooijman 1996)

There is increasing recognition that we need to consider the **'triple bottom line'** of packaging systems – their economic, social and environmental impacts. This term was introduced into the public debate by John Elkington (1998). He argues that 'businesses need to address the triple bottom line - economic prosperity, environmental quality and social justice'.

The challenge is to define what this means in practice, and to develop strategies that can be used to guide the development and introduction of packaging systems meeting sustainability (i.e. triple bottom line) requirements. One option is to establish a set of basic principles for sustainability. There are many examples of generic principles for sustainable product development, for example Datschefski's (2001) *cyclic-solar-safe* principles:

- Cyclic: The product should either be made from organic materials and be recyclable or compostable or it should be made from minerals that are continuously cycled in a closed loop.
- Solar: The product should use solar energy or other forms of renewable energy that are cyclic and safe, both during use and manufacture.
- Safe: The product should be non-toxic in use and disposal, and its manufacture should not involve toxic releases or the disruption of ecosystems.
- Efficient: The product, in manufacture and in use, should require 90% less materials, energy and water compared to products providing equivalent utility manufactured in 1990.
- Social: The product's manufacture and use should not impinge on basic human rights or natural justice.

These strategies seem to provide a useful guide to the development of principles and guidelines for sustainable packaging. However, given the role and function of packaging as a product marketing support system and its identified interaction with product, physical and macro environmental systems, a critical review of itheir applicability is essential.

Any principles or strategies to guide packaging system sustainability must be developed in consultation with (key) stakeholders in government and industry as well as the general community, in order to obtain engagement and ownership. Sustainability principles also need to acknowledge that there is no single, correct definition of sustainable packaging. Appropriate strategies must be able to allow for the context of the specific product, its life cycle and related supply chain systems.

Triple Bottom Line considerations

In many ways some of the trends in packaging are incompatible with community demands for more environmentally sustainable packaging, an issue highlighted by Gavin Williams from the Packaging Council of Australia (Williams undated). Many of these trends are driven by changes in the demographic make-up of the community, changing lifestyles and increasing concerns about public safety. Some of these trends, drivers and environmental implications are outlined in Attachment 1.

Strategies for sustainable packaging

Some proposed strategies based on the *cyclic-solar-safe* sustainability principles are outlined in the table in Attachment 2. Existing forms of packaging that illustrate these strategies are also included, and some of the issues that need to be considered in pursuing them. These examples are based on the conventional approach of applying sustainability principles. The challenge is to approach packaging sustainability from a more holistic point of view by taking the entire integrated system into account.

Benefits of sustainable packaging

While benefits of sustainable packaging might be obvious from an environmental perspective, for example reduced waste and resource conservation, it should also provide economic and social benefits. Economic benefits can include:

1. Cost savings through more efficient use of materials;
2. Value-adding in the supply chain: supply chain audits can highlight unnecessary costs or inefficiencies associated with packaging design (see for example Cumming 2002: 19).
3. Regulatory compliance: investments in the evaluation packaging systems will help to identify opportunities for ensuring compliance with increasingly stringent regulations in Australia, Europe and other markets.
4. Competitive advantage – sustainable packaging systems will help (re) position Australian products in packaging sensitive markets.
5. Closer relationships with customers and suppliers – the search for solutions to environmental challenges in the supply chain, for example the development of recovery systems for used packaging, can help to build stronger relationships with customers and suppliers (customer loyalty).

Social benefits can include:

1. Increased consumer convenience in preparing and/or using packaged products, meeting life style requirements, including expectations about environmental performance;
2. Minimization of packaging waste issues at various levels (i.e. domestic, councils, public environment);
3. Enhanced community well being.

Future challenges

There are many challenges associated with the implementation of more sustainable packaging systems. These include:

- Defining goals and principles for sustainable packaging that can provide a framework/direction for future R&D, infrastructure and policy development.
- Raising awareness within the supply chain about the need for and advantages of more sustainable packaging and potential business opportunities.
- Developing guidelines that can be used to design and implement more sustainable packaging systems.
- Evaluating progress achieved by the NPC to date in encouraging a shift towards more sustainable packaging systems, and identifying any policy modifications to support faster progress.

Meeting the Challenge

The Sustainable Packaging Alliance has started to scope research projects that address some of these challenges. These include:

Where To From Here? Defining Sustainable Packaging

- To establish a consensus framework for obtain national consensus on a definition offor 'sustainable packaging systems'.
- To engage the packaging supply chain, consumers, environment groups and policy makers in a debate about sustainable packaging principles, goals and strategies.
- To reach consensus within key stakeholder groups about the need to integrate sustainability objectives in the design and management of packaging systems along the supply chain.
- To develop an understanding of consumer attitudes and behaviour in relation to packaging and sustainability and how these might be a barrier to, or support, a shift to the improvement of sustainable packaging.
- To identify and formulate key indicators for sustainable packaging system development
- To identify barriers (technological, managerial, social, economic) for furthering sustainable packaging development and to develop pathways to overcome these barriers.
- To provide real examples of packaging (systems) that realistically embodies sustainability principles and practical strategies for implementation.
- To build awareness of sustainable packaging development as business imperative.

Attachment 1

Packaging trend	Driver	Environmental impacts
Sale of products in smaller portions	Increased number of single-person households; popularity of small portions for children's lunch boxes	More packaging material per unit of product
Increasing range of complete meal replacements	More women working; longer working hours for those employed; increasing popularity of convenience foods; changing lifestyle priorities; reduced interest and skills in food preparation	Not currently recyclable
Pre-packed meat and vegetables in modified atmosphere packaging (MAP)	Increased popularity of convenience foods, e.g. bags of salad, stir fry mixes; Trend to centrally, pre-packed meat to meet supermarket demands for efficiency and tighter health standards; Increased demand for fresh & healthy foods	Not currently recyclable; More material per unit product
Products with longer shelf life	Trend to increased consumer convenience, e.g. shopping less frequently for staples	MAP films not currently recyclable; Multi-layer barrier bottles not recyclable and may contaminate recycling streams
Tamper evident packaging	Recent contamination cases, e.g. Herrons	Additional packaging, mostly non-recyclable
Premium packed products versus budget packed products	Life style enhancement	More packaging variety for same type of products

Attachment 2

General strategy	Specific strategy	Illustrations	Issues
Cyclic flows (biomimicry)	Manufacture with renewable and compostable materials	Corn, potato or wheat starch-based polymers	Land use, water use, additives, identification in waste stream Limited performance High relative cost
		Paper and cardboard made from plantation timber or another sustainably harvested fibre source	Land use, water use
		Cellulose film	Manufacturing process, recyclability, technical limitations
	Manufacture with recycled and recyclable material	Paper or cardboard made from recycled fibre	More additives Reject of contaminants including inks, fibre residues, additives, etc
		Moulded pulp made from recycled fibre	More additives Rejects (see above)
		Recycled and recyclable polymers (e.g.HDPE or PET)	Food contact safety Processing parameters Degradation
	Design for reuse	Reusable and recyclable crate or pallet	Economies of scale More transport Maintenance/cleaning
		Ice cream pack designed for reuse as a storage container and recycling	Limited number can be reused per household
		Return system for customer refills	Food safety Convenience

	Design for recycling	Plastic containers with components made from the same or compatible plastics (including closures and labels)	Technical limitations re processing and applications
		Packaging made from materials for which a widespread collection and recycling system exists	Cost, technical limitations
Elimination of eco-toxicity impacts	Eliminate inks/adhesives that result in volatile organic compound emissions (VOCs)	Printing with non-solvent inks Non-solvent lamination	
	Eliminate use of heavy metal pigments and stabilisers		Technical limitations
Resource efficiency	Elimination of unnecessary components	Elimination of secondary packaging	Risk of primary packaging failure; Handling efficiency
	Significant reduction in materials used	Inflatable packaging	
		Pouch refills	Convenience
		Stretch tape to replace pallet film	Protection (moisture, dust, pilferage)
		Bags replacing bottles or tubs	Handling; Protection
		Lightweight bottles	
		Adhesives to replace pallet film	Protection, moisture / dust
	Bulk packaging	1000 litre refillable intermediate bulk containers (IBCs) for liquids	Safety, convenience
	Use of concentrates	Bottles or bags of concentrated detergent	Convenience