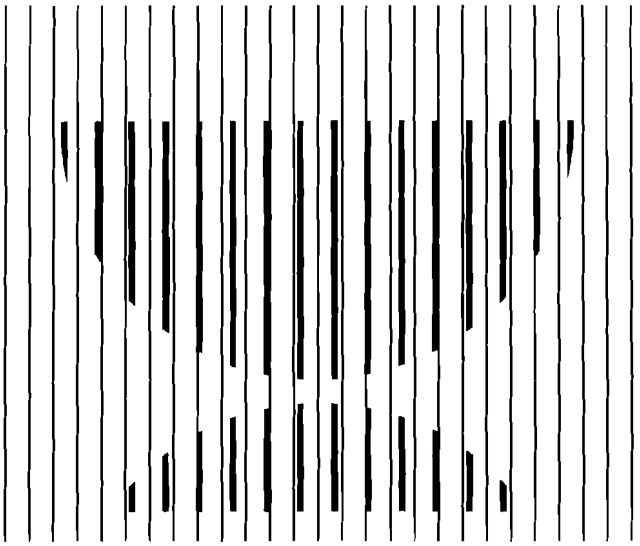
CBO STAFF MEMORANDUM

THE COST OF DECREASING DISPOSAL
THROUGH THE RESPONSIBLE ENTITY APPROACH
USED IN S. 976

April 1992



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This memorandum examines the cost of decreasing disposal through minimum recovery requirements set in the March 23, 1992, version of S. 976. It was written by Terry Dinan. This work was done in CBO's Natural Resources and Commerce Division, under the direction of Jan Acton and Roger Hitchner.

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Provisions in the March 23, 1992, version of S. 976 would amend the Resource Conservation and Recovery Act to establish minimum recovery requirements for four categories of products: certain paper products, glass packaging, aluminum packaging, and plastic packaging. Producers and importers of products in these four categories are defined as "responsible entities" and are mandated to ensure that the minimum recovery rates are met.

This memorandum estimates the additional decrease in waste disposal that would result from achieving the minimum recovery requirements set for 1995 and 2000, and examines the costs associated with meeting these requirements for two product categories: paper and plastic packaging. All of the incremental decrease in waste disposal for 1995 is projected to result from increased recovery of plastic packaging. More than 80 percent of the incremental decrease in disposal for 2000 is projected to result from increased recovery of paper and plastic packaging. Measuring the benefits of the decreased disposal resulting from S. 976 is not a straightforward task, but a potential measure of such benefits and the limitations of the measure are discussed.

DESCRIPTION OF THE RESPONSIBLE ENTITY APPROACH

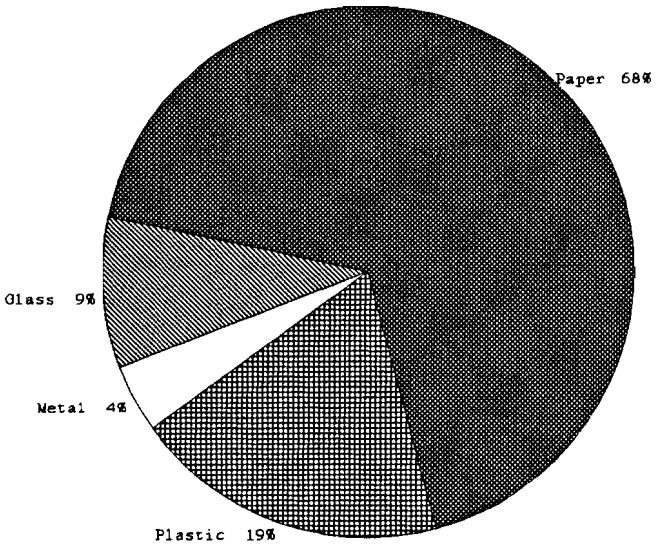
S. 976 would require responsible entities to ensure that minimum recovery requirements for the four categories of materials listed above are met. Paper and plastics represent nearly 85 percent of the total volume of materials covered by the bill (see Figure 1).

Responsible entities are defined as brand-name owners of products manufactured in the United States (or parties to whom products are first imported) that distribute products packaged in materials covered in S. 976 or, in the case of newsprint and printing and writing paper, distribute the materials themselves. A firm must have total annual receipts of $50 million or more to be considered a responsible entity.

Under S. 976, responsible entities may ensure that the required amount of materials is recovered in a variety of ways:

- By reusing the materials themselves in making their products,
- By ensuring that another firm reuses the materials,
- By reducing the weight of the materials used (for example, using lighter containers), or
- By reusing the product for its exact same purpose (for example, using refillable containers).

Figure 1.
Materials Covered by S. 976



SOURCE: Congressional Budget Office using data from Environmental Protection Agency, *Characterization of Municipal Solid Waste in the United States: 1990 Update* (June 1990).

Responsible entities would be required to report to the Administrator of the Environmental Protection Agency (EPA). The reporting requirements would include the amount of covered materials that they used and the methods by which they met their recovery requirements. In cases in which responsible entities entered into agreements with other firms (referred to in this memorandum as end users) in order to ensure that the required amount of their product was recovered, they would need to supply the Administrator with the names and addresses of these end users and describe the use of the covered material. Eligible end users include domestic or foreign firms of any size. These end users would also need to report to the Administrator, indicating the firms that they entered into agreements with and the quantity of materials that they recovered.

EFFECT OF THE S. 976 REQUIREMENTS FOR RESPONSIBLE ENTITIES ON QUANTITIES OF WASTE DISPOSED

The amount of waste diverted as a result of the policy depends on the amount of materials in each category that would be recovered in the absence of the policy. The Congressional Budget Office used projections and stated goals of the industry in developing baseline recovery rates for 1995 and 2000 (see Table 1). The recovery rates projected by the industry were adjusted to be consistent with the recovery rate as it would be defined under S. 976. For example, the paper industry's goal for 1995 is to recover 40 percent of all the paper consumed in the United States. S. 976, however, covers only a portion of paper consumed in the United States. Comparing the industry's projections of the quantity of wastepaper recovered to this smaller base raises the recovery rate to 44 percent.[1]

Decreased Waste Disposal in 1995

The policy contained in S. 976 is estimated to decrease the amount of waste disposed of in 1995 by 1.1 million tons, or about one-half of one percent of the 200 million tons of projected waste generation estimated by the EPA for 1995. The effect of the policy is small because three of the four categories are expected to meet their recovery requirements even in the absence of the policy.

All of the incremental diversion in 1995 results from increased recovery of plastic packaging. The plastics industry expects to recover 25 percent of plastic bottles and rigid containers by 1995. Because bottles and rigid

1. Further adjustments were made to deduct converting scrap from the quantity of wastepaper recovered because converting scrap is defined as recovery by the industry but not by S. 976.

TABLE 1. REQUIRED RECOVERY RATES SET BY S. 976 AND RESULTING DECREASES IN WASTE DISPOSAL IN 1995 AND 2000

	Required Recovery Rates (Percent)		Baseline Recovery Rates (Percent)			Quantities Generated (Millions of tons)		Quantities Diverted (Millions of tons)	
Category	1995	2000	Current	1995	2000	1995	2000	1995	2000
Paper[a]	40	50	33	44	45	71.1	86.1	0	4.3
Glass Packaging	25	50	31	31[b]	31[b]	9.8	8.9	0	1.7
Aluminum Packaging	25	50	40	>50	>50	4.7	4.8	0	0
Plastic Packaging	25	50	4	9.5	9.5[c]	7.1	8.1	1.1	3.3
Total						92.7	107.9	1.1	9.3

SOURCES: Congressional Budget Office using data from the Environmental Protection Agency; Glass Packaging Institute; Aluminum Association; Steel Can Recycling Institute; Society of the Plastics Industry; Jaakko Poyry Consulting, Inc.; and Franklin Associates, Ltd.

a. Includes newsprint, printing and writing paper, paper packaging, and paperboard packaging.

b. The current (1991) recovery rate for glass packaging was used because future projections were not available.

c. The 1995 recovery rate for plastic packaging was used because a projection for 2000 was not available.

containers represent only 34 percent of all plastic packaging, however, the industry is still expected to fall well short of the 25 percent recovery requirement for all plastic packaging.

Decreased Waste Disposal in 2000

The requirements for recovery in 2000 are projected to decrease the amount of waste disposed of by 9.3 million tons, or approximately 4 percent of the 216 million tons of projected waste generation estimated by the EPA for 2000. The paper and plastic categories account for more than 80 percent of the projected decrease in disposal.

Metal packaging is the only category that is expected to meet the recovery requirement for 2000 in the absence of the policy. The two primary components of metal packaging are aluminum and steel cans, which had 1991 recovery rates of 62.4 percent and 34 percent, respectively. The Steel Can Recycling Institute has established an industry goal of recovering 66 percent of all steel cans by 1995. Provided that this goal is met, the recovery rate for metal packaging will exceed the 50 percent minimum requirement.

COST OF COMPLYING WITH THE RECOVERY REQUIREMENTS FOR PAPER FOR 1995 AND 2000

The recycling provisions of S. 976 would require that 40 percent of all newsprint, printing and writing paper, paper packaging, and paperboard packaging be recovered by 1995, and 50 percent by 2000. If the policy forces recovery rates to rise above the levels that would be achieved in the absence of the policy, the end uses of these recovered materials must be expanded. The three major end uses are:

- The domestic paper and paperboard industry;
- Nonpaper and paperboard domestic uses (referred to as "minor uses"), including animal bedding, insulation, and egg cartons; and
- Exports.

The domestic paper and paperboard industry (herein referred to as the paper industry) is the biggest user of wastepaper, accounting for 75 percent of the recovered paper used in 1988. Exports and minor uses accounted for 22 percent and 3 percent of recovered paper, respectively.

There are three category of costs that the United States economy could incur to comply with the paper recovery requirements of this policy:

- o Production costs from expanding wastepaper use by the domestic paper industry, including changes in capital expenses and variable costs;

- o Transaction costs, such as increased labor for tracking recovery rates and filing reports; and,

- o Subsidy payments to encourage increased wastepaper exports and minor uses.

The projected cost of meeting the requirements of this policy for 1995 and 2000 are presented in Table 2. These cost estimates were based on limited data, and these limitations should be kept in mind when viewing the results. A high and a low estimate are presented for each cost category because of the significant uncertainty underlying these estimates.

Cost of the 1995 Recovery Goal

The only costs projected in meeting the 40 percent recovery goal in 1995 are the transaction costs associated with complying with the bill. No additional costs are incurred because the wastepaper recovery rate in the absence of the policy is projected to exceed the 40 percent goal (see Table 2). An important assumption underlying these results is that responsible entities will take advantage of the flexibility allowed under S. 976--that is, firms that do not meet the required recovery rates internally will enter into agreements with other end users in order to comply with the policy. Because the overall recovery rate for the paper category is expected to exceed the goal of 40 percent, these types of arrangements should enable all firms to comply with the policy without any additional expansion of wastepaper use. If responsible entities do not take advantage of this flexibility, then there may be considerable production costs associated with the policy.

The transaction costs associated with the policy are estimated to be between $55 million and $400 million. The EPA estimates that the number of responsible entities could be between 4,000 and 6,000. The number of potential end users includes 360 domestic producers of paper and paperboard and a much larger, but unknown, number of minor wastepaper users and foreign wastepaper users. The transaction costs of foreign firms were not considered because they are not costs to U.S. citizens. The transaction costs of minor wastepaper users were not included because there is so much

TABLE 2. ANNUAL U.S. COST OF MEETING THE PAPER AND PAPERBOARD RECOVERY RATE REQUIREMENTS OF S. 976
(In millions of 1992 dollars unless otherwise stated)

	1995 Requirement		2000 Requirement	
Cost Categories	Low	High	Low	High
Transaction Costs	55	400	55	400
Expansion of Wastepaper Use by Paper Industry				
Capital expenses	0	0	155	170
Variable costs	0	0	-140	-70
Subsidy Payments for Exports	0	0	40	270
Subsidy Payments for Minor Users	0	0	1	5
Total Cost	55	400	110	775
Quantity of Avoided Disposal (Million of tons)	0	0	4.3	4.3
Cost per Ton of Avoided Disposal (Dollars per ton)	a	a	25	180

SOURCE: Congressional Budget Office.

a. Not applicable because no disposal is avoided as a result of the 1995 recovery requirement.

uncertainty about how many there are, and because these users typically handle fairly small quantities of wastepaper and would, therefore, be unlikely to incur much expense in tracking their use.

Both responsible entities and end users would incur additional labor costs to collect necessary information about their use of wastepaper, enter into agreements with other firms, and file the required forms with the EPA. A low-cost estimate of transaction costs was obtained by assuming that 4,360 responsible entities and end users each had to devote 25 percent of an employee's time to these tasks. A high-cost estimate was obtained by assuming that 6,360 responsible entities and end users each devoted 1.25 employees to these tasks. Based on these assumptions, transaction costs were estimated to be between $55 million and $400 million per year.

Cost of the 2000 Recovery Goal

Meeting the 50 percent recovery goal for wastepaper in 2000 could cost the U.S. economy between $110 million and $775 million annually. These costs range between $25 and $180 per ton of avoided wastepaper disposal.

Transaction costs are potentially the largest cost factor. As discussed above, between 4,360 and 6,360 firms may qualify as responsible entities or end users under the policy, each of which would be required to collect information to determine the rate at which it uses wastepaper, enter into agreements with other firms, and file necessary reports with EPA.

Expanding the use of wastepaper by the paper industry would require investments in capital equipment to convert wastepaper into pulp and, in some cases, to remove the ink. The annual cost of this equipment is estimated to range from $155 million to $170 million.

Increased capital expenses may be offset in part by a decrease in the variable costs of production because the variable costs of recycled paper and paperboard production are typically less than those of virgin production. The variable cost savings would be reduced if the increased recovery rates set by this policy brought about an increase in the price of wastepaper. Based on rough estimates of variable cost savings for different types of paper and paperboard production, the total variable cost savings could be as much as $140 million in the low-cost scenario. Alternatively, the high-cost scenario assumes that the policy would cause a large enough increase in wastepaper prices to reduce the variable cost savings by one-half.

Expanding exports and minor uses of wastepaper beyond the level expected in the absence of the policy would require a subsidy payment. Responsible entities would need to pay these users of wastepaper in order to encourage them to use more. If wastepaper prices rise as a result of the policy, larger subsidy payments would be necessary. The per-unit subsidy used in this analysis is the incremental cost of using more wastepaper in the domestic paper industry.

Subsidy payments for exports represent a significant share of the total cost of the policy, particularly under the high-cost scenario. This result occurs primarily because subsidy payments on all exports--including those that would have occurred in the absence of the policy--are a cost to the United States. Subsidy payments for exports create a flow of revenue out of the United States to the foreign countries receiving the wastepaper. Unlike subsidy payments for exports, those made for minor uses that would have occurred in the absence of the policy are a transfer of revenue from responsible entities to U.S. firms in the minor use category and are not a cost to the U.S. economy.

Based on the assumptions used in this analysis, meeting the recovery requirements for 2000 may cost the United States between $110 million and $775 million annually. The policy would be expected to reduce the quantity of wastepaper disposed of by 4.3 million tons; therefore, the policy could cost between $25 and $180 per ton of avoided wastepaper disposal.

COST OF COMPLYING WITH THE PLASTIC PACKAGING REQUIREMENTS

There is not sufficient information available to develop an estimate of the cost of complying with the requirements for plastic packaging. An examination of the current state of plastic recycling, however, indicates that major changes in the industry would have to take place in order for the 1995 and 2000 recovery requirements of 25 percent and 50 percent to be achieved. Achieving these goals could be costly.

Current Plastic Recycling

Slightly less than 4 percent of the plastic packaging produced in 1990 was recycled. Old soft drink and milk bottles accounted for 60 percent of the recycled plastic.

Collecting plastics for recycling tends to be expensive relative to the other three categories of materials covered in S. 976. Plastics are light, sturdy,

and have highly varied performance characteristics. Although these characteristics enable them to serve a variety of purposes, they also make them relatively expensive to recycle.

The high volume-to-weight ratio for plastic bottles and containers means that the weight of material collected in a given truck is low compared with that of other recyclable items. A survey by the Society of the Plastics Industry and R.W. Beck indicated that the average cost of collecting plastics, separating them from nonplastic recyclables such as glass and aluminum, and baling them for sale is $360 per ton.

Once scrap plastic has been collected and baled by communities, it still needs to be sorted by resin type and color. Currently, most processing is done by hand and is expensive, although the industry is experimenting with automated sorting equipment.

Average 1991 prices for the scrap plastic bottles (once they have been sorted by resin type) ranged from $22 per ton to $144 per ton. Avoided disposal costs of more than $236 per ton, therefore, may be necessary to justify collection programs. The EPA estimates that the average national cost of waste collection and disposal in landfills meeting current environmental requirements is $65 per ton.

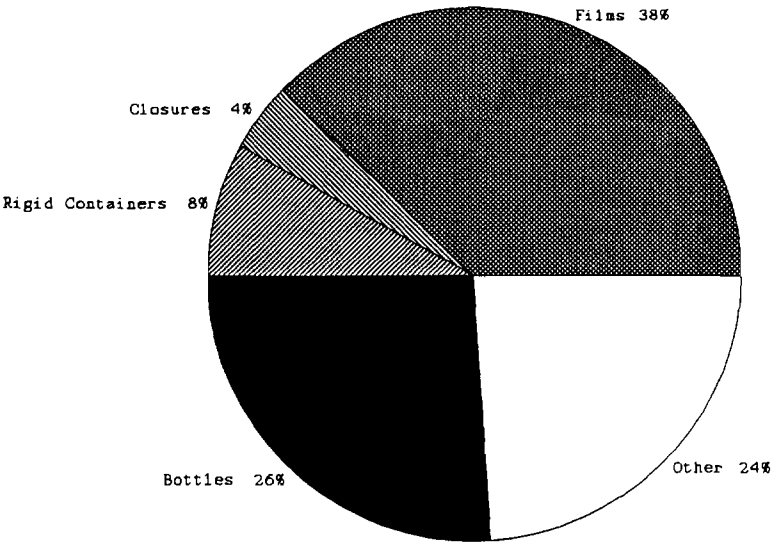
Achieving the 1995 and 2000 Recovery Requirements

The current recycling rate of 4 percent falls far short of the 1995 and 2000 recovery rate requirements of 25 percent and 50 percent. The cost of collecting and sorting plastics, as well as the relative youthfulness of the plastics industry, probably contributes to the current low recovery rate. Plastics accounted for less than 1 percent (by weight) of municipal solid waste generated in 1960 and 8 percent in 1988.

Soft drink and milk bottles currently provide the bulk of recycled plastic, but they represent only 11 percent of the total amount of plastic packaging. Achieving the 25 percent or 50 percent recovery rates required under S. 976, therefore, would necessitate expanding the recovery of other types of plastic.

The plastics industry has been actively encouraging recycling programs and has established a goal of increasing the recovery rate for all bottles and rigid containers (for example, margarine tubs and ice cream containers) to 25 percent. Only 11 percent of bottles and rigid containers are currently recovered. As indicated in Figure 2, bottles and rigid containers account for 34 percent of all plastic packaging. Even if the industry meets its goal,

Figure 2.
Types of Plastic Packaging



SOURCE: Congressional Budget Office using data from the Society of the Plastics Industry.

therefore, only 8.5 percent of all plastic packaging would be recovered. Provided that the rate of recycling in the three remaining categories (films, closures, and others) remains the same, the overall recovery rate for plastics would rise to 9.5 percent.

Reaching the bill's goal of a 25 percent recovery rate for plastic packaging by 1995 will require that either significant quantities of other plastic items, such as films, be recovered or that extremely high recovery rates for plastic bottles and containers be achieved. Although films make up 38 percent of plastic packaging, less than 1 percent of them are currently recovered. The diversity of films, contamination problems, and the lack of collection mechanisms for most films account for their low recovery rate.

A 75 percent recovery rate for plastic bottles and containers would be necessary to achieve a 25 percent overall recovery rate for plastic packaging if significant increases in other types of plastic packaging did not occur. A 75 percent recovery rate is substantially higher than the current 62 percent recovery rate for aluminum cans, which has traditionally been the most profitable material to recover.

Even if 100 percent of all plastic bottles and rigid containers were recovered, the 50 percent recycling requirement could not be met unless significant quantities of other types of plastic packaging were recovered as well.

Alternatives for Reducing Costs

The cost of meeting the recycling requirements for plastics could be reduced in a variety of ways. Three alternatives are discussed here.

First, the recovery rates set for the four categories in S. 976 could be adjusted to reflect the relative cost of recycling materials in the different categories. The relatively high cost of recycling plastics may justify a lower recovery requirement. Alternatively, the types of plastics that are required to meet the 1995 and 2000 targets could be limited to those types that can be recycled most economically, such as bottles and rigid containers.

Second, the policy could be revised to allow trading of recovered units among the four categories. In this case, higher recovery rates for the materials that can be more economically recovered (such as metal packaging) would compensate for lower recovery rates for plastics.

Finally, firms might be allowed either to ensure the recovery of the required amount of their product or to pay a disposal fee that reflects the

average national cost of disposal. For example, a firm that used 100 tons of plastic packaging might meet the 25 percent requirement by ensuring that 10 tons are recovered and paying a disposal fee for 15 tons.

BENEFITS OF THE RECYCLING REQUIREMENTS IN S. 976

Measuring the benefits of the decreased disposal resulting from S. 976 is not a straightforward task. The cost of waste disposal is commonly used as a measure of the benefit of recycling. However, there are two problems with using this measure. First, available measures of disposal costs may fail to account for all of the costs of disposal. Second, to the extent that avoided disposal costs are already accounted for in local decisions about recycling programs, using them as a measure of the benefit of a federal policy would result in double counting.

The EPA estimates that the average cost of disposing of mixed waste in a new landfill meeting current environmental requirements is $20 per ton. This estimate includes the cost of capital, operating costs, and postclosure requirements to prevent environmental contamination. In addition, the average cost of collecting mixed waste for disposal is $45 per ton. Thus, using EPA estimates, the average total cost of collecting and disposing of mixed waste is $65 per ton.

An important issue is whether this measure of disposal cost reflects the full benefits of avoided waste disposal. Strong resistance to the siting of waste disposal facilities may reflect societal preferences that place the cost of disposal at a higher level than is measured by capital and operating expenses. It may be difficult to place a dollar value on these preferences, but they do add real costs to the siting of disposal facilities in the form of negotiations, delays, and financial reimbursement to communities. Efforts to include public preferences would raise the cost of disposal above the $65 per ton estimate.

Another important issue, however, is whether avoided disposal costs are already reflected in the prices of recycled materials and are, therefore, already accounted for. If all households and communities considered the full costs of waste disposal when deciding whether or not to dispose of items or divert them for recycling, then the prices for recycled materials would be expected to reflect the avoided disposal costs. In this case, any policy that encouraged further recycling would make society worse-off. Although prices currently charged for waste disposal often do not reflect full costs, many recycling programs take at least some measure of avoided disposal costs into account. If avoided disposal costs are already incorporated into communities' decisions about the type and

amount of materials to recover, they should not be counted as a benefit of this policy.

CONCLUSIONS

If the baseline projections of recovery for materials were achieved in the absence of this policy, the incremental decrease in disposal from the 1995 minimum recovery requirements set in S. 976 would be about 1.1 million tons, or less than 1 percent of the amount of waste generation projected for that year. The incremental decrease in disposal is small because, assuming that responsible entities take advantage of the flexibility offered under S. 976, the policy would not bring about increased recovery of paper, aluminum, or glass.

The decrease of 1.1 million tons in disposal that is projected in 1995 is attributable to increased recovery of plastic packaging, which is likely to be expensive to achieve. Meeting the 25 percent recovery requirement for plastic packaging would necessitate recovering plastic bottles and containers at a rate even higher than that for aluminum cans, which has traditionally been the most profitable material to recycle. Alternatively, achieving the 25 percent recovery requirement would necessitate increasing the recovery of categories of plastic packaging that currently are recovered in only minor amounts.

The incremental decrease in disposal estimated for 2000 is 9.3 million tons, which is 4 percent of projected waste generation for that year. Forty-six percent of the disposal avoided in 2000 is projected to come from increased recovery of paper products covered under S. 976. Based on available data, the total cost of increased paper recovery is estimated to be between $110 million and $775 million annually, or between $25 and $180 per ton of avoided disposal.

Thirty-five percent of the decreased disposal for 2000 is projected to come from increased recovery of plastic packaging. The cost of meeting the 50 percent recovery rate requirements set for all plastic packaging in 2000 could be very high. Even if 100 percent of all bottles and rigid containers were recovered, the overall recovery rate would rise to only 34 percent. The required recovery rate of 50 percent could not be achieved without beginning to recover substantial amount of films, which currently have a recovery rate of less than 1 percent.

The EPA estimates that the average national cost of collecting and disposing of mixed waste in landfills meeting current environmental requirements is $65 per ton. However, it is unclear whether this estimate of

disposal cost fully reflects societal preferences and whether a full measure of disposal cost should, in fact, be used as a measure of the benefits of this policy.