SECTION II - SOURCE REDUCTION OF SOLID WASTE PRODUCTS

CHAPTER A: PRESENT PROGRAMS OF SOURCE REDUCTION OF SOLID WASTE

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Source reduction, often confused with recycling, means the elimination or reduction of the material going into the solid waste stream. Although source reduction has been shown to be successful, it is being practiced in only a few places within the U.S. Source reduction can most productively be applied to packaging, as well as durable and non-durable individual goods. These represent 35%, 11%, and 18% of the municipal waste, respectively.

Legislation has had a significant effect in Oregon, where its bottle bill, with little economic impact, reduces solid waste by 7-10% and saves millions of pounds of aluminum, steel and glass per year. Minnesota has taken another approach, creating its Packaging Control Agency, which reviews the design of packages. Its right to review has been upheld by the courts.

Packaging's contribution to solid waste has been reduced by the private sector when the consumer isn't involved. Intra-industry packaging (cardboard boxes, etc.) has been designed to use the least amount of material in the most efficient form. Products for individual consumers generally are enclosed in packages that are expected to sell themselves through attractiveness and variety in shape, color and size. Manufacturers therefore have tended to resist legislation which could reduce the freedom to choose types and styles of packages. On the other hand, when different brands of beer were sold in the same type of bottle in Oregon the quantity of those sold didn't change significantly. Several source reduction programs attempted have failed due to lack of public acceptance.

Both durable and non-durable goods can be improved in many ways to reduce their proportion in the solid waste stream. These improvements have been applied in a few cases, but generally much more yet remains to be done in the durable and non-durable goods area of source reduction.

This section will present methods already in existence for reducing solid waste at its source. It takes the solid waste problem one step farther than recycling. The question is not what do we do with the garbage, but how do we keep it from being formed in the first place and still provide services that people need.

When municipal (i.e., residential and commercial) solid waste is broken down by weight (1976), it consists of 35% packaging materials, 29% individual products (cars, radios, books and newspapers), and 36% food, yard and miscellaneous waste (Smith, 1978). Based on proportional contributions, the targets of any attempts at source reduction should be first packaging, then individual products.

This section will cover legislation related to reduction of solid waste and what the private sector has done in the packaging industry and in individual products, touching on economics throughout.

Legislation is a powerful tool in waste reduction, although it is sometimes bitterly opposed by various parts of the private sector (Pagan, 1978). One of the first aspects of solid waste problems

that became apparent to the general public was litter. Everyone who has lived through the late 1960's has seen "Keep America Beautiful" campaigns. Beverage containers were easily the most identifiable objects in roadside litter. For this reason, legislation controlling the use of beverage containers appeared first. This legislation was initially aimed at reducing litter and not at elimination of solid waste. On the West Coast at that time, land fill was still the generally accepted answer to the solid waste problem.

One of the first pieces of legislation to limit sources of litter was Oregon's bottle bill of 1972, which requires a two cent deposit on beverage containers used by two or more beverage manufacturers, and a five cent deposit on all others. Upon return, the deposit must be refunded by any seller of that container. Metal containers with detachable parts are banned within the state. Establishment of cooperative redemption centers is encouraged.

Two and one half years after the bill went into effect, 90% of the beer containers sold were being returned and 92% of the soft drink containers were returned. In 1975 96% of all containers were returned (Oregon Department of Environmental Quality, 1977). In Oregon, therefore, beverage containers that once went to land fill and litter are now returned. As a result, household garbage diminished 7-10% (Oregon Department of Environmental Quality, 1977). Road litter has been reduced by 92%. 89% of beverage cans formerly used in Oregon have been eliminated. If 436 million cans per year were consumed, then close to 400 million fewer cans are used annually since the bill was implemented. Another way of looking at it is that if 60% of the cans were aluminum and 40% bi-metal, then 5.8 million kilos (12.7 million pounds) of aluminum and 11 million kilos (25 million pounds) of steel were saved. In not producing so many containers, 3.5×10^{11} cal. (1.4 trillion BTUs) of energy have been saved; which is enough energy to heat 50,000 Oregon homes for a year (Oregon Department of Environmental Quality, 1977).

The economic impact of the bill was generally favorable, although it did adversely affect the beverage industry for the first several years.

In 1973,		
bottle manufacturers	lost	$ 269,000
can "	"	350,272
malt brewers	"	5,328,383
distributers	"	589,000
soft drink bottlers	"	2,764,675
retailers	gained	2,945,825

(Gudge and Bailes, 1974)

After the passage of the bill the average price of beer in Oregon rose from $1.22/six-pack to $1.24/six-pack, but the average price in Washington was still higher at $1.32/six-pack, so the Oregon price

rise wasn't exorbitant. Soft drinks also increased in price during the same period, but they stayed comparable to those of neighboring states (Gudge and Bailes, 1974). In 1974, after the beverage economy leveled out, bottlers saved 10.5 million dollars in container costs while paying out an extra 4.6 million dollars in increased costs of filling and shipping. The resultant net increase in revenue amounted to 5.9 million dollars for the industry as a whole (Gudge and Bailes, 1974).

As a result of the Oregon bill the employment situation improved as well. Production laborers lost 350 jobs, truck drivers gained 140 jobs and warehouse handling gained 575. This amounts to a net increase in permanent employment of 365 people (not including temporary employment to construct new bottling facilities (Gudge and Bailes, 1974). The reduction in numbers of cans and bottles saved $656,832 per year in land fill costs and $366,000 per year in litter clean-up costs (Gudge and Bailes, 1974).

Needless to say, Oregon's bottle bill can be considered a success. The consumption of beer and soft drinks, after an initial decline, has risen at the same rate as before (Oregon Department of Environmental Quality, 1977). In 1975, 90% of the people were happy with the legislation (Oregon Department of Environmental Quality, 1977). Since there are now as many brands of beer and soft drinks as before the bill, the beverage industry appears to have survived its implementation without serious damage (Gudge and Bailes, 1974).

A bill passed in Vermont has met with similar success. It requires a five cent deposit on beverage containers and a 4 mill tax on non-biodegradable containers. Beer and soft drink producers are required to pay 20% of handling costs incurred by retailers. As in Oregon, this bill has also banned detachable container tops. Litter has been reduced an estimated 67% and beer consumption has remained steady. There is much less data on the Vermont experiment, but it appears that the bill will be almost as successful as Oregon's (U.S. Environmental Protection Agency, 1977).

On a smaller scale the National Park Service has required a five cent deposit on all cans and bottles sold in the Yosemite National Park. All cans are stamped. No can without a stamp is accepted for refund. Park retailers have found no significant change in the sale volume. On the other hand, the number of beverage cans in the park waste stream has diminished drastically (EPA, 1977).

According to one estimate, beverage containers represent 10% of the national solid waste stream (Smith, F.A., 1976). Container legislation of these kinds combined with recycling appear to be easily capable of removing 90% of this fraction from the national solid waste stream.

In May of 1973 Minnesota passed a more comprehensive law which deals with a wider range of consumer product packaging. This law is aimed at reducing the amount and types of materials entering the solid waste stream. It encourages reduction and recycling. It has established the Minnesota Packaging Control Agency, which reviews new packages with respect to their contribution to the solid waste problem. Anyone can submit a package for review. The process involved in reviewing a package is slow. The Agency staff has 120 days to approve or ban a package. If the package is banned, a public hearing must be held and the ban must be reaffirmed by a majority vote of the state legislature. A large number of new packages

on the market in Minnesota, combined with the lengthy nature of this process has limited real action to only the worst offenders. Additionally, in May of 1975 the packaging industry filed suit claiming that the regulations were too vague. After a year and a half in court the package law was upheld. This legislation is promising, as it deals with the heart of the packaging problem, but its effectiveness has so far been severely limited (U.S. Environmental Protection Agency, 1977).

In California there is presently little specific legislation related to source reduction of containers and packaging, although there are some bills that allocate funds for research. One law is the Nejedly-Z'berg-Dilles Solid Waste Management and Resources Recovery Act of 1972 that, among other things, has had the solid waste management board investigate changes in product characteristics, as well as production and packaging practices that reduce solid waste at the source.

Another law passed was the Resources and Energy Recovery Act of 1976 (SB 650) that identifies markets and economic barriers for recovered materials and charges assessments to manufacturers of wasteful products.

The United States Congress has enacted three laws related to source reduction. One is the Resource Conservation and Recovery Act (PL 94,580, 1976), which calls for the reduction of amounts of solid waste generated and reduction of resource consumption. It allows for state and local financial assistance for solid waste programs. A second federal law is the Energy Policy and Conservation Act (PL 94,580), which requires significant reductions in weight of cars. The principal purpose of this law, however, is to conserve fossil fuels, not to reduce the quantity of solid waste entering land fill sites. The third law is the U.S. Resource Recovery Act of 1970, which includes a clause imposing certain disposal charges on packaging, vehicles and other manufacturing goods.

Most of the legislation described above is related to packaging. Packaging or containers represent 35% of the solid waste stream. This fraction is broken down by weight as follows:

49% paper
25% glass
13.2% metals (12% ferrous, 1% aluminum, .2% other)
6% plastics
4% wood
2.8% other

(Smith, 1976)

When considered by volume, paper and plastics comprise larger percentages of the total. Plastics deserve careful attention, since they are the fastest growing segment. In addition, they are generally non-biodegradable and are hard to reuse and recycle. 18% of paper is recycled and other materials are only occasionally recycled or reused (Smith, 1976).

We spend a lot of time and money dealing with packaging which is subsequently thrown away. In 1966 the U.S. spent 25 billion dollars or 3.4% of its Gross National Product (GNP) on packaging and

419 million to dispose of it. Since 1966 in the U.S. the total weight of packaging has increased proportionally faster than the GNP (Darnay and Frankling, 1969). An average 24% of what a consumer pays for a product pays for the package. This may climb to an average of 63% for high convenience items (individually packaged oatmeal, mini salt shakers).*

Packaging, of course, does provide some necessary services; the container holds the merchandise, dividing it into useful portions, it communicates a message and sometimes dispenses it. The question is, how can these services be provided using either the smallest amount of material or no packaging at all?

In general there are two types of packaging, one for unitizing and advertising, the other for protecting items during shipment. The packaging related to shipping has been modified by the private sector as well as is possible to use the lightest and most efficient forms. This is done because this packaging doesn't have to impress a consumer. It has a strictly utilitarian purpose. These packages are usually in the form of cardboard boxes (although plastic, with its disposability problems, is growing in popularity). Many of the boxes used for intra-industry shipping are reused and cardboard that isn't reused is recycled. For example, Bell and Howell's 1969 criteria for packages were as follows: "Make sure incoming supplier has not overpacked. Can we eliminate packaging and can the package perform multiple uses." Bell and Howell uses some packages four times in shipping of goods during production (California Bureau of Solid Waste Management, 1969, p. 110).

The packaging reaching the consumer is different from that used in shipping. Most companies rely on fancy packages to sell their product. The consumer judges the package not on its contribution to solid waste, but on its convenience, the information it gives and its appearance or attractiveness. Packaging that has poor advertising may not be seen at all (Darnay and Franklin, 1969). Therefore manufacturers generally resist legislation reducing the variety of types and sizes of containers (pagan, 1978). As mentioned earlier, Oregon's bottle bill has a clause where deposits would be reduced to 2¢ per bottle if they were used by more than one brewery. As a result, the beer industry in Oregon has largely converted to the well known stubby brown beer bottle because of the savings in container costs. Insofar as various brands of beer can be said to look and taste alike, the variety in bottle design could be expected to be an important factor in beer sales. Three years after Oregon's bill was introduced, most breweries were found to have maintained their proportion of the market and the overall rate of sales was stable. This suggests that packaging variety had little effect on which brand was successful (Gudge and Bailes, 1974).

Another problem in reducing solid waste from packaging is consumer acceptance of change. For example, shopping bags used to be doubled, one inside the other, so heavy items could be carried. This was a direct cost borne by merchants, so a new double-strength bag was developed. These use only 2% more material than the single-strength bag (Darnay and Franklin, 1969) This development showed promise, except that grocery shoppers frequently insist on doubling even these double-strength bags. A composite bag (plastic-paper)

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* Prices were taken from various package sizes. The cost of the largest size per unit product was compared to the smallest size and the percent calculated.

was developed that used even less material, but its stretchy nature gave people an insecure feeling. This attempt at source reduction failed because of lack of public acceptance.

One of the successes in packaging is the aluminum can, although not an ideal answer. It is easy to recycle and uses a minimum amount of aluminum. Steel cans have been developed along the same lines in recent years using thinner and thinner walls and using better welding techniques or no welding at all. (EPA, 1977).

When taken together, durable individual goods (appliances, tires, cars, etc.) and non-durable individual goods (newspaper, books, clothing, etc.) account for 29% of the solid waste stream. These comprise the remaining targets for source reduction of solid waste. Durable goods, although comprising less than half of the contribution of these last two (11% of total solid waste) includes some of the most troublesome and bulky items to handle in land fill operations. For this reason, efforts to reduce the durable goods contribution to the solid waste stream would be worthwhile.

There are several ways to reduce the quantity of solid waste due to disposal of durable and non-durable individual goods. One of these is to introduce a new product that has the same function as its predecessor, but which does that function using fewer materials. A second way to reduce is to make products last longer. A third is to use modular design, wherein if a small part breaks, it can be easily replaced without throwing away the entire appliance. These methods have been used to some degree voluntarily by the private sector. Such methods include development of long-lasting solid state electronic devices, which replace those using vacuum tubes, converting to half-size computer cards, using less vinyl than previously in phonograph records, switching to long lived steel belted radial tires, and developing a modular steam iron and other appliances. Some reduction in the durable goods contribution to solid waste has been initiated by the government by requiring lighter cars. However, only limited progress has been made to the present in reducing solid waste from durable and non-durable goods. Some possibilities will be suggested in the next chapter.

BIBLIOGRAPHY

1. California Bureau of Solid Wastes Management, Sept. 22-24, 1969, Proceedings of the First National Conference on Packaging Wastes: San Francisco, 242pp.

2. Central Contra Costa Sanitary District, 1974, Citizens Advisory Committee on Solid Waste Recycling Final Report and Recommendations.

3. Darnay, Arsen and Franklin, William E., 1969, The Rose of Packaging in Solid Waste Management 1966/1976.

4. Gudge, Charles M. and Bailes, Jack C., March 1974, Economic Impact of Oregon's Bottle Bill, Oregon State University Press.

5. Lowry, Edwin F. et al, Jan. 1975, Disposing of Non-returnables Guide to Minimum Deposit Legislation: California, Stanford Press.

6. Oregon Department of Environmental Quality, 1977, Oregon's Bottle Bill - The 1977 Report.

7. Pagan, Marge, April 11, 1978, Glass Bottle Blowers Association of the U.S. and Canada (AFL-CIO) letter to ABAG: Oakland, Local Union No. 141.

8. Sachsel, George F., May 12-13, 1971, Proceedings of the Solid Waste Resources Conference on Design of Consumer Containers for Re-use or Disposal: Columbus, Ohio, EPA Printing Office, 330pp.

9. Smith, Frank Austin, April 1976, Quantity and Composition of Post Consumer Solid Waste: Material Flow Estimates for 1973 and Baseline Future Projections: Waste Age.

10. U.S. EPA, 1975, Resource Recovery and Waste Reduction; Third Report to Congress: Washington, D.C., U.S. Government Printing Office, 96pp.

11. U.S. EPA, 1977, Resource Recovery and Waste Reduction, Fourth Report to Congress: Washington, D.C., U.S. Government Printing Office.

12. Waggoner, Don, 1974, Oregon's Bottle Bill: Columbia Group Press.

13. Wahl, D. and Allison, G., 1975, Reduce; Targets Means and Impacts of Source Reduction: Washington, D.C., League of Women Voters Publication, 47pp.