



CORNELL WASTE MANAGEMENT INSTITUTE

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WASTE PREVENTION: WHAT, WHY AND HOW

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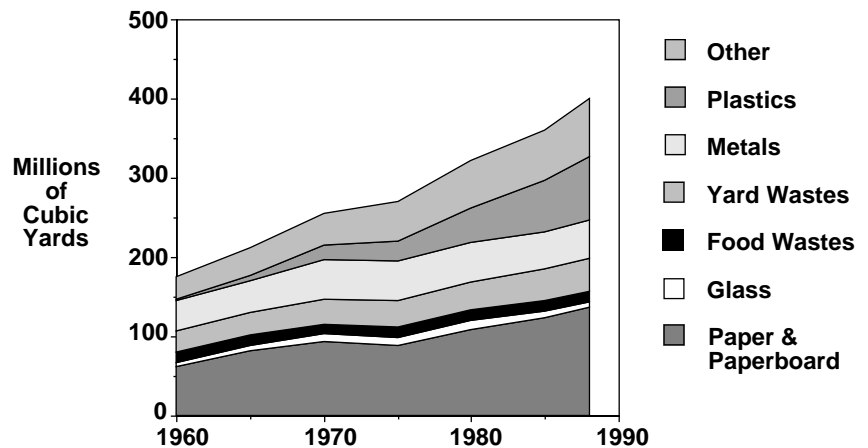
What is Waste Prevention?

While there is some disagreement as to the definition of source reduction or waste prevention (this paper will use the term waste prevention), it makes most sense to define it as *reducing the quantity or toxicity of the solid waste which enters the collection and disposal management system*. Thus wastes remaining "on-site", whether yard wastes composted in residential back yards or industrial scrap recycled at the plant, and refillable bottles replacing single use containers, all represent a reduction in the amount of waste which must be transported and managed at solid waste facilities. Activities that increase the amount of waste residents and businesses deliver to off-site recycling facilities is not included within this definition of waste prevention.

Why Reduce the Amount of Waste?

Minimizing the economic and environmental impacts of processing and disposing of solid waste by reducing the amount and toxicity of waste entering the collection system is the goal. Decreasing solid waste can minimize the high monetary, environmental and political costs of disposing of solid waste.

Figure 1. Volume of Solid Waste In The USA



Data Source: Franklin Associates, 1990

Unfortunately in the United States, the amount of waste generated each year is increasing. We are fighting against a rising tide both due to increasing population and to an increase in per capita trash generation. At the current rate of increase, if we eliminated 10% of our current solid waste, in a little over 6 years we would be back up to today's level of trash. (See Figure 1) Looked at another way, if we do not stem the tide with effective waste prevention, our waste stream will continue to grow.

Waste Prevention Targets

There is no magic technique or technology that will reduce the amount of solid waste. Just as the waste piles up piece by piece, so must prevention "divide and conquer". Obvious targets for waste prevention are components that represent a large fraction of the solid waste stream, those that have

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a short useful life, those for which a less wasteful alternative exists, and those which represent a particular environmental concern in the disposal system.

Some of the wastes which have been targeted include:

•**yard wastes** - estimated at about 20-25% of the municipal solid waste (msw) stream.

•**packaging** - (including goods and foods) estimated at about one third of the msw stream. Fast food packaging is less than 1%, but seems to have symbolic value that makes people particularly focus on it. (note: Contrary to popular belief, due to lightweighting - the substitution of lighter or thinner materials, the weight percentage of msw attributable to packaging is decreasing.)

•**junk mail** - estimated at about 1.5% of msw stream. (note: The quantity of junk mail was estimated to double between 1980-1986.)

•**disposable diapers/disposables in general** - diapers are estimated at about 2% of msw stream and 4% of residential waste stream. About 18 billion are disposed of each year and \$4 billion dollars spent on this product annually. While diapers are a focus, disposables in general are a concern.

•**batteries** - heavy metals including lead, cadmium and mercury make batteries an environmental concern. About 65% of the lead reaching landfills and incinerators is from automotive batteries, despite the fact that a majority of car batteries are recycled. Household batteries contribute over 50% of the cadmium and mercury in the solid waste stream.

•**hazardous wastes** - from households, small businesses and farms

Paths to Achieve Waste Prevention

There are a number of paths that can lead to waste prevention, some of which are more appropriate to federal or state action, others to local government or businesses and individuals. Businesses, citizens and institutions can implement programs to cut their own wastes by taking a close look at their waste stream and implementing actions to reduce the volume and toxicity. Businesses can also affect the municipal waste stream by changing their products and packaging. The techniques that may be used by government to implement these approaches are discussed in the section below.

- increasing the life of a product through:
 - increased durability/longevity
 - increased repairability
 - design for reuse
- decreasing the amount of material used in a product such as lightweighting packaging
- reducing the toxicity of products entering the waste stream:
 - minimizing the toxics in packaging or products
 - making feasible the separation and removal of toxic components prior to disposal
- reducing use and consumption of "wasteful" products by individuals, government, and businesses
- increasing management of wastes on-site such as backyard composting

Simply increasing the biodegradability of wastes does not contribute to waste prevention unless those wastes become part of an on-site composting program.

Techniques for Waste Prevention

There are three basic techniques which can be used to implement the approaches to waste prevention mentioned above. Governments should evaluate the potential usefulness of each of these techniques.

1. *Financial incentives and disincentives* including:
 - taxes (eg. a tax on packaging)
 - tax credits
 - deposits on reusable products and "hard to handle" wastes
 - volume based disposal fees (pay by the bag)
2. *Regulations and restrictions or bans*
 - banning certain products, uses of a product or constituents in a product
 - banning certain items from the collection/disposal system
 - labeling requirements
 - product design requirements
 - govt. procurement requirements (eg. purchase preferences)
 - planning requirements
3. *Education and facilitation*
 - public information
 - labeling/environmental shopping campaigns
 - youth education
 - technical assistance for individuals and business
 - waste exchange programs

include items like paints, solvents, cleaning agents, and pesticides some of which may legally end up in municipal disposal systems.

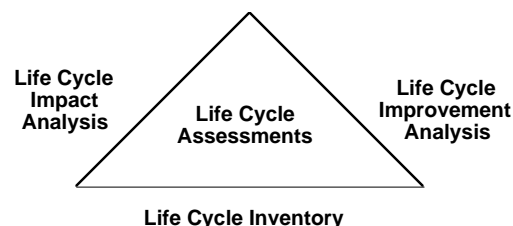
•**consumer electronics** - also called "brown waste" should be receiving attention since they are a very significant source of heavy metals including lead, mercury and cadmium.

Life Cycle Assessments (LCAs) are detailed analyses that consider the energy and raw materials used and the releases to air, water and land associated with a product or process. Recently, studies comparing products such as disposable versus cloth diapers or paper versus plastic bags have been commissioned by industry representatives and received media attention. Ideally such analyses would enable users to make sound choices. A true LCA must include an *inventory of releases* and an *assessment of the relative impacts of those releases*.

All of the studies to date have only been inventories and even for inventories, results are highly dependent on the assumptions that are made. Most of the existing studies have been done to promote a particular product type and make unwarranted conclusions such as "product x causes 7 times more water pollution than product y". Because different pollutants have vastly different impacts on the environment (some are highly toxic and others are not, for example), the summing of total pounds of pollutants released to water is very misleading about the environmental impact.

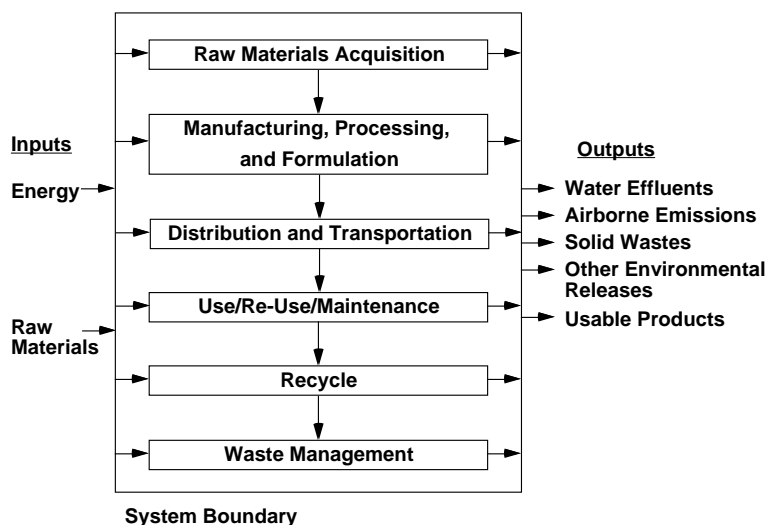
Perhaps the best use of LCAs is to identify the steps and processes in the manufacture, distribution and use of a product which have the most severe environmental impacts, and should thus be the targets for improvements to reduce those impacts. (See Figures 2 and 3)

Figure 2. Components of A Life Cycle Assessment



Source of Figures 2 and 3: A Technical Framework for Life Cycle Assessment, © 1991, The Society of Environmental Toxicology and Chemistry (SETAC); by permission.

Figure 3. Life Cycle Inventory



Issues and Concerns

In developing a waste prevention program, there are issues which should be addressed. *Measurement of success* is one issue since with limited available funds, programs need to document their success and measuring waste that was prevented is a difficult problem.

The *likely "side effects"* of any program need to be assessed. These may be *administrative or environmental*. Will there be additional administrative demands such as enforcement? Will enacting volume based disposal fees lead to increased illegal dumping? If so, how will that be dealt with? Will new enforcement or educational efforts require additional staff? How much will it cost and who will do it?

Assessing the total *environmental implications* of our programs and products is highly complex, requiring a cradle-to-grave life cycle analysis of energy and raw materials usage and environmental releases. Even if we narrow our focus and look only at the solid waste impacts of our actions, we must evaluate the implications. For example, banning non-degradable fast food packaging is likely to lead to an increase in the use of paperboard packages.

Does this substitution improve the situation or does it add weight and volume to the waste stream? Does a proposed change decrease the chance for recycling?

Economic implications are also crucial and require analysis. How does the program change who pays? Is the change equitable? Volume based disposal fees, for example, would fall on everyone approximately equally (there is not a large difference in the amount of waste generated by different income groups). Subsidies for poor people may be called for. In addition, there are tax implications in shifting from waste fees imbedded in local taxes to volume based user fees since the new fees would not be deductible from an individual's federal or state income taxes.

Waste Prevention Programs

Reducing the amount of solid waste we produce is not likely to be the result of any one action, but will depend on a range of actions taken by government, business and citizens. The companion "Viewpoint" to this Fact Sheet describes some of the programs which have been implemented or are under consideration. In addition, a bibliography and examples of some innovative programs are available from the Cornell Waste Management Institute.

The Cornell Waste Management Institute (CWMI) and the New York State Solid Waste Combustion Institute are located at Cornell University. CWMI is a program of the Cornell Center for the Environment dedicated to serving the public through research, outreach, training, and technical assistance programs in solid waste disposal, management and planning. A key objective is to assist communities in developing integrated solutions to solid waste, through consideration of waste reduction, recycling, composting, incineration, and landfilling in an environmentally safe, economically sound and energy efficient manner.

FACT SHEET is a series of information pieces on selected topics in the field of municipal solid waste. Each FACT SHEET is accompanied by a VIEWPOINT on a related topic. We encourage you to use the information in the FACT SHEET series for community education, and to stimulate thinking and debate among citizens, environmental groups and policy makers.

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