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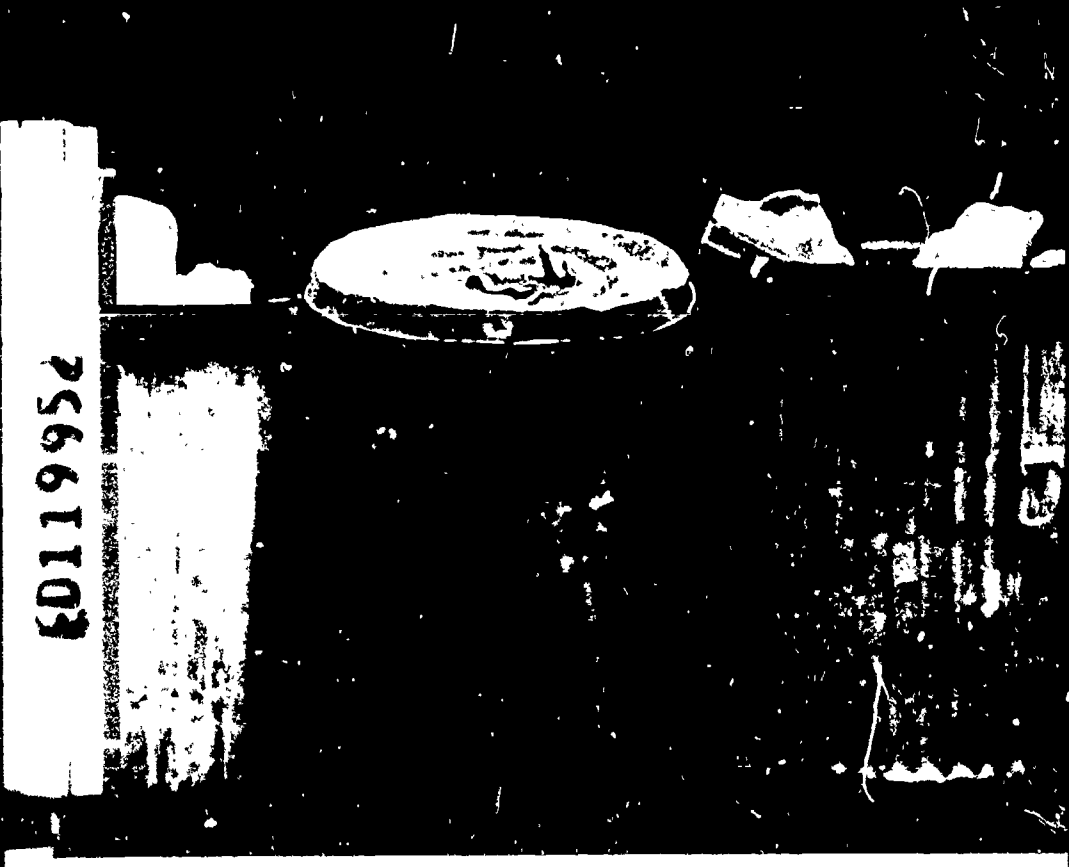
ABSTRACT

This booklet contains information for citizens on solid wastes. It discusses the possible energy available in combustible and noncombustible trash. It suggests how citizens can reduce waste at home through discriminating buying practices and through recycling and reuse of resources. Recommendations are given for community action along with state and federal responsibilities in resource use. The appendices also include a checklist for the home and community and a glossary of solid waste terms. (MR)

ENERGY IN SOLID WASTE



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INTRODUCTION

Although the current energy crisis is causing hardship for some and inconvenience for many, it is also the source of an unprecedented opportunity—an opportunity which, if we are wise enough to seize it, could be of lasting benefit to all Americans Through its impact on our daily lives, the shortage of energy is dramatic evidence that our physical resources are not unlimited. It should convince us that we can no longer afford or tolerate the prodigal waste or the "throw-away" philosophy that has increasingly pervaded our living patterns during the three decades since World War II.

Let us not for a moment think that only our energy supplies are limited. The resources of the earth are all finite. Yet, we waste prodigious amounts of food, fiber, and minerals with little regard for the future "crises" that could come upon us as quickly as the energy crisis.

We must move toward a conservation ethic in every facet of our society and our economy This will require reconsideration and restructuring of many traditional values There is no better place to begin than literally at our doorstep—through the recovery, recycling, and reuse of the valuable resources we now discard as "solid waste."

In 1971 we conducted a special study of this subject and, in our 1972 ANNUAL REPORT TO THE PRESIDENT AND TO THE COUNCIL ON ENVIRONMENTAL QUALITY, made recommendations for more effective administrative and Congressional actions to improve resource recovery, recycling, and reuse of our solid waste Solid waste is still running a poor third to our national commitments for solving air and water quality problems. Less than 2 percent of the Environmental Protection Agency's budget is devoted to solid waste, and only at the local government level is it given the attention it must have.

Yet, solid waste, as with our energy situation a year ago, is a "crisis around the corner " Our garbage and trash are piling up faster than we can find satisfactory places to put them. The National League of Cities reports that almost half of our cities will run out of current disposal capacity in from one to five years Even where capacity still exists, open dumping continues to be the dominant method of disposal. This situation poses severe sanitary and environmental problems.

Equally disturbing is the fact that this garbage and trash represent a tremendous waste of energy and other scarce resources that we no longer can afford to squander Even though our recent oil and gasoline shortages have been eased — at least temporarily — we cannot afford to relax conservation practices Our limited supplies of nonrenewable resources are still being depleted rapidly In addition to oil, we already are heavily dependent on imports for newsprint, aluminum, and tin — all items that now get thrown away. Moreover, the energy in our solid waste is and will continue to be a resource we no longer should bury, burn wastefully, dump in the ocean, or broadcast as litter across our landscape.

In attacking this problem, citizen action can make a substantial contribu-

tion. Individually and collectively, citizens can reduce the amount of waste at home, at work, and at play. They also can do much to facilitate the recovery, recycling, and reuse of the resources now being wasted. Furthermore, they can insist on appropriate government attention and action in setting examples for others to follow.

This report is designed to stimulate and guide these efforts. It is in the Committee s tradition of encouraging citizen action and helping to make it more effective by providing basic informational tools. It does not attempt to cover all the issues of solid waste management. Rather, it puts primary emphasis on citizen practices that can be initiated readily and rapidly in and around the household to reduce solid waste and to conserve the energy involved. In addition, it urges basic and long-range changes in wasteful life-style patterns that now prevail. Recognizing that citizen action alone cannot resolve all of the solid waste problems, it also points out the need for a broad-gauge national solid waste policy and commitment to it by all levels of government and the private sector.

There is great potential for a multiplier effect here. By reducing unnecessary consumption and by increasing our resource recovery, recycling, and reuse, we can help bring our energy supply and demand into better balance; we can conserve our diminishing natural resources, we can reduce land use requirements for waste disposal, and we can minimize other adverse impacts on the quality of the environment that we all must live with henceforth — a huge environmental payoff for a modest investment.

Henry L. Diamond
Chairman

CHAPTER I: A NATIONAL OVERVIEW

Somewhere along the line, too many Americans lost the pioneer ethic of "waste not, want not." Today, largely because we have forsaken frugality for a carefree abandon born of affluence, the abundance of materials—and of their packaging—is taken for granted, discarded casually, and forgotten as soon as the garbage and trash are removed from the doorstep.

The amount of this waste is enormous. According to the most recent studies by the Environmental Protection Agency (EPA), the total municipal waste collection for 1971 was 125 million tons per year or 3.2 pounds per person per day. These figures include wastes generated in the household, commercial establishments, and institutions like schools and hospitals. Although it excludes industrial, agricultural, animal, and mineral wastes, the total amount that ends up in the "National Trash Can" is tremendous (see Figure 1).

Not only is the total volume staggering, but it also represents an inexcusable waste of money and energy. The costs of the nation's collection and disposal of residential and commercial wastes are rising dramatically, and EPA estimates that—unless current practices are modified—these costs will soar upward from $2.6 billion in 1971 to $3.7 billion in 1980 and $4.4 billion by 1985.

The waste of energy represented by solid waste is equally depressing. For instance, let's look at the National Trash Can. Significantly, 80 percent of these materials (99.1 million tons) are combustible, have low sulphur content, and could be burned as fuel without significant odor or smoke. In fact, according to the latest available information developed by EPA, the approximate heat value of this portion is 5,500 Btu's per pound. Nationally, the 99 million tons of combustibles theoretically represent about one quadrillion Btu's of energy—equivalent to 8 billion gallons of gasoline, 7.3 billion gallons of No. 2 fuel oil, or 178 million barrels of crude oil. If the current estimates of our recent domestic petroleum shortfall (about 730 million barrels per year) are valid, an equivalent of about 24 percent of that shortfall amount is now being buried or wastefully burned.

The foregoing comparisons, of course, are hypothetical, and it is unrealistic to assume that *all* of our combustible residential and commercial waste could be burned as fuel. Nor should it, necessarily. Much of our waste paper, for instance, can and should be recycled rather than burned.

Paper—Burning Versus Recycling

According to the EPA SECOND REPORT TO CONGRESS ON RESOURCE RECOVERY AND SOURCE REDUCTION in March, 1974, about 70 percent of paper in municipal solid waste is mixed and/or contaminated and is thus difficult to separate out. The other 30 percent of the waste paper, though, consists of writing stock, data cards, corregated cardboard, and newspapers. These are relatively easy to sort out, and there are good reasons to do so.

Paper is the most important communications medium, the most widely used packaging material, and an important component of construction and industrial products. Its use in our modern society has increased so dramatically that paper (particularly newsprint) is in short supply. Because of strikes at Canadian newsprint mills, imports have not been readily available to satisfy demands. Ironically, even though the demand for recycled paper exceeds supply, the percentage of paper being recycled decreased between 1950 and the early 1970's.

These alone are sufficiently valid reasons for recycling paper rather than burning it as fuel. But there are other reasons also. From an environmental conservation point of view, there is a widely cited statistic that each ton of recycled paper saves 17 trees. If two-thirds of the trash paper could be separated out and recycled, 430 million trees would be saved each year

From an energy conservation point of view, the Midwest Research Institute reports that recycling of paper requires less than one-third of the fossil fuel energy needed to make paper from primary resources. If, as EPA's Second Report to Congress indicates, it is technically possible to recover half of the 70 percent of the mixed waste paper, the recycling of this portion (13 7 million tons) plus the 11.7 million tons of the easily separable items could mean a fossil fuel energy savings equivalent to 2.4 billion gallons of gasoline per year This exceeds the fuel energy equivalent of 2.2 billion gallons of gasoline that could be produced annually by burning the same amount of trash paper mixed in with other combustibles but from which the noncombustibles have been separated out. Thus, the recycling of paper — as opposed to burning — would produce a net energy benefit of about 200 million gallons of gasoline, enough to drive 270,000 cars 10,000 miles a year at a rate of 13.3 miles per gallon.

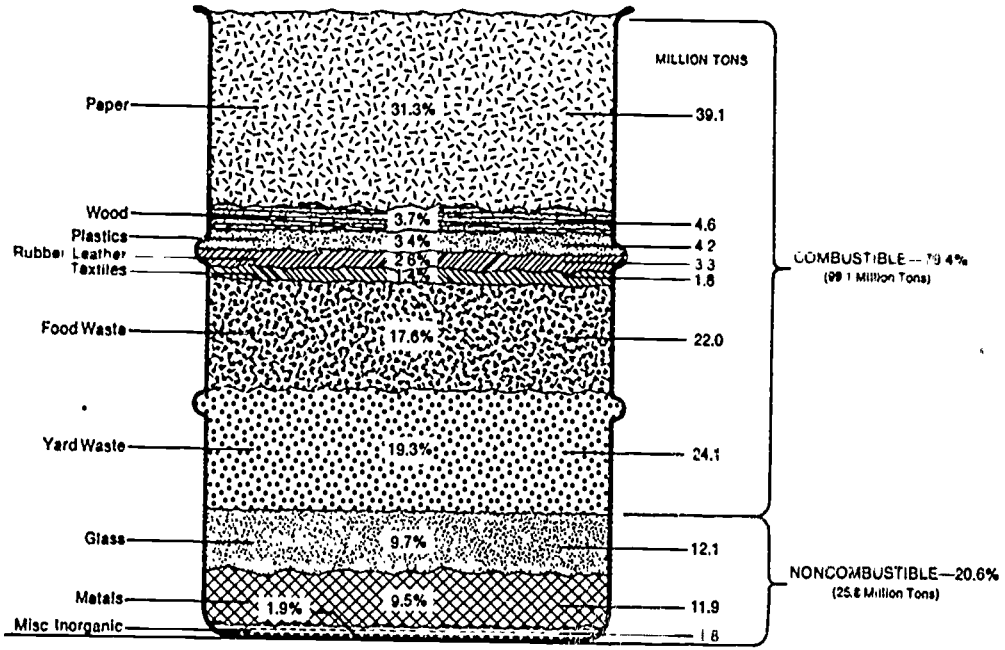
Plastics Need More Study

Waste plastics pose a paradox similar to that of waste paper Like paper, waste plastics can be burned to produce heat energy; but, as with paper, the recycling of these materials can conserve valuable natural resources. There is, however, a major impediment to the recycling of plastics — once mixed in the municipal waste stream, the technology of separating, purifying, and upgrading the multitude of plastic varieties simply does not exist. Thus, because its heat value (11,000 Btu s per pound) is the highest of any component in the National Trash Can, the present consensus is to burn this plastic component as fuel But, again as with paper, there are good reasons not to do so.

Plastics are made from a scarce natural resource - petroleum Unlike the paper source, which is renewable, petroleum is not. Once gone, it is gone forever. Although the production of plastics now consumes only 1 5 percent of the petroleum used in this country, this production is increasing at the impressive rate of more than 10 percent per year. At this rate, present production, which uses a gasoline equivalent of 4 billion gallons per year, would increase to an equivalent of 8 billion gallons by 1980. To continue to rationalize the burning of waste plastics as fuel instead of recycling them is to foster rather than forestall the depletion of the world's currently most critical natural resource

National Trash Can

(Annual Municipal Solid Waste—1971)



Source—Environmental Protection Agency. Second Report to Congress, Resource Recovery and Source Reduction, 1974.

FIGURE 1

Based on present knowledge, it is extremely difficult to determine how much of this petroleum consumption could be reduced by recycling instead of burning. Since feasible technology apparently does not exist to recover plastics mixed in the waste stream, an alternative is to segregate waste plastics at the household level for separate collection. Here too, though, there are problems. Because of the low-density factor of most discarded plastic items, collection trucks have to make more trips to obtain a favorable tonnage payoff. For this reason and because of the lack of recycle markets for mixed plastics, most recycle centers do not handle discarded plastic materials.

The latter point, however, may not necessarily be decisive. In New York City, where the Environmental Action Coalition operates 40 recycling centers, a manufacturer of plastic "slip sheets" offered to buy *all* of the mixed plastics

that the coalition could recover. His plan was to select out the suitable plastics and discard the remainder. To make the operation viable, he needed at least 100,000 pounds of mixed plastics per month, and the coalition recycle centers could collect only about 10 percent of that amount. Because he was unable to find any other economically suitable source of scrap plastic, the operation failed. In this case, the potential market apparently was there, but because the recycle centers previously had refused discarded plastics, these centers were unsuccessful in instituting the new procedure on a sufficient scale. This example indicates that more research is needed to find and develop similar markets. Once these are available, home separation of waste plastics and their collection could become economically feasible as well as desirable for conservation purposes.

Certainly, the potential conservation benefits warrant additional research into ways to recycle rather than burn these petroleum derivatives. For example, if at least 25 percent of the 4.2 million tons of plastics in the National Trash Can were separated out at the household level and collected separately for recycling, the petroleum used in plastic production could be reduced by about 9 million barrels, or a gasoline equivalent of about 400 million gallons per year. If the impediments to such recycling are basically economic, the value of the diminishing critical resource may even warrant public subsidy of the recycling process.

Energy in Our Noncombustible Trash

The energy that could be saved by recycling some of the nonburnable trash components is equally impressive. According to the National Commission on Materials Policy, recycled aluminum requires less than 3 percent of the energy needed to produce aluminum from bauxite ore. Recycled steel requires less than half of the energy needed to produce steel from virgin ore. When it is assumed that about 70 percent of the aluminum and 90 percent of the steel in the 1971 National Trash Can could be recovered, these factors translate to a potential recycling energy equivalent saving of 226.5 trillion Btu's or 1.8 billion gallons of gasoline — enough to make nearly 7 million one-way car trips per year from New York to San Francisco on a basis of 13.3 miles per gallon.

The Case for Glass

In terms of energy conservation, the case for the recycling of glass is less favorable. This is mainly because more energy is often required to sort out the glass from mixed trash in many scattered locations than to extract raw materials from a single location. According to EPA's first report to Congress, (dated February 22, 1973), the energy needed to produce recycled glass versus the manufacture from glass sand varies from 3 percent more energy needed for recycling to 6 percent less, depending on the recovery system for obtaining the cullet (reclaimed glass). Based on more recent figures, EPA now estimates a glass recycle savings of about 2.5 million Btu's per ton when at least 50 percent cullet is used in making new glass. Annually, this amounts to about 21 trillion Btu's — an energy equivalent of about 170 million gallons of gasoline.

Although the net energy result is considerably less than for steel or aluminum, recycled glass still has considerable value as a needed component in glass manufacture, and it can be used in road paving, construction bricks, and building panels.

Recycling alone, however, is only a part of the energy potential of reusing glass The big energy potential of glass is its reusability in the form of a returnable bottle vis-a-vis the disposable beverage containers now so prevalent and causing so much of the solid waste disposal and litter problem. In 1972, 54 billion throwaway containers were used in the United States. On an average, each of these consumes 4,198 more Btu's of energy than does each usage of a 10-trip returnable glass container. Nationally, if glass returnable bottles were used instead of throwaways, the energy saving would be about 225 trillion Btu's or an equivalent of 1 8 billion gallons of gasoline. This would be enough to supply nearly 2½ million cars for a year.

The Energy in Our Litter

Not all of our urban waste ends up in the trash can. Entirely too much of it is strewn as litter along our highways, in picnic areas, and elsewhere across the landscape The initial problem lies with the careless consumer who tosses an empty can or candy wrapper out the car window. It is aggravated by a production system that stimulates exorbitant waste by excessive packaging, by policies of rapid obsolescence of products, and by methods that result in goods that cost less to replace than to repair, retain, or recycle. In any event, the results are monstrous From infor nation compiled under the auspices of Keep America Beautiful, it can be estimated that our wayside waste amounts to as much as 4 million tons per year. Thirty-five percent of this consists of disposable bottles and cans; 50 percent is paper-based, and 15 percent is plastics, rubber, and other combustibles. The most obvious result is an environmental eyesore which costs us, the public, as least $200 million a year to collect and dispose of—an unfortunate but necessary diversion of manpower, money, and energy.

Here again, the energy component of this landscape litter is significant. The energy factors related to disposable beverage containers and paper products have already been discussed. Automobile tires, which are particularly combustible, are worthy of special mention. Approximately 200 million tires—almost a tire per person—are discarded each year. Although all of these are not discarded along the roadside, tires do represent at least 3 percent of the items scattered there as litter. As such, they are particularly obnoxious because they do not deteriorate and their bulky unsightliness is a lasting eyesore Even when collected, they are a disposal problem because they do not settle easily into landfills, and they produce acrid black smoke when burned in the open air If burned as fuel under the proper conditions, each tire has a 260,000 Btu value, equivalent to about 2 gallons of gasoline.

The Total Energy Potential

In the foregoing we have indicated examples of energy factors in both the National Trash Can and the litter strewn across our countryside. Individually,

these statistics are impressive. The cumulative totals, as shown in Figure 2, are even more so.

In addition to the 1,397 trillion Btu's of potential energy in the National Trash Can and wayside litter, 225 trillion Btu's of energy could be saved by using returnable, reusable bottles instead of throwaway cans and bottles. This latter energy factor, though, is not completely additive. If throwaway beverage containers were eliminated, the potential recycle energy factor of steel must be reduced by 26 trillion Btu's, aluminum by 53 trillion Btu's and glass by 10 trillion Btu's. The net result then would be about 1,307 trillion Btu's of potential energy in municipal waste and litter plus 225 trillion Btu's saved by using returnable bottles — a total of 1,532 trillion Btu's of potential energy. This is equivalent to 12.3 billion gallons of gasoline or about one-sixth of the amount of gasoline used in 1972 by the more than 100 million privately owned registered cars in the United States.

Energy in National Trash Can (NTC) and Countryside Litter (1971)

COMPONENTS	National Total (million tons)	Btu's (trillions)	Gasoline Equivalent (million gal.)
Combustibles in NTC (as fuel)	73.7[1]	810.7	6,486
Combustibles in litter (as fuel)	2.5	27.5	156
Recycle 65% of paper in NTC	25.4	304.8	2,438
Recycle 90% of ferrous metals in NTC	9.5	114.5	916
Recycle ferrous littered cans	0.2	1.9	15
Recycle 70% of aluminum in NTC	0.5	112.0	896
Recycle aluminum in littered cans	0.02	3.7	30
Recycle 70% of glass in NTC	12.1	21.2	170
Recycle glass in littered bottles	.28	0.7	6
TOTAL	124.2	1,397.0	11,113

[1]*Minus 25.4 million tons of paper*

FIGURE 2

Other Important Environmental Benefits

The saving of energy, although certainly important, is not the only benefit that can be gained from recovery and reuse of our solid waste. For example, the recovery and reuse of a material obviously conserves the natural resources and the landscape from whic' at material is derived. This aspect becomes particularly important as the e' s toward national self-reliance pose threats of more strip mining and its degradation of our landscape.

Recycling and reuse of materials also eliminates the need to find places to dump or bury them. Pilot projects sponsored by EPA at Franklin, Ohio and St Louis, Missouri, for instance, reduce the volume of waste disposal to 5 percent of that collected; they recover up to 25 percent of material content for reuse: and they produce a fuel energy equivalent of up to 80,000 gallons of gasoline per 1,000 tons of refuse input. The more advanced pyrolysis (burning with reduced oxygen) processes sponsored by EPA and being developed at San Diego, California, and Baltimore, Maryland, do an even more thorough job. The pyrolysis processes that produce a heating oil reduce the volume of wastes to less than 10 percent, and those that produce a heating gas leave little that has to be carted away to a dump or land fill.

In addition to the above, recycling produces other distinct environmental benefits The substitution of waste materials for virgin materials in manufacturing systems also results in decreased air and water effluents. In its 1973 Report to Congress, EPA cited studies that compared recycling versus manufacture from virgin sources for glass, paper, and steel — the principal recovery components of solid waste. The results indicate that in most cases studied, the atmosphere effluents, waterborne wastes, solid wastes, and water consumption (as well as energy demands) are substantially lower for resource recovery as compared to virgin material utilization.

What Can Be Done?

The present systems of burying or burning our waste, although expedient, cannot continue much longer. We truly and rapidly are running out of acceptable sites for the former, and the air pollution resulting from many current incineration operations is unacceptable.

Basically, then, there are three feasible strategies to consider:

(1) Source reduction — voluntary and/or compulsory actions by both producers and consumers.

(2) Source separation — voluntary and/or compulsory actions at the household or commercial source to facilitate recovery and reuse.

(3) Waste processing — the application of emerging technological processes that maximize the recovery of materials and energy.

These strategies, of course, are not mutually exclusive. It is not a matter of choosing any one instead of the others, because each strategy is necessary to some degree Although source reduction and source separation reduce the problems of collections and disposal, some form of waste processing is still needed.

As indicated, several technological processes for materials recovery and/or fuel conversions are emerging. Some of these show promise as ultimate answers to municipal solid waste disposal. Yet, most of these are still in the demonstration stage, and few full-scale recovery plants exist Recovery by these methods should be attractive mainly in areas where high disposal costs prevail and local markets for the recovered materials exist.

The current economic differentials, though, are subject to change As easily accessible disposal sites become scarcer and force transportation over greater distances, the costs of disposal will rise. As basic material resources are becoming increasingly scarce and expensive to exploit, this is helping to close the economic gap. Finally, and most emphatically, energy already *is* scarce, and its cost *is* rising rapidly, making recovery systems more economical as well as imperative.

Nevertheless, even with materials processing systems becoming economically feasible as well as environmentally necessary, it will take several years to install these systems and bring them "on line" In all regions of the country In the meantime, the solid waste stream will continue to increase and overflow available disposal sites—unless *we* reduce the amount of that flow.

Experience has shown that informed and thoughtful citizens will take it upon themselves to do what is needed in times of existing or impending crises The energy emergency is here, and as Environmental Protection Agency Administrator Russell Train has pointed out, it is a situation brought on by the excessively wasteful lifestyle of our society. Since our society is all of us, we are the ones who can modify it.

The following chapters are designed to show how we — in the home, at work, and at play — can modify our wasteful ways.

CHAPTER II: CITIZEN ACTION BEGINS IN THE HOME

In discussing energy in our solid waste, we have concentrated on two principal categories — municipal waste (National Trash Can) and countryside litter. These two categories are the most offensive and the most dangerous to health when accumulated in and near population centers. They are the categories that are increasing most rapidly and thus posing the greatest problems of disposal. Moreover, these categories are the parts of our national waste to which individual citizens can most readily relate and can most effectively modify.

In order to determine what citizens can do in the home, we need to look at the National Trash Can again. This time we need to look not only at the materials in it but at the product source categories as well (see Figure 3).

From this breakdown we see that about 80 percent is derived from market-product sources (as opposed to yard and garden-type wastes). Excluding food wastes, market-product sources account for about 60 percent of the waste flow. It is to this 75 to 80 million-ton portion that product source reduction and material recycling programs can be principally directed.

There is one further step to take before measuring the recycling savings that can be accomplished in the home. EPA figures indicate that 72 percent of municipal waste (the National Trash Can) is generated in the home. After subtraction of that which is collected from commercial establishments and institutions, the home-generated components are shown in Figure 4. This figure also indicates the amount of each component accumulated annually in the average household and the hypothetical energy savings that could be accomplished by either recycling or burning these materials as fuel.

Figure 4A presents these results graphically. In the home "Recycle Center," materials which are feasible to separate and store for special collections are shown. The gasoline container beneath each material indicates the gasoline energy equivalent that could be saved by recycling these products in comparison to their manufacture from virgin resources.

In the "trash center" a stylized garbage can containing food and other waste materials which are not suitable for home separation is shown. The gasoline energy equivalent to be obtained by burning each component as fuel is shown in the related containers. Yard wastes are shown separately because they probably would be collected this way, or they could be converted to compost as a fertilizer substitute in place of the petroleum-derivative, commercial fertilizers now used in home gardens. The bulky waste items (furniture, appliances, etc.) are not illustrated, since most of these would be collected separately, and because of their variations in content, it is difficult to estimate their recycle values.

Now that we have seen the magnitude of the possibilities, we can investigate ways to save the energy by certain actions in the home. Most of these

The National Trash Can

(Residential, Commercial & Institutional by Material and Source, 1971)

KINDS OF MATERIALS	MATERIAL TOTALS		PRODUCT SOURCE CATEGORIES (million tons)						
	10^6 Tons	Percent	Newspapers, books, and magazines	Containers and Packaging	Major household appliances	Furniture and furnishings	Clothing and footwear	Food products	Other products
PAPER	39.1	31.3	10.3	20.4	—	*	*	—	8.4
GLASS	12.1	9.7	—	11.1	*	*	—	—	1.0
METALS									
Ferrous	10.6	8.5	—	5.4	1.7	*	—	—	3.5
Aluminum	0.8	0.6	—	0.6	0.1	*	—	—	0.1
Other nonferrous	0.4	0.3	—	0.1	0.1	*	—	—	0.2
PLASTICS	4.2	3.4	*	2.5	0.1	0.1	0.2	—	1.3
RUBBER & LEATHER	3.3	2.6	—	*	0.1	*	0.5	—	2.7
TEXTILES	1.8	1.4	*	*	—	0.6	0.5	—	0.7
WOOD	4.6	3.7	—	1.8	—	2.3	*	—	0.5
FOOD WASTES	22.0	17.6	—	—	—	—	—	22.0	—
PRODUCT TOTALS	99.1	79.3	10.3	41.9	2.1	3.2	1.2	22.0	18.4
YARD WASTES	24.1	19.3							
MISC. INORGANICS	1.8	1.4							
TOTAL WASTE	125.0	100.0							

*trace

FIGURE 3

Annual Household Solid Waste and Recycle Energy Value

	National Totals (million tons)	Average Household Accumulations (pounds)	Annual Household Energy Savings Equivalent	
			Recycling (gal. of gasoline)	Burning (gal. of gasoline)
MATERIAL				
PAPER				
Newspapers	7.0	233	11.2 or	10.2
Other Separable	5.3	173	8.3 or	7.6
Nonseparable	10.9	370	—	16.3
GLASS	10.8	368	3.7	—
FERROUS METALS	6.3	210	10.1	—
ALUMINUM	.6	20	16.0	—
OTHER NONFERROUS	.2	7	—	—
PLASTICS				
Separable	1.0	33	4.9 or	2.9
Nonseparable	2.3	77	—	3.4
RUBBER & LEATHER	1.0	33	—	1.4
TEXTILES	1.0	33	—	1.4
WOOD	.6	20	—	.9
FOOD	17.8	593	—	26.1
MISC. INORGANIC	1.0	33	—	—
SUBTOTAL	65.9	2,203	54.2	70.2
BULKY MATERIALS	6.4	213	—	—
YARD WASTES	18.1	600	—	19.2
TOTAL	90.4	3,016	54.2	89.4

FIGURE 4

Household Refuse Collection Center

(Annual Accumulation—1971)

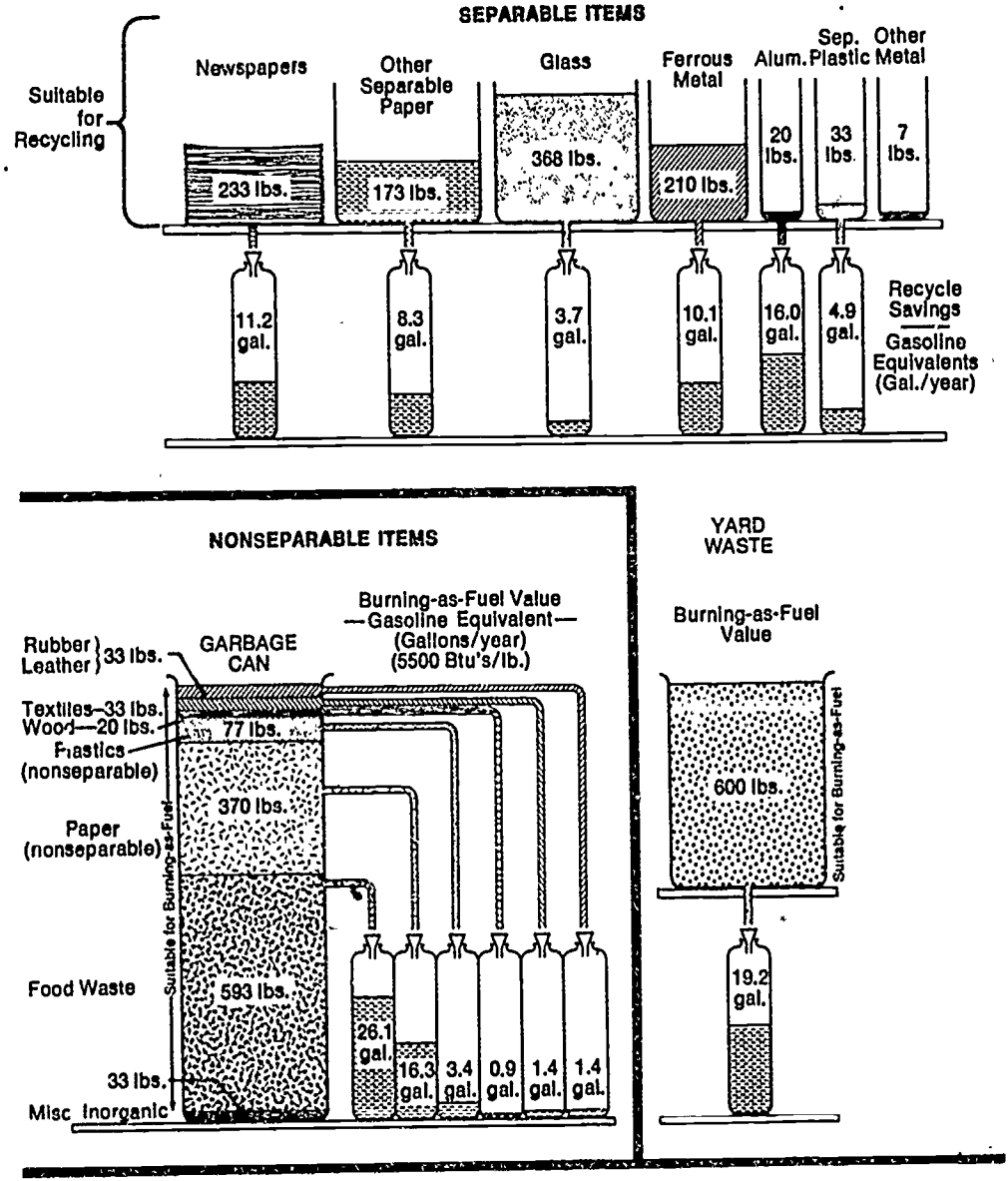


FIGURE 4A

actions can be taken readily and inexpensively, and they can be effective as short-range measures to cut down collection costs and the demands on dump sites More importantly, these measures also make good sense in the long term, even for a future when technological processes are available for broad-scale reduction, recovery, recycling, and reuse.

Source Reduction

Source reduction involves changes in consumer consumption. When done voluntarily, it means more discriminate purchasing, more reuse of the products bought, and more thoughtful practices prior to the discard of used-up or throwaway materials.

An obvious and dramatic example of source reduction is the purchase of returnable instead of throwaway beverage containers. Effective action can start as soon as tomorrow's trip to the supermarket. The first step can be the purchase of a six pack of soft drinks in returnable bottles instead of no-deposit, no-return containers This action will reduce the size and weight of next week's trash; it will save an energy equivalent of 1½ pints of gasoline, and when the 30-cent deposit is returned during next week's shopping trip, the six-pack purchase will have cost 18 cents less than for throwaways. In terms of today's rapidly rising grocery costs, any such savings is prudent. With gasoline shortages, the saving of 1½ pints of gasoline that can take the family car 2½ miles is substantial Since throwaway beverage containers now constitute 7 percent of municipal waste, elimination of this component will be meaningful in reducing trash collection and disposal problems. Moreover, less roadside litter is one of the principal benefits of source reduction through the use of returnable bottles instead of throwaway containers. This was the principal objective of the Oregon bottle bill, and it was effective almost immediately — eliminating at least two-thirds of the beverage container litter and at least 10 percent of all roadside litter in Oregon the first year.

Other examples of source reduction, waste-saving actions include, the purchase and reuse of cloth towels instead of paper ones, the purchase of toothpaste in tubes without superfluous cardboard boxes, elimination of extra bags and boxes by using and reusing a strong paper bag or a canvas tote bag to carry home groceries and other purchases. A check list of these and other suggested reduction tactics is included at the end of this booklet.

Source Separation

In the home, source separation means the segregation of solid waste into categories that can be recovered before they enter the waste stream. The separation of newspapers for the recovery of paper fiber is an obvious and substantial example Newspapers now represent about 8 percent of municipal waste, and a recent study in five New Jersey communities indicates that the average household accumulates about 6 pounds of newspapers per week. By separating out all these papers for recycling, each housewife can save an energy equivalent of 14 9 gallons of gasoline per year and save more than two pulpwood trees from harvest each year.

Similar actions to separate out cardboard, glass, aluminum, tin cans, and ferrous metals also can facilitate recycling operations. Metal coat hangers (currently in short supply) can be collected and returned to the cleaners Outmoded clothing, toys, china, appliances, and furniture can be donated to charities for reuse. Again, these are but a few of the actions that can be taken with a minimum of effort and that can avoid unnecessary energy waste

Inhibitors to Householder Action

The foregoing actions to reduce waste and separate out recyclable materials all sound so simple that the question readily arises as to why they are not being done now. After all, waste reduction in the home and along the highway appears to be largely a matter of thoughtful restraint Separation of certain home waste items also is relatively easy. But the answer is not quite that simple.

Again, let's consider the beverage container situation. Today's manufacturing and merchandising practices favor the throwaways, and we the consumers have become conditioned to their convenience Proof of this lies in the accompanying charts (Figures 5 and 6), showing the dramatic switch from 1955 to 1969 and projected trends to 1976. Even now, in 1974, it has become difficult and often impossible to find preferred brands in returnable bottles on the grocery or supermarket shelves.

This situation, of course, is not accidental. Most manufacturers prefer the one-way containers which are lighter in weight and thus reduce handling problems and shipment costs, disposables avoid the collection and cleanup operations associated with reusable containers, and the beverage companies don't have to worry about the inspection and discard of chipped or broken bottles. Merchandisers share many of these same opinions, and many supermarket operators would be glad to see returnable bottles disappear entirely As a result, manufacturers, distributors, and retail dealers strenuously oppose legislation like the Oregon "bottle bill" that requires a deposit on all beverage containers sold in the state and also bans the dangerous and nondegradable "flip-top" cans. Opponents of this type of legislation refer to increased consumer inconvenience and cost, and they foster the recycling of aluminum, steel, and glass as better and less expensive ways of reducing litter and solid waste. They also claim that obliteration of throwaway containers will put some companies out of business and result in the loss of jobs Moreover, they say bottle bills will hurt small independent operators more than they will big companies which can better afford the large capital costs of machinery to process returnable bottles or to switch emphasis to other products and processes

Nevertheless. there is irrefutable evidence that Oregon's bottle bill has resulted in substantial reduction in the vital areas of litter, solid waste, and energy consumption.

This leaves capital costs of adjustments and potential job losses in the disposable container industry as the principal arguments against any measure restricting throwaway containers. As to the job issue, various studies show widely different results — from one study that predicted the nationwide loss of

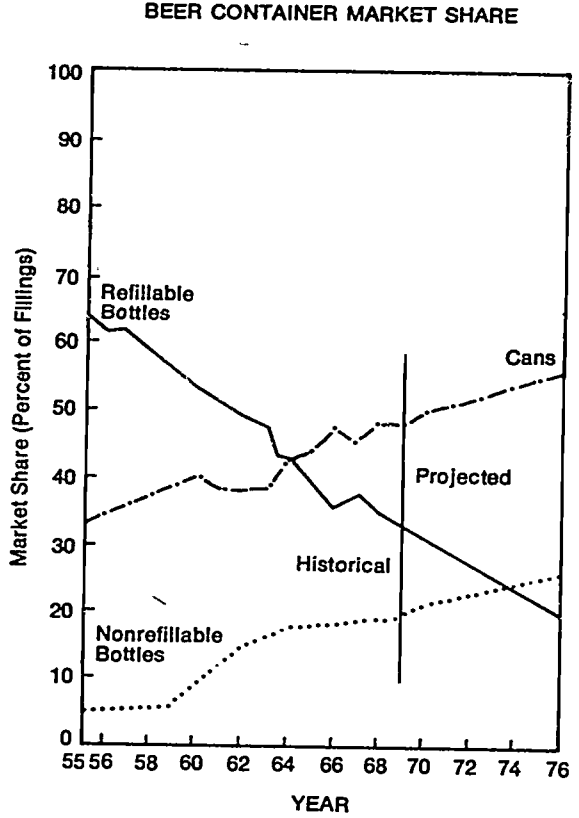


FIGURE 5

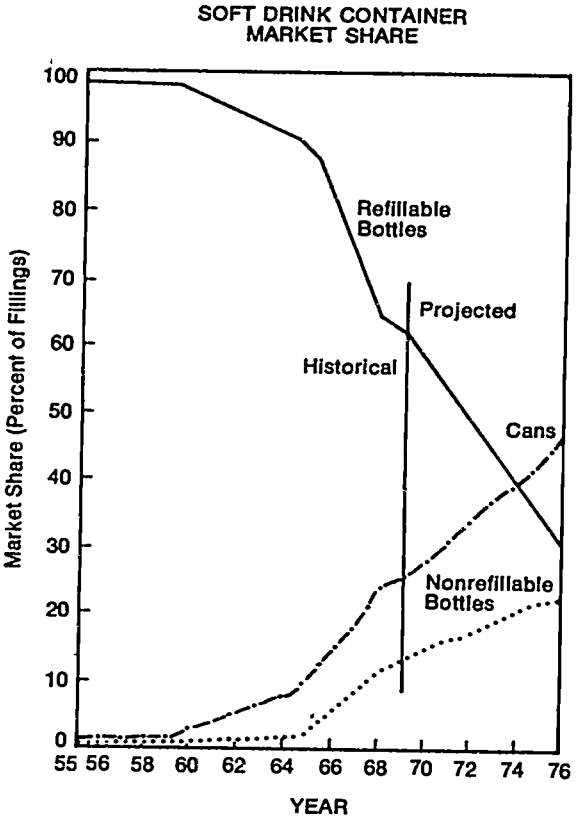


FIGURE 6

(Historical data from: Glass Containers Manufacturers Institute, and the Can Manufacturers Institute; projections by Research Triangle Institute.)

164,000 jobs to other studies that estimate a 130,000 job gain in the retail and distribution trades. Clearly, the issue of future job impacts needs closer examination. It is strange, though, that there was not an equal concern for the earlier job losses in the bottling, brewing, and supermarket business as a result of the market trends shown in Figures 5 and 6. EPA is conducting studies on how to reduce economic impact, considering such factors as (1) time-phasing of the conversion to returnable containers and (2) direct compensation of displaced workers where the impacts are severe.

Even with the job effect somewhat uncertain, it is clear that the housewife is now restricted from making the open choice of using returnable bottles as a means of reducing waste and energy consumption. Legislative mandates like the Oregon bill, of course, can change this — but such actions take time to accomplish. More immediate results can be instigated by consumer demands on the supplier. After all, if the marketplace still functions on the principle that "the customer is right," then we have the ideal arena for citizen action to make the difference.

Some claim that the average homemaker won't often take overt action and that when he or she does, it is not apt to be sustained for long. We find it hard to concur with a "put-down" like this, particularly if there is a cause célèbre — a national crisis or an impending crisis that threatens the homemaker's family or way of life. To check on this, EPA conducted a study in 1972, Metropolitan Housewives' Attitudes Toward Solid Waste." One of the major findings stated:

> "Despite their concern about the solid waste problem and their expressed desire to do something about it, few housewives have taken any direct action in the past. Those who have done so have cooperated only minimally. *The root of the problem appears to lie in the lack of authority to reinforce positive attitudes and to channel current and future efforts.*"

Therein lies the basic issue — individual and collective apathy and inaction. These are the problems that this citizen action guide is designed to overcome. We hope this booklet itself will convince individual homemakers to instigate the suggested actions and to continue them as part of the normal household routine. One way that this can be accomplished is through citizen and neighborhood leaders who can provide the needed encouragement and direction to concerned but indecisive individuals.

Voluntary Action May Not Be Enough

Voluntary action, of course, is best. No on likes to be regulated or taxed Moreover, the systems doing so tend to become so bureaucratic, cumbersome, and expensive that the ends may get lost in the means. Nevertheless, where voluntary actions are insufficient to protect the public interest, mandates become necessary. In dealing with solid waste problems, some states and localities already have found this to be the case. Oregon, Vermont, South Dakota, and certain counties elsewhere have instituted bottle bills. Similarly, several communities have passed ordinances that require the separation at

their source of such items as newsprint, corrugated cardboard, glass, and some metals. Other mandatory measures not yet invoked can be aimed directly at product manufacturers — setting standards to limit the amount and types of packaging and counteracting planned obsolescence by requiring that products have a certain length of useful lives.

Ultimately, some mandates may be necessary to reinforce or supplement voluntary actions. These, too, take time to institute. So we come back to the basic premise — the fastest way to get something done is to do it ourselves. The check list at the end of this booklet provides a guide for such actions. These, in turn, may suggest others.

Other Actions in the Community

Although citizen action to reduce solid waste and its energy component should and must begin in the home, it should not be limited to that realm. To be fully effective, the "waste not, want not" ethic must be extended to every facet of community life.

There are many places where this can be done. EPA studies show that in 1971, 28 percent of municipal waste was generated in wholesale and retail outlets, offices, hotels, restaurants, and institutions like hospitals and schools. Since these are the places where the community residents work, they are logical places where citizen action can be extended and be effective in abating solid waste.

Here again, paper may be the easiest material to separate out of the waste stream. In the commercial-institutional sector, paper and paper products constitute nearly half of the waste generated. This ratio varies widely from banks and offices, where the trash is almost entirely paper content, to hospitals and restaurant waste, where pure paper products are relatively minor. Yet, in almost all such places, a considerable amount of paper can be diverted for recycling.

Banks and offices are prime examples. The Bank of America, for instance, reported in 1971 that it had been able to segregate and recycle nearly 25 million remittance envelopes, most of its outdated records, and all of the 132 tons of wastepaper produced by its Los Angeles data processing center as well as approximately 120 tons of tab cards and computer ledgers generated by its San Francisco center. In addition, the bank is completing the cycle by increasing its use of recycled paper in its normal bank operations. Other banks and offices have taken similar actions, but many still have not. It is in this latter group that citizens — as customers, workers, and officials — can be effective in promoting the separation and recycling of paper and encouraging the greater use of recycled paper in carrying out various business functions.

Retail stores also are prime targets. Grocery and liquor stores, in particular, discard a large amount of cardboard packing boxes and other paper-content materials that can be readily separated for recycling. Much of this already is being done, and a lot of the discarded cardboard boxes are being reused by our mobile society for the packing and shipment of household goods. But most grocery stores, particularly supermarkets, can do much more to reduce solid waste and the energy involved. Their role in the returnable versus throwaway bottles has already been discussed. In addition, store owners can be effective in passing on customer complaints about excessive packaging to

the manufacturing industries. Likewise, any large grocery chain can be particularly effective in encouraging the increased use of recycled paper in the products it sells.

Department and clothing stores and other retail establishments also should be encouraged to take similar actions to reduce the volume of the municipal waste stream. Restaurants and hotels, of course, generate a high percentage of food and other waste that is so mixed and contaminated as to prevent reasonable separation at the source. Here too, though, there are possibilities for the separation and recycling of shipping cartons and empty food containers, both metal and glass.

Hospitals produce unique problems of contaminated waste, much of which can best be burned and has a high fuel value. In addition, though, hospitals and medical centers also use many "disposable" plastic syringes and pill dispensers, and other products which could be replaced by reusable materials at a considerable savings in money, materials, and energy Citizen inquiries and suggestions can be effective in getting these things done

In any community, company owners and industrial executives play the dual role of citizens and citizen leaders. By carrying out recycle practices in their homes, they can set examples that their neighbors and others will emulate. By extending these and other conservation practices into their places of business, these managers can be particularly influential in stimulating their employees to similar efforts — at work and in their homes.

The litter problem is the most susceptible arena for effective citizen action. The act of littering is, after all, purely a matter of ethics As such, it is a logical extension of home behavior. If through this publication and other anti-litter promotional efforts, we might instill thoughtful restraint and the "waste not, want not" ethic on a universal basis, there would be much less litter scattered along the highway and across our landscape.

Unfortunately, mere appeals to the public conscience are never universally accepted or fully effective. Neither are public regulations, and anti-litter laws are noteworthy examples of failure because of the enforcement difficulties Even bottle bills that combine regulation and economic incentives will not eliminate *all* litter. The most effective answer, then, may be to adopt a national strategy that includes the best aspects of all three methods — persuasion, regulation, and economic incentives.

Citizen action can make the difference in the instigation and success of each method. The citizen role in establishing regulations and economic incentives will be discussed in the following chapters.

CHAPTER III: TOWARD A NATIONAL POLICY

Citizen action, of course, is essential in both solid waste and energy conservation To be fully effective, these efforts need to be combined with and supported by a national program in which federal, state, and local governments and private industry all assume major responsibilities. Any such program must be based on adoption of a national policy that assigns the various responsibilities and assures that they will be carried out.

The reasons for such a national policy have been dramatized during this past year In the *absence* of a strong national energy policy that would have prepared us for an oil import embargo, energy suddenly became a national crisis in late 1973 In that situation, impromptu citizen actions combined with a mild winter to avert any national disasters. But we would need a clear national policy to cope with another embargo on oil or other scarce natural resources.

In the realm of solid waste, critical disposal problems will probably occur on a city-by-city basis rather than on a nationwide basis like the oil shortages that affected all of us at the same time. Nevertheless, with half of our cities facing a shortage of disposal sites within five years, a strong national policy is needed to coordinate government and industry capabilities to cope with these situations Sound national policies and programs are not developed overnight, nor should they be But we need to be sure that we are moving in that direction and that we are taking the right approach. Hence, we need to review the status of present efforts in order to see what still needs to be done.

Local Government—The Front Lines

Not surprisingly, municipal government is shouldering the brunt of the solid waste problem — and the financing of it. In 1973 the National League of Cities and Conference of Mayors reported that it cost municipal governments $6 4 billion to collect and dispose of their garbage and trash.

Collection constitutes 70 to 80 percent of this cost. It involves more than 300,000 public and private personnel and 100,000 compactor trucks which consume an estimated 287 million gallons of gasoline and 163 million gallons of diesel fuel per year.

The disposal problem, although less expensive, is much more critical. In 1970 there were some 16,000 authorized disposal sites, only about 5 percent of which were operated on an acceptable sanitary landfill basis. As a result of EPA's "Mission 5,000" (jointly sponsored by 30 other organizations), 5,500 open dumps have been closed, but unfortunately, an equal number of new ones have been opened up. Currently, the Conference of Mayors reports that half our cities will be running out of suitable solid waste sites within five years.

In response to these problems, several substantial actions have been taken. But these are scattered and fragmented and have only scratched the surface of the overall problem. To reduce the problems and cost of collection, several communities now require curbside collections as well as requiring householders to separate certain items, such as newspapers, before collection In addition to the states of Oregon, Vermont, and South Dakota, a few counties have enacted laws requiring refundable beverage containers, and other local governments are considering comparable actions. With technical assistance from EPA, many communities have reduced collection costs through increased efficiency. In Portland, Maine, redesigned collection routes saved $23,000 a year and at the same time provided additional service. Efficiencies that reduce truck mileage, of course, conserve gasoline. It has been estimated that by cutting twice-weekly collections to one and through improved vehicle routing procedures, there could be a nationwide annual savings of 18.2 million gallons of fuel oil and 39 million gallons of gasoline.

On the disposal end, some inroads are also being made. The city of New Orleans and the National Center for Resource Recovery are developing a program for the recovery and marketing of reusable materials from the city's trash and garbage. Based on an EPA-assisted demonstration project in St Louis, 20 other major cities are considering or are committed to using solid waste as auxiliary fuel to generate electricity.

As stated above, these examples are the exception rather than the rule. But they do point in the right direction, and they indicate the advantages to be gained by nationwide application. Any methods of source and collection reduction have long-range as well as short-range benefits. But when it comes to the installation of broad-scale recycling process technology that now exists most local governments, even when supported by substantial citizen action, cannot do the whole job.

With considerable justification, the Conference of Mayors and the National League of Cities contend that the following federal actions are imperative:

- Solid waste policy must be related to the larger policy issue of total resource conservation.
- Federal solid waste legislation should establish the goals and the programs to reduce refuse growth and achieve maximum feasible recovery of resources.
- Support for solid waste programs at all levels of government should be given a higher priority.
- Federal programs for resource conservation should include financial assistance for providing solid waste disposal and resource recovery facilities to meet the requirements of established environmental standards.

State Government—The Pivotal Role

Nearly all states have adopted, or are now developing, a statewide or interstate regional plan for managing solid wastes in ways that will avoid

environmental damage Many states have passed laws banning open burning or dumping Clearly, these are appropriate state roles, and they should be encouraged to pursue them more aggressively.

The most comprehensive action to date has been Connecticut's adoption of a statewide solid waste management plan recommended in a report prepared by the General Electric Company in cooperation with the state's department of Environmental Protection. Significantly, this report concludes that energy is the most valuable single commodity in the waste stream. This report also presents a concise and graphic state-of-the-art analysis of the various emerging technological processes for recovering and conserving solid waste energy Other states, regions, and communities could benefit from reviewing this analysis.

Significant statewide attacks also have been launched against litter. As previously discussed, Oregon enacted its bottle bill in June, 1971. Vermont followed this action about a year later, South Dakota also has passed one, and since then similar legislation has been introduced in 30 other states. Although such regulation is a proper role of state government, many feel that federal legislation is also needed because of the interstate ramifications of the beverage business.

The Federal Government — Its Present and Future Role

Today, as in the past, the federal government's role is restricted mainly to providing funds for research and development, grants and contracts for training personnel, and grants for the demonstration of new or improved disposal methods aimed at resource recovery. State governments have been responsible for regulation and oversight, and local government has traditionally been responsible for collection and disposal. Although the Citizens' Advisory Committee on Environmental Quality agrees that this division of responsibility is basically correct, we do not feel that the levels of effort in meeting these obligations have been equitable. In the past, funds available for work on the solid waste problem have been pitifully small in view of the obvious needs. Now, in view of the energy and other resource shortages, it is becoming even more important that the federal government assist the state and local governments in establishing systems to recover these resources to the fullest extent possible.

Since 1965, when solid waste first received national recognition, the research sponsored by the Council on Environmental Quality, the Environmental Protection Agency, the Bureau of Mines, and other federal agencies has provided a wealth of information on how better to recover, recycle, and reuse materials and energy from our solid waste. Other studies in the public and private sector have added to this knowledge. The National Commission on Materials Policy has made recommendations on how to incorporate this knowledge into national policy and programs. The gist of these efforts is clear. So long as economic pressures tilt the balance toward cheap but environmentally undesirable disposal, and so long as no consistent and uniform rules exist for private and public operations, the necessary transition from poor solid waste management to optimum management will not take place as quickly as it should.

Thus, the stage is set for federal action. Now it is up to the Administration and the Congress to adopt a national policy and establish substantial programs to put our knowledge to work. It is up to us as citizens to see that this is done, because we are the ones who will have to bear the brunt of the inevitable garbage/trash crisis if nationwide action is not taken soon.

The Committee feels that a national solid waste policy should include at least the following major elements:

1. **Interstate transportation rates should be revised to promote the movement of recyclable materials.** At present, freight rates approved by the Interstate Commerce Commission (ICC) make it more economical for producers to use virgin materials than those recovered for recycling. In the case of ferrous scrap, for instance, the Institute of Scrap Iron and Steel indicates that on the average it costs at least twice as much to ship ferrous scrap as newly mined ore. By also considering the cost of shipping the coal and the other reducing elements necessary to process the two sources, iron ore gets a freight rate advantage of at least $1.49 per ton less than for scrap iron. Similar discrepancies exist with regard to other secondary materials such as glass and rubber.

2. **Federal agencies should be required to carry out programs of resource recovery, recycling, and reuse.** For example, these agencies should be required to manage their own wastes in a way that maximizes materials and energy recovery. To close the circuit, federal purchasing practices should give priority consideration to competitive products with the highest percentage of reclaimed or recycled content. The General Services Administration has taken initial steps by modifying paper specifications in this regard But more can be done Until the federal government leads the way, it is going to be difficult to get others to follow suit.

3. **Consideration should be given to federal tax measures that will provide economic incentives for private industry to reduce the depletion of critical natural resources and to maximize resource recovery, recycling, and reuse** There are several things that can be done in this area, but the issues are complex and need careful deliberation.

   a. **Tax incentives to encourage increased production and use of recycled materials.** The current tax system encourages the use of virgin materials through the capital gains treatment of timber and the depletion allowance on virgin minerals. To offset these incentives, it would be appropriate to provide equivalent incentives to the reuse of scarce materials and to encourage energy savings through the recycling of such materials as steel instead of producing them from raw ore.

   A principal argument against tax incentives for recycling of selected products is that, to the extent virgin materials are scarce, their prices will rise and encourage use of recycled materials even without tax incentives. In addition, since a substantial amount of recycling already is taking place, tax incentives would produce a substantial "windfall" element. Even if this element were reduced by focusing on "additional" recycling investment, it would be diffi-

cult to segregate the new activity in many cases, and claims will be made that those who were initiators in the recycling would be discriminated against.

b **Rapid amortization for recycling facilities.** This would encourage private firms to enter the industry, whereas now there is little resource recovery from municipal solid wastes other than various EPA-supported projects. Although municipal governments theoretically could undertake this activity and sell the usable wastes, they are operating under tight budgets which do not provide the flexibility they need to undertake these investments. The arguments against rapid amortization claim that it would be difficult to restrict the provision only to disposal of municipal, consumer, and commercial solid wastes. Broader coverage would provide a tax windfall for a well-developed industrial solid waste disposal industry. Also, new plants enjoying rapid amortization benefits would be given unfair competitive advantage over firms with plants built before availability of this provision.

4 **The question of providing federal grant assistance or loan guarantees for the construction and/or operation of resource recovery facilities needs very careful deliberation.** Currently, the initial capital investment to replicate the present demonstration projects varies, depending upon the type and size of process, from $7.5 million (fuel recovery) to $12.3 million (pyrolysis) for handling 1000 tons per day. Many communities, because of institutional or fiscal limitations, feel unable to launch such programs without financial assistance, and proposals to solve this problem cover a wide range. On one hand there are proposals to launch a massive federal grant and/or loan guarantee program for facility development and operation. On the other hand, there are claims that it is now economically feasible for private industry to build and operate municipal solid waste disposal systems without federal assistance. By presenting here at least some of the pertinent aspects of the alternatives, we hope to provide a basis for citizen selection and support of the best course of action to pursue.

a **Federal grant and/or loan program** — During the past decade, many federal grant/loan programs have been initiated to assist state and local governments in meeting the social or environmental needs of their constituents. Such assistance has been justified where the impact of the problems has national implications, where the state or local resources are insufficient to cope with the situation, or where there are insufficient economic incentives to solve the problems by other means. Such were the situations that justified federal assistance to meet health, education, welfare, outdoor recreation, and open space needs and to solve air and water pollution problems. Although some financial assistance of this nature is still dispersed on a categorical basis, much has recently been encompassed into federal revenue-sharing programs.

Many feel that the solid waste situation is comparable to these other social and environmental issues, and that in spite of the expense and the probable three- to five-year lead time needed to

institute a federal grant or loan program, such action is justified. Arguments for such action are based on the belief that in several respects federal anti-pollution policies have compounded local solid waste collection and disposal problems, that state and local budgets are already too strained to support substantial new capital investment, and that revenue sharing has not produced significant developmental work in solid waste management. Concerning claims that private industry can do the job without financial assistance, federal aid proponents skeptically point out the lack of any widespread initiation of such action.

Based on these premises and on cost estimates developed in conjunction with state and local governments, proposals before the Congress in mid-1974 include a three-year program encompassing up to $825 million in low-interest loan guarantees for facility construction, $190 million in grants for facility construction if loans are not available, and $200 million in grants for operation and maintenance of disposal facilities if such operations cannot be accomplished as effectively by other means without federal assistance.

b. **Alternatives**—Those who feel there is no need for federal financial assistance present equally persuasive arguments for alternative approaches to the problem. The states of Connecticut and New York, for instance, have initiated statewide programs without federal grants and/or loans. Connecticut established a Resource Recovery Authority with $250 million bonding authority for the construction of 10 separate regional facilities to process 84 percent of the state's waste. The first plant is to be operational by 1976. In New York State, grants totaling $175 million out of a 1.1 billion environmental bond issue passed in 1972 will be made to local communities for construction of facilities, some of which will be operational by late 1975 or early 1976.

At the local level, New Orleans has reached an agreement with the National Center for Resource Recovery (a corporation representing a number of major U.S. industries and labor organizations) to assist in the construction and operation of facilities to recover and market much of the city's solid waste. The city of Chicago and the Commonwealth Edison Company have made a joint commitment on a project to use shredded solid waste as fuel, and similar projects are under way in New York City; Boston, Brockton, and Saugus, Massachusetts, and Nashville, Tennessee. At least 10 other cities are planning to proceed on their own initiative.

Several industrial companies have developed systems to process and dispose of municipal wastes at a profit. Already, they are presenting bids to various cities, claiming they can institute these new systems faster than can be accomplished through normal local government procedures and that they can dispose of municipal waste as or more cheaply than the present or projected methods in these communities. This competitive situation results largely from at least two factors that have developed rapidly during the past

year: (1) the rising prices for the fuel and the materials recovered (coal and oil prices have doubled; those of recycled newsprint and some grades of scrap steel have tripled); and (2) the scarcity and rising costs of municipal disposal sites and the increasing costs of disposal methods that satisfactorily meet health and environmental standards. An answer to the criticism that so few privately financed processes have actually materialized is the reluctance of many communities to change from established disposal practices. Another key factor is the current shortage of construction capital.

5 **Federal legislation requiring a refundable deposit on all beverage containers is needed to promote the use and reuse of refillable instead of throwaway beverage containers.** As discussed earlier, such action would reduce litter, household rubbish, and consumer expenditures. Moreover, and most importantly, such action would reduce the waste of critically short supplies of energy and nonrenewable resources. On the other hand, enactment of such a measure probably would have adverse impacts on the industries that manufacture and market the "no-deposit, no-return" cans and bottles which are now so prevalent in the marketplace.

With more than 30 states and 25 communities considering different forms of beverage container regulation, why do we need federal legislation that focuses only on beverage containers?

The first and foremost reason is that the energy shortage is a critical national problem, and refillable beverage containers provide an inexpensive, expeditious, and energy-saving alternative to the continued proliferation of energy-wasting disposable beer and soft drink containers. On a nationwide basis, resumption of an all returnable beverage container system could almost immediately save an energy equivalent of nearly 5 million gallons of gasoline per day This is equal to the estimated energy yield by 1978 from a crash program to produce oil from shale rock—a project which will involve the expenditure of billions of dollars in capital investment, unprecedented environmental disturbance, and the daily creation of a pile of waste rock six times larger than the Lincoln Memorial.

The second major reason for federal beverage container regulation is that deposit legislation is more feasible and less disruptive when implemented nationally instead of on a state-by-state basis. Federal legislation will solve the problems of interstate bootlegging and littering as well as provide uniform requirements for containers and thus make for less economic disruption in the long run Checkerboard state-by-state action drawn out over years of legislative debate will result in the unresolved problems becoming regionalized in the areas most reluctant to deal with them, thereby prolonging their final resolution.

The third important reason for federal legislation of this type is timing. Whereas new technologies for solid waste resource recovery will take years to implement on a national basis, required deposits on beverage containers will produce more immediate results. In Oregon, for instance, a year after its bottle bill went into effect, officials were reporting 75 to 85 percent fewer beverage containers in roadside litter, 385 million fewer containers produced, and considerable energy savings. On a nationwide basis, the results would, of course, be far more substantial.

Another important reason for a federal bottle bill is the very real need for federal leadership in establishing a new national conservation ethic that emphasizes prudent consumption of energy and materials resources Enactment of federal beverage container legislation could be highly significant as a first substantial, nationwide, "waste not, want not" step toward this national conservation ethic. In terms of energy conservation alone, Congress and the Administration could take a giant step forward toward solving the energy problem.

Several beverage container bills have been introduced in the Congress, and the Administration has endorsed the concept of requiring a refundable deposit on all beer and soft drink containers if it is phased in over time This call for a phased approach is caused by concern about ways and means to reduce the adverse economic impacts resulting from a switch from the manufacture and distribution of disposable bottles and cans to returnable, refillable containers. This is a valid concern, and any federal enactment should include provisions for relieving and/or reducing the adverse effects of job relocation and production changeovers to refillable bottles.

With regard to economic impact, it is important to remember that the suggested legislation would not *ban* throwaway containers; it simply mandates a *refundable deposit* on each container sold. Thus, instead of affecting only container manufacturers, the refund creates economic incentives to influence the consumer as well as the beverage industry to decrease waste The mandatory deposit, moreover, would make Americans aware of the cost of waste—an extravagance of energy and resources that our society can no longer afford

Time Is Important

Obviously, the sooner federal programs to foster the recovery, recycling, and reuse of the resources in our solid waste are put into effect, the sooner we can realize the benefits on a nationwide basis. Nationwide, energy of *any* kind is needed *right now*. Furthermore, municipal solid waste disposal problems are fast approaching crisis proportions. Various bills to strengthen the federal role along the lines suggested herein have been introduced in both Houses of Congress. These and other measures are being deliberated in various subcommittees, where citizen concerns for early passage could appropriately be focused. On the Senate side, measures to (1) change interstate transportation rates, (2) require intensification of federal agencies' recycling efforts, (3) provide grant and/or loan assistance, and (4) regulate beverage containers are being considered both in the Commerce Subcommittee on Environment and also in the Senate Public Works Subcommittee on Air and Water Pollution. In the House of Representatives, these measures are being handled by the Interstate and Foreign Commerce Subcommittee on Public Health and Environment. The Joint Committee on Internal Revenue and Taxation is studying various tax incentive proposals which must first be passed by the House Ways and Means Committee.

CHAPTER IV: CITIZENS CAN MAKE THE DIFFERENCE

The Committee believes that the nation is coming closer to establishing a national policy of resource recovery, recycling, and reuse, largely because of the growing interest and concern expressed by numerous citizens' groups across the country in recent years. They surely have been a major factor in causing governments and industries to move faster in devising successful recycling programs Anti-litter campaigns and the establishment of local recycling centers have focused public attention on the potential of recycling. When properly organized, these efforts can and do serve as a valuable educational tool for improving local communities.

Despite these efforts, the Environmental Protection Agency reported in early 1974 that the percentage of recycled resources now being used is lower than ever before in history. Too often, citizen groups have rushed into setting up local recycling centers, for example, only to find that poor planning, lack of existing markets, and a tapering-off of volunteer participation forced them to close down Having started with high expectations, many people are thus discouraged about the potential of recycling as a result of this experience.

The Citizens' Advisory Committee, though, is still convinced that citizen groups have and will continue to have an extremely significant role to play in furthering a recycling policy. The very existence of these citizen groups and their obvious commitment to resource conservation is a clear sign of public interest and willingness to move in this area. While the total volume of bottles, cans, and paper collected or separated at home may be only a small percentage of the total produced, this at the very least is a beginning solution to a very large problem These are the actions that can hold the line until government and industry are able to build a significant number of total waste recovery plants around the country On a continuing basis, the citizen actions suggested in this booklet make good sense in modifying a nationwide life-style that has been unnecessarily and foolishly wasteful.

At this point, no one is sure how willing the majority of American consumers are to abandon the pervasive "convenience psychology" that now exists By and large the average citizen has not been making a connection between his increased consumption of packaging materials, for instance, and the increasing costs of local refuse collection which are paid out of his taxes. Even more critical is the amount of energy and other valuable resources now being wasted under existing practices.

It is on this latter point that this booklet has focused, with the hope that the facts presented herein will help overcome the major impediments to large-scale recycling for the recovery of resources and energy.

Individual Citizen Action Check List for the Home and Community *

Think About the Disposal Problem and Energy Factor of Every Purchase.

—— You'll conserve energy, reduce waste, and save money by buying beer, soft drinks, milk, and water in returnable bottles — and returning them. If returnables are not available or if they cost more, complain to the store manager.

—— Look for long-life products, and avoid plates, cups, and eating utensils that are designed for one-time use.

—— Consider using cloth instead of paper for towels, napkins, handkerchiefs, diapers. If paper serves a better purpose, insist on those products made from recycled paper.

—— Cut down on items that are overpackaged by buying in bulk whenever possible, and then transfer them to smaller containers at home. This reduces the number of containers discarded and saves considerable money. Avoid individually wrapped slices of cheese and prepackaged fruits and vegetables. Complain to the manager if you are given no alternative.

—— Avoid prepackaged and precooked foods. Cooking from scratch not only wastes less packaging but may cost you less as well.

—— Avoid products packaged in plastics made from petroleum derivatives. Ask your butcher for paper meat trays and your grocer for paper bags in which to put your fruits and vegetables.

—— Avoid products packaged in polyvinyl chloride containers (clear, semi-rigid, glass-like containers which frequently hold shampoo, hand lotion, mouthwash, and cooking oil). These petroleum derivatives give off poisonous fumes when incinerated.

—— When environmentally good products come on the market, buy them, and urge others to do so too.

Think About Reusing Items Around the Home.

—— Scarce paper can be saved by shopping with your own canvas or other reusable shopping bags.

—— Use old newspapers to polish windows and tiles, to clean ovens, and to wrap gifts.

—— Reuse old envelopes and both sides of stationery.

—— Reuse gift wrapping paper and ribbons. Don't wrap presents that come in a box and don't use plastic tape which spoils wrapping paper for reuse.

—— Share magazines with friends, or give to libraries or other institutions.

—— Return metal coat hangers to you. cleaner.

—— Don't throw products into the trash heap when they still have a useful life. Take old furniture and clothing, as well as appliances and toys, to the Salvation Army, Goodwill Industries, or a secondhand shop.

—— If you have a garden or backyard, keep your vegetables and fruit scraps, coffee grounds, and tea leaves, as well as your yard wastes, to make a compost pile.

Think About Assisting the Recycle Process.

—— Collect newspapers, cardboard, and clean paper for separate collection or personal delivery to recycle center.

—— Use different colored containers to collect bottles, aluminum, and tin cans after removing tops and paper labels. Deliver to recycle center when convenient.

—— Flatten cans and boxes, and crush other containers before discarding or holding for recycling collection. Ordinarily, ninety-eight percent of the space in a full trash can is air.

—— If there is no nearby recycling center, consider starting one. Write to Concern, Inc. (2233 Wisconsin Avenue, N.W., Washington, D.C. 20007) for its Recycling Center Plan.

Reduce Litter at Its Sources.

—— As a pedestrian, place candy, gum wrappers, empty cigarette packages, cigarette butts, and other disposable items in sidewalk trash receptacles. If local government doesn't furnish and maintain these, insist that it be done.

—— In automobiles, carry a trash collection container, and use it and the ash tray.

—— In the home, securely enclose garbage and trash put out for collection.

—— Offices and commercial establishments also should use enclosed collection containers.

—— Loading and unloading platforms should be well policed each day to eliminate litter.

—— Trash collection organizations and companies that use open trucks to carry loose materials should keep such trucks covered.

—— Contractors at construction sites should provide and regularly service appropriate on-site receptacles for light construction refuse and for employees' lunchtime and coffee-break discards.

Encourage Others to Think About Waste and Energy Conservation.

—— In the marketplace, ask stores to carry returnable and reusable products and to foster the reduction of superfluous packaging.

—— In the office, start a reuse, recycling program: use of both sides of stationery, separate collection of newspapers, scrap paper, boxes, and other paper products that can be delivered to a recycle center.

—— In your community, encourage energy conservation through the reduction of solid waste and litter. Foster recycling centers. Encourage better community waste collection systems that are more efficient, save money, and that facilitate recycling and energy conservation.

—— In your community, find out what stores, hospitals and other institutions are doing to encourage the recycling of their solid waste. Urge them to set an example for industry and citizens in the community. Reward them by telling the community what good things they are doing.

—— Check on your local community disposal sites. Demand the closure of any open dumps.

—— Investigate the solid waste practices of local industries. Urge improvement of measures that do not foster or facilitate recovery and recycling

—— Industrial executives and company owners, as responsible community citizens, can instill good solid waste management practices into the work patterns of their employees.

*This check list was compiled from similar lists previously published by Concern, Inc., the League of Women Voters, and other sources. The U. S. Environmental Protection Agency is preparing other information materials along these lines. They will provide suggestions on ways and means to help neighborhood and civic groups stimulate and support better solid waste management at both the consumer and community level. For information on the availability of these materials, we suggest writing to the Office of Solid Waste Management Programs, U S Environmental Protection Agency, 1835 K Street, N. W., Washington, D. C 20460

GLOSSARY OF SOLID WASTE TERMS

The following are brief definitions of key words or phrases used in this publication They are prepared for lay readers and should not be considered technically complete Some are excerpts from the National Center for Resource Recovery (NCRR) publication GLOSSARY OF SOLID WASTE MANAGEMENT, which encompasses many more terms and is available from NCRR for 40 cents (Order No NCG-03-02) Address. 1211 Connecticut Avenue, N.W., Washington, D.C. 20036.

Bottle Bill

The vernacular term applied to various federal, state, or local legislative proposals to encourage the refilling and reuse of glass bottles, instead of nonreturnable beverage containers.

British Thermal Unit (Btu)

The unit of heat required to raise the temperature of one pound of water one degree Fahrenheit at or near 39.2 degrees Fahrenheit. In resource recovery systems, Btu's indicate the amount of heat energy available if a given amount of waste is burned.

CONVERSION TABLE

To Convert From	To	Divide By
Btu's	Barrels of Crude Oil	5,600,000
Btu's	Gallons of Gasoline	125,000
Btu's	Kilowatt-hours	3,412.8

Disposal Capacity

The amount of land now being used or designated for deposition of municipal solid waste refuse or the residue from the processing of such by incinerator or other methods.

Ferrous

Metals predominantly composed of iron. In municipal waste, these usually include steel or "tin" cans which can be separated out by use of electromagnets.

In-Plant Waste

Waste generated in the manufacturing process, such as the trimmings from the shaping of sheet metal products. It may be recovered through internal recycling or through a salvage dealer.

Litter

That highly visible portion of solid waste generated by the consumer and carelessly discarded outside of the regular disposal system.

Nonferrous

Metals which contain no iron. In waste materials these are usually aluminum,

copper wire, brass, bronze, etc., which cannot be separated out by magnetic means.

Pilot Plant

Any small-scale experimental facility constructed for the purpose of investigating or testing the technological feasibility of a new energy recovery or resource recovery technology.

Plastics

Man-made materials containing primarily carbon and hydrogen, with lesser amounts of oxygen, nitrogen, and various organic and inorganic compounds Plastics, technically referred to as "polymers," are normally solid in their finished state, but at some stage in their manufacture, under sufficient heat and pressure, they will flow sufficiently to be molded into desired shape. Thermoplastics, such as polyethylene, polyvinyl chloride (PVC), polystyrene, and polypropylene, become soft when exposed to heat and pressure, and harden when cooled. Thermosetting plastics, such as phenolic and polyester, are set to permanent shapes when heat and pressure are applied to them during forming, and reheating will not soften these materials.

Pyrolysis

The process of chemically decomposing an organic substance by heating it in an oxygen-deficient atmosphere. High heat is usually applied to the material in a closed chamber evaporating all moisture and breaking down materials into various hydrocarbon gases and carbon-like residue. The gases may be collected with suitable equipment, and used or sold. The residue may be further processed into useful materials, such as carbon, sand, and grit, or can be landfilled.

Recycling

A resource recovery method involving the collection and treatment of a waste product for use as raw material in the manufacture of the same or a similar product—e.g., ground glass used in manufacture of new glass.

Residential Waste

Waste materials generated in houses and apartments. The materials include paper, cardboard, beverage and food cans, plastics, food wastes, glass containers, old clothes, garden wastes, etc.

Resource Recovery

A term to describe the extraction and utilization of materials and values from the waste stream. Materials recovered, for example, would include metals and minerals which are used as "raw materials" in the manufacture of new products. Recovery of values would include energy recovery by utilizing components of waste as a fuel, production of compost using solid waste as a medium, and reclamation of land through sanitary landfills.

Reuse

The use of a waste material or product more than once. For example, containers are reused when they are returned and refilled.

Sanitary Landfill

A method of disposing of refuse on land without creating nuisances or hazards to public health or safety. Careful preparation of the fill area and control of water drainage are required to assure proper landfilling. To confine the refuse to the smallest practical area and reduce it to the smallest practical volume, heavy tractor like equipment is used to spread, compact, and usually cover the waste daily with at least six inches of compacted dirt. After the area has been completely filled and covered with a final 2- to 3-foot layer of dirt and has been allowed to settle an appropriate time, the reclaimed land may be turned into a recreational area such as a park or golf course. Also, under certain highly controlled conditions, the land may be used as a plot on which some types of buildings can be constructed.

Separation

To divide waste into groups of similar materials, such as paper products, glass, food wastes and metals. Also, the further sorting of materials into more specific categories, such as clear glass and dark glass. Separation may be done manually or with specialized equipment.

Solid Waste

In broad terms, solid waste includes the unused, unwanted solid materials discarded in the process of production and consumption of commodities used by our society. As such, it includes the 4.5 billion tons of animal, mineral, crop, industrial, and municipal waste materials generated in the United States in 1971. As used in this publication, it refers to the garbage, rubbish, and trash discarded from our homes and places of business and the litter scattered across our landscape. It does not include the human and other wastes that enter the sewerage stream.

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