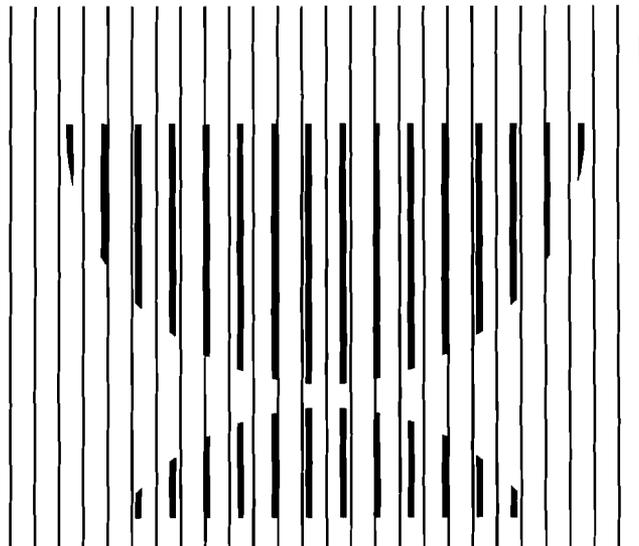




CBO STAFF MEMORANDUM

**THE COST OF DECREASING DISPOSAL UNDER
THE RECOVERY REQUIREMENTS OF H.R. 3865**

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**CONGRESSIONAL BUDGET OFFICE
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This memorandum examines the cost of decreasing disposal through minimum recovery requirements set in section 401 of the June 9, 1992, version of H.R. 3865. 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 June 9, 1992, version of section 401 of H.R. 3865 would amend the Resource Conservation and Recovery Act to establish minimum recovery requirements for five categories of products: all paper, paper packaging, glass packaging, aluminum packaging, and certain types of plastic packaging.

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 the 1995 requirements. The cost of meeting the 2000 requirements was not estimated because the bill does not specify the recovery requirement for all paper in 2000 and there is insufficient information on baseline recovery rates for the packaging categories in that year. Measuring the benefits of the decreased disposal resulting from H.R. 3865 is not a straightforward task, but a potential measure of such benefits and the limitations of the measure are discussed.

DESCRIPTION OF THE RECOVERY REQUIREMENTS IN SECTION 401 OF H.R. 3865

Section 401 of H.R. 3865 would set an industrywide recovery requirement for all paper and paperboard (herein referred to as paper). This requirement would be 40 percent in 1995 and would be increased by the Administrator of the Environmental Protection Agency (EPA) in the year 2000. Individual paper manufacturers would not have to meet specific recovery requirements, but would have to report on their progress in helping the industry meet its overall goal.

The bill would also set requirements for packagers that use the four categories of packaging listed above. Large categories of plastic packaging would be exempt from the requirements, including flexible packaging that protects the quality or integrity of the product, and food packaging (unless use is approved by the Food and Drug Administration, is in widespread commercial use, and can be used in an economically viable fashion). Each packager may comply with the policy in a variety of ways:

- o By reducing the weight or volume of the package,
- o By reusing the package for the same purpose (for example, using refillable containers),

- o By ensuring that a required percentage of the packaging materials used are recovered--by the packagers or through a designee--and used in other domestic products or exported. The requirements are:
 - o 25 percent in 1995,
 - o 35 percent in 1998, and
 - o 50 percent in 2000.

EFFECT OF RECOVERY REQUIREMENTS ON AMOUNT OF WASTE DISPOSAL

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 the industry's projections and stated goals 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 defined under H.R. 3865. For example, the paper industry's goal for 1995 is to recover 40 percent of all of the paper consumed in the United States; by the EPA definition of recovery, however, the 1995 recovery rate would be 37 percent. In the case of paper, the definition of recovery used in H.R. 3865 is assumed to be consistent with the EPA definition. Alternatively, if the definition of recovery used in H.R. 3865 was found to be consistent with that used by the paper industry, then the bill would not bring about any additional recovery of wastepaper.¹

Decreased Waste Disposal in 1995

The projected decrease in disposal resulting from the requirements of section 401 varies depending on which estimate of the baseline recovery rate for plastics is used. Under the higher recovery rate baseline, the total amount of waste disposed of is decreased by 2.5 million tons, or 1.25 percent of the 200 million tons of projected waste generation estimated

1. The difference between the paper industry's and EPA's estimates of the recovery rate results from differences in items included in supply of wastepaper and in items counted as recovered. For example, the paper industry counts converting scrap as recovered, whereas EPA does not. In addition, EPA makes adjustments to the supply of wastepaper to eliminate items that are not counted as municipal solid waste and to include items such as packaging from imported products.

TABLE 1. REQUIRED RECOVERY RATES SET BY H.R. 3865 AND RESULTING DECREASES IN WASTE DISPOSAL IN 1995 AND 2000

Category	Required Recovery Rates (Percent)		Baseline Recovery Rates (Percent)		Quantities Generated ^a (Millions of tons)		Quantities Diverted (Millions of tons)	
	1995	2000	1995	2000	1995	2000	1995	2000
Paper	40	b	37 ^c	41 ^c	84.7	96.1	2.5	n.a.
Paper Packaging	25	50	41 to 47	41 to 47 ^d	38	41.6	0	3.7 to 1.2
Glass Packaging	25	50	26 to 31 ^e	26 to 31 ^e	9.8	8.9	0	2.1 to 1.7
Metal Packaging	25	50	> 50	> 50	4.7	4.8	0	0
Plastic Packaging	25	50	< 10 to 25 ^f	< 10 to 25 ^d	2.7 ^g	3.1 ^h	> 0.4 to 0	1.2 to 0.8
Total					101.9 ⁱ	n.a.	> 2.9 to 2.5	n.a.

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 only that portion of the amount generated that is covered by H.R. 3865.
- b. Not specified.
- c. Based on EPA definition of recovery.
- d. 1995 estimate was used because projections for 2000 are not available.
- e. Current recovery rate was used because projections are not available. Low estimate does not count refillable bottles as recovered. High estimate counts each refillable bottle as recovered five times.
- f. The lower estimate assumes that exempt plastics do not count toward the recovery rate; the upper estimate assumes that all recovered plastic (including exempt plastics) counts toward the recovery rate.
- g. "Most likely" estimate of amount of nonexempt plastic provided by the Society of the Plastics Industry.
- h. Assumes the same growth rate for nonexempt plastics as is projected for all plastic packaging by the EPA.
- i. Paper packaging is not included in this total because it is accounted for in the paper category.

by the EPA for 1995. Under the lower recovery rate baseline, the total amount of waste disposed of is expected to be greater than 2.9 million tons, or more than 1.45 percent of total waste generation.

Most of the incremental diversion in 1995 results from increased recovery of paper. The incremental amount of paper diverted as a result of the policy accounts for only 3 percent of the amount of wastepaper generated.

The plastics industry expects to recover 25 percent of plastic bottles and rigid containers by 1995, or 9.5 percent of all plastic packaging. (Bottles and rigid containers represent 34 percent of all plastic packaging.) Many of the recovered bottles and containers would be food containers and, therefore, would be exempt from the recovery requirements defined under H.R. 3865. The higher baseline recovery rate for plastics assumes that recovered food containers would count toward meeting the recovery requirements for nonfood packagers. For example, a detergent manufacturer that uses plastic containers could ensure that old plastic milk bottles were recovered in order to meet its recovery requirements.

If recycled food containers did not count toward meeting nonfood packaging recovery requirements, then the 1995 baseline recovery rate would fall far below the 25 percent requirement. The baseline rate is difficult to calculate in this case, but it would be less than 10 percent.²

The lower estimate of the baseline recovery rate for glass does not count refillable bottles as being recovered. This estimate is consistent with the EPA definition of recovery rates. The higher recovery rate counts each refillable bottle as being recovered five times. This is the definition of recovery used by the Glass Packaging Industry and is included here because using refillable bottles is one way in which glass packagers may comply with the bill.

2. Soft drink and milk bottles currently account for 60 percent of all recovered plastic packaging. Assuming that they would account for the same share of recovery in 1995, the estimate of recovered plastics, excluding soft drink and milk containers, would be 0.27 million tons, or 10 percent of covered plastics. In reality, the 0.27 million tons would include other food containers as well (for example, ice cream containers); therefore, 10 percent serves as an upper limit on the baseline recovery rate if recovered food containers were not counted toward meeting the recovery requirements for nonfood packaging.

Decreased Waste Disposal in 2000

It is not possible to estimate the incremental amount of waste diverted as a result of section 401 because the bill does not specify the recovery rate for paper in 2000. In addition, estimates of the incremental quantities diverted in the four packaging categories are tenuous because no baseline recovery rates are available for 2000. The most recent estimates of recovery rates are used as a guide to the magnitude of additional packaging that might be diverted as a result of the bill.

One interesting finding is that no additional amount of metal packaging would need to be recovered in order to comply with the 50 percent recovery goal in 2000. The two primary components of metal packaging are aluminum and steel cans, which had 1991 recovery rates of 62.4 percent and 34.0 percent, respectively. The Steel Can Recycling Institute has established an industry goal of recovering 66 percent of all steel cans by 1995. If this goal is met, the recovery rate for metal packaging will exceed the 25 percent recovery goal in 1995 and the 50 percent goal in 2000.

COST OF COMPLYING WITH THE RECOVERY REQUIREMENTS FOR 1995

The recycling provisions of H.R. 3865 would require that 40 percent of all paper (including both paper and paperboard) be recovered by 1995. In addition, the recovery rate for each of the four packaging categories would be 25 percent.

Cost of Meeting the Paper Recovery Requirements

Meeting the goal of recovering 40 percent of wastepaper in 1995 would reduce the amount of wastepaper disposed of by approximately 2.5 million tons and could cost the U.S. economy between \$20 million and \$85 million annually, or between \$8 and \$34 per ton of avoided wastepaper disposal (see 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.

There are three major end uses for recovered paper:

TABLE 2. ANNUAL U.S. COST OF MEETING THE 1995 PAPER AND PAPERBOARD RECOVERY RATE REQUIREMENT OF H.R. 3865

	Low	High
Costs (In millions of 1992 dollars)		
Capital expenses	120	130
Variable costs	-100	-50
Transaction costs	a	5
Total	20	85
Quantity of Avoided Disposal (Million of tons)		
	2.5	2.5
Cost per Ton of Avoided Disposal (Dollars per ton)		
	8	34

SOURCE: Congressional Budget Office.

a. Less than \$1 million.

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

The domestic 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. This analysis assumes that all of the additional recovery of paper under H.R. 3865 stems from increased use of recycled paper by the paper industry. This assumption was made because H.R. 3865 places responsibility for meeting the recovery goal on the paper industry in two ways:

- o Paper manufacturers are required to report to EPA on their individual efforts in meeting the overall goal for the industry; and
- o Paper manufacturers would be required to comply with company-specific recovery requirements if the industrywide goal is not met.

Two category of costs that the U.S. economy could incur in complying with the paper recovery requirements of this policy are examined:

- o Production costs from expanding the use of wastepaper by the domestic paper industry, including changes in capital expenses and variable costs; and
- o Transaction costs, such as increased labor for tracking recovery rates and filing reports.

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 \$120 million to \$130 million.

Increased capital expenses may be offset in part by a decrease in the variable costs of production because the variable costs for recycled paper and paperboard production are typically less than those for virgin production. The variable cost savings would be reduced if the increased recovery rates set by this policy caused the price of wastepaper to rise. 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 \$100 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.

The transaction costs associated with the policy are estimated to be between less than \$1 million and \$5 million. About 360 domestic producers of paper and paperboard would be required to file forms with EPA. A low-cost estimate of transaction costs assumes that each producer had to devote 5 percent of one employee's time to these tasks; a high-cost estimate assumes 25 percent.

This analysis does not fully capture all of the effects of increased use of recovered wastepaper. Three types of effects that are not reflected in the cost estimates provided above are:

- o Costs to households and businesses of separating wastepaper,
- o Transportation costs and emissions, and
- o Emissions from paper production.

Increased recovery of wastepaper would require households and businesses to put more effort into separating wastepaper. No estimates have been made of the additional time and effort that might be required to do this.

Increased use of wastepaper by the domestic paper industry would require more shipments of wastepaper to paper mills and fewer shipments of virgin materials. No information is available on whether the amount of transportation required (and, therefore, both costs and emissions) would increase or decrease as a result of this change.

The increased use of wastepaper and decreased use of virgin materials would cause changes in the types and quantities of pollutants emitted by paper mills. Some types of pollutants would be likely to increase, others to decrease. These changes are not reflected in the cost estimates provided above. A study conducted for the Natural Resources Defense Council, however, examined the change in pollution abatement costs with increased use of recovered materials for two types of paper production: corrugated containers and boxboard (for example, shoe boxes and cereal boxes).³ This study estimated that the total costs of abatement would be lower when recovered materials are used than when virgin materials are used if the level of emission for each type of pollutant that was examined was held constant.

3. John Schall and Reid Lifset, "The Economic and Environmental Impact of the Recycling Utilization Standards in S. 976 Resource Conservation and Recovery Act Amendments of 1992" (paper prepared for the Natural Resources Defense Council, April 1992).

Cost of Complying with the Packaging Requirements

The cost of complying with the packaging requirements would vary depending on whether the high or low baseline recovery rate for plastic packaging is used. Both of these cases are discussed below.

High Baseline Recovery Rate for Plastics. No production costs are expected to result from the packaging requirements in 1995 because the baseline recovery rate for each of the packaging categories is expected to exceed the 25 percent recovery requirement.

An important assumption underlying these results is that packagers will take advantage of the flexibility allowed under H.R. 3865--that is, packagers that do not meet the requirements themselves will enter into agreements with other firms that use the recovered materials (referred to here as end users) in order to comply with the policy. Because the overall recovery rate for each packaging category is expected to exceed the goal of 25 percent, these types of arrangements should enable all firms to comply with the policy without any additional recovery of packaging materials. If packagers choose not to, or are unable to, take advantage of this flexibility, then the policy may create significant additional production costs.

Packagers may be unwilling or unable to take advantage of the flexibility offered by H.R. 3865 because:

- o The cost of finding firms that recover materials and entering into agreements with them is too high;
- o Firms that use recovered packaging materials demand excessive prices for the sale of their excess recovery rights;
- o Packagers that use recovered materials refuse to enter into agreements with packagers that do not in order to force them out of the market and thereby enhance their own market share;
- o There is too much uncertainty surrounding the legitimacy of these types of agreements or the price that firms will have to pay to enter into these agreements in the future.

Transaction costs associated with the recovery requirements for packaging could be substantial, possibly between \$1.5 billion and \$7.5 billion. Both packagers and end users of recovered packaging materials would incur additional labor costs to collect necessary information about their use of recovered materials, enter into agreements with other firms, and file the required forms with EPA. Approximately 300,000 corporate tax returns were filed by manufacturers in 1988. The estimates of transaction costs provided above assume that each of these firms would qualify as either a packager or an end user under H.R. 3865.⁴ The \$1.5 billion estimate of transaction costs was obtained by assuming that each of the 300,000 firms had to devote 10 percent of one employee's time to these tasks; the \$7.5 billion estimate, by assuming that each firm devoted 50 percent.

If a size limit were placed on the definition of "packager" used in H.R. 3865, then the amount of transaction costs could fall substantially. If firms were required to have gross revenues of greater than \$50 million to qualify as "packagers," then the transactions costs associated with H.R. 3865 could be similar to those estimated for the responsible entity provisions of S. 976, or between \$55 million and \$400 million.⁵

Low Baseline Recovery Rate for Plastics. Production costs associated with the recovery requirement for plastic packaging could be significant if recovered food packaging does not count toward the 25 percent recovery requirement. In this case, the baseline recovery rate for plastic packaging would be less than 10 percent (see discussion above). The amount of plastic packaging recovered would have to more than double in order to meet the 25 percent requirement. In addition, the increase in recovery would have to come from nonfood plastic containers, which are currently recovered in smaller amounts than food containers and, therefore, are likely to have relatively higher recovery costs.

4. In reality, not all manufacturers would qualify as packagers under H.R. 3865, but many retailers and distributors would. The figure of 300,000 manufacturers was used as a gross estimate of the number of firms that would be subject to the packaging requirements.

5. Congressional Budget Office, "The Cost of Decreasing Disposal Through the Responsible Entity Approach Used in S. 976," CBO Staff Memorandum (April 1992).

BENEFITS OF THE RECYCLING REQUIREMENTS IN SECTION 401 OF H.R. 3865

Measuring the benefits of the decreased disposal resulting from H.R. 3865 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 reflected in local decisions about recycling programs, using them as a measure of the benefit of a federal policy would result in double-counting.

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 that 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 estimate of \$65 per ton.

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 H.R. 3865 would be between 2.5 million tons and 2.9 million tons, or between 1.25 percent and 1.45 percent of the amount of waste generation projected for that year.

Most of the incremental decrease in disposal in 1995 would result from the increased recovery of paper. The cost of meeting the 1995 paper recovery requirements is estimated to be between \$20 million and \$85 million annually, or between \$8 and \$34 per ton of avoided wastepaper disposal.

Provided that packagers take full advantage of the flexibility offered by H.R. 3865, there would be no significant production costs incurred to comply with the 1995 requirements for at least three categories of packaging: glass, paper, and metal. If no size limit is placed on the definition of a packager, however, transaction costs could be very substantial--possibly between \$1.5 billion and \$7.5 billion.

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.