Packaging: Meeting the Environmental Challenge

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Packaging is the ultimate symbol of the 20th century's consumer culture. It protects what we buy and raises our standard of living. In developing countries, 30 to 50 percent of food shipments are spoiled because of inadequate packaging and distribution systems. In developed countries with more sophisticated packaging, storage, and distribution, only 2 to 3 percent of food shipments are wasted. Packaging not only protects goods, but conveys information about their contents and preparation or administration, and – in some cases – foils would-be tamperers. It plays a vital and growing role in the global economy. And through the vision of Andy Warhol, the Campbell's Soup can and the Brillo box have been elevated to the level of art.

At the same time, packaging is on the environmental front line. It is the largest and fastest-growing contributor to one of the most troubling environmental problems: the garbage crisis. In this article we outline the scope of the waste management challenge as it concerns packaging, discuss current approaches, describe some innovative initiatives that are under way, and suggest actions management should take.

Editor's Note: This article is derived from the book Packaging for the Environment: A Partnership for Progress, *by E. Joseph Stilwell, R. Claire Canty, Peter W. Kopf, and Anthony M. Montrone, published by AMACOM Books, a Division of the American Management Association, October 1991.*

The Scope of the Problem

Packaging accounted for more than 30 percent of the U.S. municipal solid waste stream in 1990 (Exhibit 1). Where is all this packaging going? In the United States, most packaging and other waste are buried in landfills. But even with its abundance of open land, the United States is running out of room for its garbage. One-quarter of the country's municipalities are expected to exhaust their landfill capacity before 1995, and more than half the population lives in regions with less than 10 years of landfill capacity (Exhibit 2). Meanwhile, the environmentally sound alternatives to burying garbage – recycling, reuse, and energy recovery – are just beginning. For the throwaway society, the 1990s will be a decade of reckoning.

While packaging is not the only culprit in the solid waste crisis, it is a highly visible component and one that directly involves consumers. And its short lifetime exacerbates the problem. Although the useful lives of some packages, such as paint cans and reusable canisters, may be as long as several years, the useful lives of others, such as fast-food hamburger wrappers, can be as fleeting as a few minutes (Exhibit 3).

Exhibit 1

Components of U.S. Municipal Solid Waste and Types of Packaging Waste, by Percent

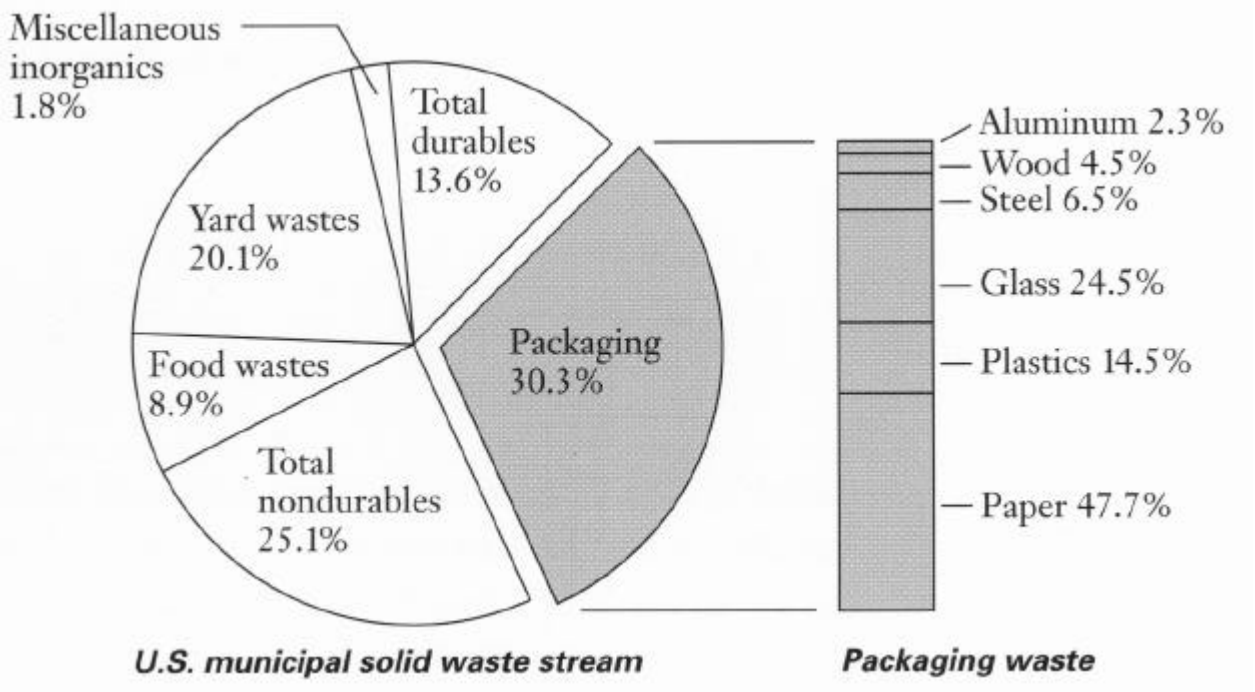


Exhibit 2

Remaining Years of Landfill Capacity, by State

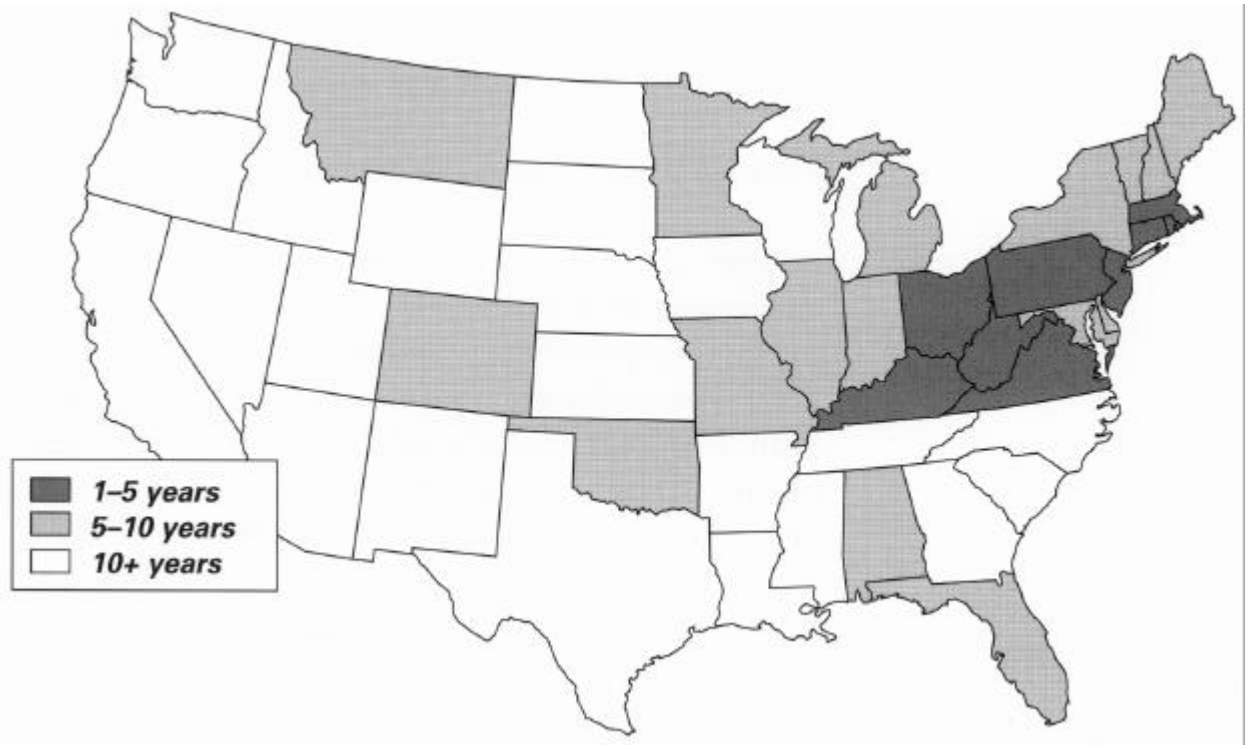
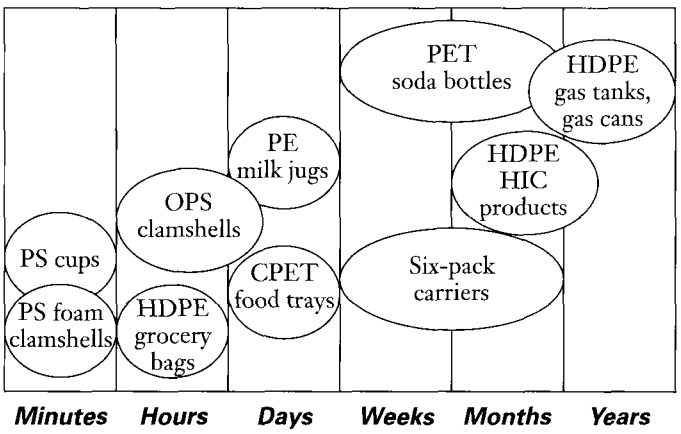


Exhibit 3

Useful Lifetimes of Various Packages



Key

PS = *polystyrene*
OPS = *oriented polystyrene*
PE = *polyethylene*
HDPE = *high-density polyethylene*
PET = *polyethylene terephthalate*
CPET = *crystallized PET*
HIC = *household/industrial chemicals*

Fortunately, because of the sheer volume of packaging in the solid waste stream, even relatively small improvements in packaging can make a real difference in the magnitude of the garbage crisis. Packaging thus offers a unique opportunity for companies to assume a leadership role in environmental responsibility.

And that role need not be motivated purely by altruism. Companies are already developing market strategies and building competitive advantage by demonstrating environmental consciousness in packaging.

We have already seen some dramatic examples:

• Procter & Gamble has pioneered a number of environmental improvements in packaging, including the first 100 percent recycled plastic bottle used in the United States for a major consumer product – Spic & Span. P&G has also reduced the volume of its packaging by offering other national brands as refills and concentrates. It is committed to using at least 25 percent recycled content in its plastic bottles. Most important, it has helped build an infrastructure for recycling.

• H. J. Heinz Company replaced its multilayer plastic ketchup bottle with a polyethylene terephthalate (PET) bottle that is more easily recyclable. The company expects to improve its 51 percent share of the $600 million American ketchup market by prominently labeling the bottle as recyclable.

• The Body Shop, a highly successful British-based retailer of natural and organic hair and skin products, has differentiated itself through „green marketing." Its stores display information on environmental issues, provide refillable containers, and offer discounts to consumers who reuse the company's packaging. Even its catalogues are recycled: mail orders are packed in shredded pages of Body Shop catalogues.

Such pioneering firms are still very few. Most companies are just beginning to grapple with the waste management implications of their packaging choices.

Current Approaches to Waste Management

The U.S. Environmental Protection Agency (EPA) recommends four principal approaches to waste management, listed below in order of preference, with an emphasis on the first two:

• Source reduction, including reuse of packaging

• Recycling, including composting

• Waste combustion, with energy recovery

• Landfilling

Source Reduction. The most effective means of solving the garbage crisis is to prevent it at the source. Effective source reduction slows the depletion of resources and prolongs the useful life of the available waste management infrastructure. This principle is firmly embedded in the best environmental policies practiced by leading corporations. For example, Procter & Gamble practices source reduction in its vacuum-packed „brick bag" for ground coffee. While not recyclable at present, the brick bag produces considerably less packaging waste than metal coffee cans. The company believes that, where recycling is not yet an option for consumers, a sound environmental alternative is minimal packaging that reduces the burden on landfills. At the same time, the company offers instant coffee in a fully recyclable PET plastic container, thus providing consumers a range of environmental packaging choices to suit their local waste management infrastructures.

Recycling. While some types of packaging, such as the brown corrugated box and the aluminum beverage can, have well-established recycling infrastructures, efforts to recycle most other forms of packaging have just begun. Although 50 percent of aluminum cans were recycled in the United States in 1990, only 8.5 percent of glass containers and less than 2 percent of all plastics were recycled; and, apart from brown boxes, virtually no paper packaging was recycled. Overall, American consumers are dumping garbage at a much faster rate than they are recycling it.

Composting is one form of recycling that is growing in popularity, and it is not just for autumn leaves and yard waste. In Europe, composting facilities for mixed solid waste have been successfully operated for more than 30 years. In Sweden, nearly one-fourth of all solid waste is composted. In the United States, 24 localities are either composting mixed solid waste or have facilities planned for completion by the end of 1991. An additional 150 municipal composting projects are in various stages of planning.

Waste Combustion. Incineration technology has been greatly improved in recent decades. Current technologies include scrubbers to control toxic emissions, as well as energy-recovery features. Waste-to-energy facilities are a reasonable option for mixed waste; plastic waste, in particular, has a high energy content (Exhibit 4). However, incinerators are rarely welcome in U.S. communities. The EPA projects that the U.S. incineration rate will reach about 25 percent in the year 2000. By contrast, incineration rates are already much higher in other countries: Switzerland incinerates 74 percent of its garbage; Japan, 66 percent; and Sweden, 50 percent.

Landfilling. At present, the United States depends most on the least desirable of the EPA's four solutions, relegating 73 percent of its garbage to landfills while incinerating 14 percent and recycling 13 percent. As described above, this solution is rapidly approaching its physical limitations.

Innovative Initiatives

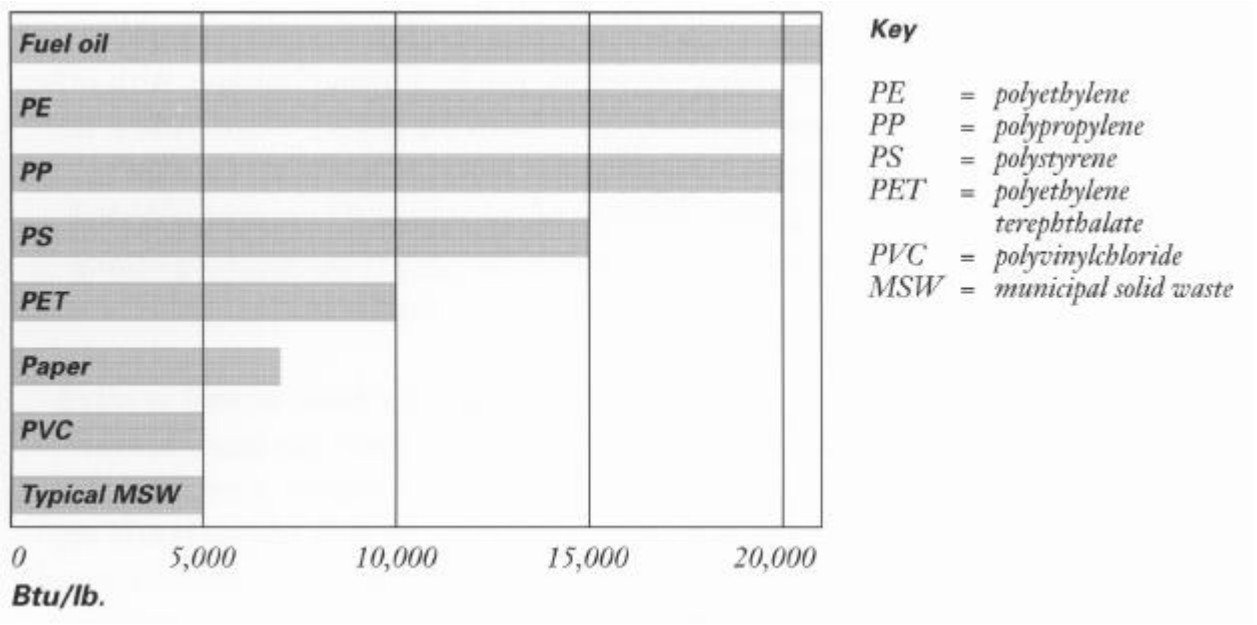
Leading companies are already undertaking bold new environmental initiatives in a number of areas: technology, marketing, infrastructure, information technology, and policy.

Technology. 3M Company has one of the oldest and most successful environmental programs, „3P" – Pollution Prevention Pays. 3M has invested hundreds of millions of dollars in technology development to prevent pollution and waste at the source, rather than focusing on end-of-pipeline cleanup.

In its first 15 years, the 3P program resulted in more than 2,700 successful projects, yielding $500 million in savings and a 50 percent reduction in pollution per unit of production. 3P encourages technical innovation to prevent pollution at the source through four methods: product reformulation, process modification, equipment redesign, and resource recovery.

Exhibit 4

Comparative Thermal Energy Content of Waste Packaging Materials



Projects that use one of these methods to eliminate or reduce pollution, save resources and money, and advance technology or engineering practice are eligible for recognition under 3 P.

Despite this success, and although the basic concept of pollution prevention remains timeless, 3M management concluded in 1988 that 3P's results did not go far enough. Although emission reductions were significant, the company wanted to do more. It launched a short-term program: Pollution Prevention Plus (3P+).

As 3M CEO Allen Jacobson noted, „With 3P+, we are moving into new territory, taking environmental responsibility well beyond what is required. With the idea of prevention thus ingrained in our operating philosophy, we move a step closer each day to the ideal of zero pollution."

At the heart of 3P+ is a long-term research effort to reduce sources of pollution in 3M's manufacturing processes. The goal is to cut all releases to the environment by 90 percent from 1987 levels by the year 2000.

Marketing. Procter & Gamble, which has applied environmental thinking to some of the world's best-known consumer products, has worked to build a recycling infrastructure by forging linkages with other companies up and down the supply chain. And it has created a market for recycled materials by making a commitment to using at least 25 percent recycled material in its consumer packaging and by working closely with its packaging suppliers.

P&G believes that buyers like itself, as well as retailers and private labelers, can drive the trend toward recycling by specifying mass volumes of recycled packaging from suppliers. Its work with plastic bottle suppliers is instructive. The company directly influenced the recycling infrastructure and made the suppliers a visible part of its public awareness campaign. Through this collaboration, P&G proved that plastic recycling can be achieved, not only for low-profile brands, but for large-volume flagship products such as Tide, the top-selling brand of the detergent industry, and Downy, the top-selling brand of fabric softener.

P&G indicates that its use of recycled material is limited only by availability. The company continues to field calls from potential purveyors of used HDPE bottles and refers them to its plastic bottle suppliers.

Infrastructure. An excellent example of an industry-based effort to build environmental infrastructure is the National Polystyrene Recycling Company (NPRC). A joint venture by major U.S. producers, the NPRC is building and investing in polystyrene recycling facilities as a profit-making venture, thus creating an infrastructure for plastics recycling. Although polystyrene packaging comprises only 1 percent of the country's

municipal solid waste in landfills by volume, it has nonetheless attracted much attention from environmentalists.

In response, eight leading manufacturers of polystyrene plastics founded the NPRC in 1989 to create a program of responsible corporate citizenship. Through the NPRC, the industry demonstrated its dedication to making its products environmentally friendly by helping to collect those products after they are used and recycling them into new products.

By early 1991, each of the eight member companies had contributed $4 million to the effort, as well as enormous quantities of travel time, meeting time, and sheer „sweat equity." What made this remarkable achievement possible was a shared vision and a clearly understood goal: to create an infrastructure to recycle 25 percent of the polystyrene produced for food service and packaging by 1995.

Information Technology. Johnson & Johnson is the largest and most comprehensive manufacturer of health care products for consumer, pharmaceutical, and medical products markets. Johnson & Johnson uses computer technology to project the impacts of changes in its packaging materials. It can instantly calculate the impacts – both competitive and environmental – of design and material changes across entire product lines.

The system, called PackTrack, is a part of the company's community environmental development function. PackTrack is a kind of „super spreadsheet" that allows the company to quantify and analyze the impacts of changes in its packaging materials, using the Coalition of Northeastern Governors' Preferred Packaging Guidelines as a model. For example, a user can input certain variables to test the impacts of a source reduction in a packaging material, and the program will generate reports by brands or product lines indicating annual cost savings, waste reduction in pounds per year, ratios of packaging to product materials, competitive comparisons, and other data useful in decision-making.

Policy. Du Pont, one of the world's largest chemicals and plastics producers, has made „corporate environmentalism" a key business strategy and management responsibility. Perhaps the most dramatic example of Du Pont's environmental policy was the decision to discontinue its $750-million-a-year business as the world's largest producer of chlorofluorocarbons (CFCs).

In 1986, Du Pont led industry support of international negotiations that resulted in the Montreal Protocol of 1987, which would reduce CFC production by 20 percent in 1992 and another 30 percent by 1997. The ink was barely dry on these accords when the National Aeronautics and Space Administration's (NASA's) Ozone Trends Panel announced additional scientific findings. At that point, Du Pont's management had seen enough. The company took a leadership role by announcing a complete phaseout of fully halogenated CFCs as soon as possible, but by no later than the turn of the century. From the time it received the NASA data, the company took only 72 hours to chart this completely new course. By the end of 1990, Du Pont had invested $240 million in developing alternatives to CFCs – and it received the EPA's 1990 Stratospheric Protection Award.

The Challenge – and the Opportunity

Despite isolated success stories such as those above, most companies are still struggling with the environmental implications of their packaging choices. We suggest that they take immediate action on two fronts: their own packaging choices and their national/regional waste management infrastructures.

Packaging Choices. In terms of packaging choices, industry's response to the environmental challenge has so far focused on recycling and source reduction. But the complexity of the issues involved demands a more systemic, integrated approach based on comprehensive analysis and long-term vision as well as innovative solutions.

Among the analytical tools now being deployed is life cycle analysis. This is a fairly new technique for exploring the environmental implications of a given product decision – in this case, a packaging choice – from „cradle to grave" (i.e., from raw material acquisition through manufacturing, energy consumption, design, and transportation, to final use and disposal of the package). Life cycle thinking is an important step toward understanding the full environmental implications of packaging choices. (For a detailed discussion, see the article by Karen Blumenfeld, Ralph Earle III, and Jonathan Shopley in this issue of *Prism.)*

Once a company has ascertained the full implications of its packaging alternatives, it can use Total Quality Management (TQM) techniques to make the most effective choices. TQM offers a variety of tools that can readily be applied to ensure that the company's strategies for packaging and waste management make a positive contribution to its competitive position.

National/Regional Infrastructures. Most countries are still very far from achieving integrated, comprehensive national systems of waste management. This lack of infrastructure makes the task of evaluating packaging alternatives highly challenging. What is unrecyclable today may be easily recyclable tomorrow. Degradability – hardly a useful concept in the United States today – may influence packaging dramatically if composting becomes widespread. Packaging must be viewed in a systemic context so that industry can make

packaging choices that will have the gentlest ecological impact, while adhering to sound business principles.

Toward this end, it is useful to have a clear conceptual model for industry's overall environmental objective. The emerging concept of an „industrial ecology" offers such a model. In an industrial ecosystem, as in natural ecological systems, all outputs become inputs somewhere else. One company's waste finds new life as another company's raw material. Ultimately, there is no such thing as „waste," because materials and energy are continually circulated and transformed.

The path toward fulfillment of this long-term vision will be difficult and uncertain. However, industry is well positioned to assume a leadership role in moving countries and regions toward environmental responsibility. Industry has a long history of adapting to consumer tastes and needs. It has the technical expertise, the investment capacity, and the infrastructure to effect meaningful change. And industry is in the business of formulating and implementing strategies in a fast-changing marketplace – before scientists, legislators, or anyone else can.

The challenge for industry is to balance the packaging needs of consumers – for food preservation, product protection, economy, and lifestyle considerations – with the best current thinking on environmental practices. Ultimately, this model is not merely a sound approach to packaging – it is the only sustainable path for future economic success.

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