

# Waste not want not

Waste is an unavoidable element of the packaging and product lifecycle.

**Richard Inns**, former global issue leader with Unilever R&D, explains what is being done and where producers need to go next.

**Cycles with** their inputs, outputs and waste are built into the fundamental fabric of the world today. In pursuit of sustainability, you can only seek to minimise or balance out your losses, they cannot be stopped altogether. In attempting to define sustainability in packaging, it is easy to lose track of the quest for a kind of packaging superconducting cycle that will flow forever without apparent input or loss.

This search has partially been driven by the tendency to view packaging in isolation without relating it to its primary function of product protection and waste prevention. The challenge has lain in coupling packaging into overall product sustainability. By doing so, the most significant savings in resources from the packaging cycle lie in product waste prevention.

More than 40% of food in developing countries is lost and half of the content of landfills in emerging countries is food that rotted before it could reach consumers. Recent research from Brazil showed that CO<sub>2</sub> equivalent emissions from such materials in landfills amounted to 152 million tons, well in excess of the CO<sub>2</sub> emissions generated by the total global packaging industry.

Could all of that waste be saved by packaging? Probably not, but it could be greatly reduced. That emission figure from pre-sale product waste is equivalent to 730kg per person, while the typical Western European figure is 50kg per person. This suggests that better packaging could save in excess of 100 million tons of CO<sub>2</sub> emissions in one country alone. The return on environmental investment through better packaging protection would clearly be considerable.

## BASIC RULES

Packagers need to start from the basis that packaging has a job to do: to protect, inform and sell in highly competitive environments. That said, some basic rules need to be followed for the packaging used and the materials from which it is made:

**1** The package is made from a material that retains its properties at a high level for a maximum period. Every material or pack degrades to some degree, losing a proportion



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of its properties through each cycle of usage. Paper fibres will go through recycling seven times before they totally

lose their properties. That rule of seven, related to halving fibre lengths, applies equally to polymers and many cyclical processes. Within these natural rules we must get the most out of a material in each incarnation.

**2** The source of the material will remain viable for the foreseeable future. The most fundamental measure combines reserves of raw material with rates of replenishment through recycling and, for natural materials, regrowth. For example, known reserves of bauxite and iron ore are estimated at between 400 and 700 years. The high levels of recycling that can be achieved make the life of the material once extracted effectively infinite; glass is the same. Paper, by contrast, depends on the sustainable regrowth capacity of our forests backed by recycling.

Sustainable supply of plastics is more difficult to define but we can look to carbon replenished through CO<sub>2</sub> cycles, fermentation or low molecular weight residues as some of the feedstock for the future. One of the biggest challenges remains how to manage the light weight fraction of packaging, generally defined as any pack component less than 7g in weight.

**3** The amount of material used is optimised as far as possible given the requirements of manufacture, storage and distribution and marketing. The Essential Requirements of the EU Packaging and Packaging Waste Directive 94/62/EC require minimum weight and volume consistent with consumer safety and acceptance. The European packaging industry has been eliminating around 500,000 tons of packaging from the market each year through light weighting.

**4** The packaging is made in such a way that it minimises the product's impact on the natural environment. Looking at a pack as a vehicle for distribution and protection of its contents, it is the total impact of the pack and product that should be considered in designs, not the packaging alone.

**5** The contents of the pack do not become waste before they reach the consumer and are fit for purpose when the consumer uses them. Prevention of food waste through physical cushioning and barrier protection should be considered. Spoilage rates of greater than 40% of food production exist in developing countries, according to the International Food Information Council. Even under the best conditions spoilage of loose-packed food in transport can reach 25%.

Competition between packaging sectors and materials has always been a prime driver of material optimisation as well as innovation. Maintaining the current range of materials is essential so that the best pack choices can be made, ensuring minimum environmental impact for the complete product, including transport optimisation and waste prevention.

The approach to sustainability needs to embrace all materials. While the over-reaching concept remains constant there needs to be a translation into appropriate terms for each major class of material. Each material can be assessed in a slightly different way but must achieve the same goal: 'meeting the needs of the present without compromising the ability of future generations to meet their own needs' (source: Brundtland Report).

**ADAPT TO MATERIALS**

The pursuit of sustainability comes down to recovering the material and recapturing the optimum environmental value from it. That process needs to be adapted to the material in question. It may mean recycling, involve incineration or another form of recovery, but it will keep the material at the highest level for as many uses as possible, consistent with a positive Life Cycle Assessment or carbon footprint balance.

Aiming for optimum rather than maximum levels of material recycling is the most environmentally efficient approach. For a given material there will be limits between, as recovery levels increase, the energy required for the recycling process outweighs the energy gain from the material produced. This effect occurs despite the fact that using recycled materials rather than virgin for most conversion processes reduces energy input by around 60%. There will always be materials that through degradation or contamination are not energy efficient to recover.

The major issue for paper is how to expand the availability of certified, and chain of custody certified, virgin pulp sourcing.

Virgin materials will always be needed for certain applications and to replace the constant 15% loss through the fibre degradation that occurs in paper processing. Legal sourcing of pulp is a given but above that in priority is the need to source through certified suppliers. In Europe and North America, non-certified pulp represents only 10% of the total used and even that can be eliminated with concerted action. Globally, 57% of pulp used is uncertified and that is an important challenge to face.

The next challenge for paper will be for chain of custody certified packaging to be more widely available, providing more users with positive assurance about the sources of virgin paper and pulp materials. Establishing a chain of custody is not easy given the complexity of the paper supply chain and progress is likely to be slow. At present, only 14% of packaging papers are

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covered by chain of custody so it is a long road but one that needs to be successful.

**RECOVERY RATES**

Improved recovery and recycling technologies such as the development of food grade recycled PET and HDPE and

processes for recovery of mixed and contaminated waste must also play an increasingly important part.

There is a clear picture of how sustainable plastics will be defined in future but it is encouraging that the industry is moving forward on a number of fronts to reach that goal. Glass, steel and aluminium share a characteristic in that their raw materials are effectively infinitely recyclable. When recovered material is used, energy consumption is significantly reduced in the process. There are also large reserves of the basic raw materials. Sustainability with these materials is a matter of putting in place sufficient infrastructure to ensure that the high levels of recovery experienced in Europe are repeated around the world.

Improving packaging sustainability is an action for everyone. The materials we use must be legally and ethically sourced and the energy used to convert them must be minimised. The industry will move more towards 'green' sourcing and that means we must put in place the recovery infrastructure that will keep those materials in use at the highest possible level of performance for as long as possible.

To achieve true sustainability packaging must be seen as part of the total product, not in isolation. The product must reach the consumer in a fit condition for use and adequate life remaining. We must achieve that with minimum waste in transit, use of material and minimum overall impact. There must be effective recovery after use. Only after all of these are achieved can we say we are attaining sustainability. **pci**



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