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Recycling: Market Analysis*

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Recycling: Market Analysis*

by

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Summary

To arrive at any practical solution for extensive recycling, both technology and economics must be considered. This bulletin deals with the present state of local markets for glass, ferrous metals, aluminum, brass and copper, lead, paper, rags and rubber. Although there are salvage outlets for all of these materials, only glass and metal cans are accepted in unlimited amounts. Junk cars are accepted by two dealers, with no payment, and bulk metal, such as appliances, by only one, with no payment. The amount of paper accepted is limited by the physical size of the companies, and their share of the paper market. However, at this time the marketing limit has not been reached.

Part I

Introduction

Recycling involves technology and economics to an extent that the two cannot be separated, if a practical approach is to be reached. Any proposed solid waste disposal system must be economically feasible to be accepted in the immediate future, but it must also be flexible enough to allow for changes, both in the composition of solid waste and in the economy. As both the private citizen and manufacturers become more aware of ecological problems, the amount and structure of solid waste may change drastically. The economy may see changes such as tax incentives, depletion allowances, freight rate changes, and other moves to stimulate using of secondary materials. It is also conceivable that both unemployment increases and concern over exhaustion of energy sources will result in a preference for greater use of labor and lessened use of raw materials in manufacture. However, the present situation must be considered first.

This bulletin deals with the present state of markets for glass, ferrous metals, aluminum, brass and copper, lead, rags and rubber in Part I and paper in Part II. The information about most materials presents the situation in Monroe County. Since paper constitutes over 50% of municipal waste (by weight) and the overall situation in the United States can provide pertinent information for local planning, more extensive coverage is given to recycling of paper. The following percentages by weight have been given for the various components of municipal waste (1): paper 42-60; food 8-12; glass and ceramics 7-8; metallic 7-8; plants, trees, grass 7-15; plastics 1-4.

* This report is based primarily on "Recycling Municipal Wastes: A Preliminary Report by the Recycling Committee of the Rochester Engineering Society Task Force on Solid Waste Disposal," June 21, 1971. It was reviewed by Roger Hoadley, P. E., and Milton Gross, Eng.

Glass

The Glass Containers Manufacturers Corporation has arranged for recycling of glass in most states. The glass must be delivered to them, however, and the costs of transportation and labor pose more of a problem in New York than in many states. In Ann Arbor, for instance, an ecology group paid a rubbish collector to haul glass collected seventy miles and, after paying him, still made a fair profit. Handling glass has presented other problems, mainly because of the weight involved.

The standard price paid for glass is \$20 per ton, delivered to the company and Owens-Illinois, in Brockport, is no exception. The glass usually must be delivered sorted into clear, green and brown. At times the company can process all colors together, but the procedure is so sporadic that the public cannot be asked to do one thing one week and something else the next. In parts of the country where the glass is used for glasphalt (road covering which is used in place of asphalt) or glass bricks, color sorting is not necessary. Neither of the latter uses allows glass to be reused as glass, however.

The local plant, Owens-Illinois in Brockport, has stated that it will take any amount of glass available. If they cannot use it themselves, they will ship any surplus to a branch which can use it. Manufacturers of glass containers currently favor recycling in the form of re-melting glass over recycling in the form of re-use of the original container (returnable bottles). However, the use of returnable and interchangeable containers, such as the beer bottles used by many companies in the Pacific States, results in savings of both mineral resources and energy.

Ferrous metals

Recycling iron and steel varies nationwide, but it is usually cheaper and easier to use virgin ore than scrap. Freight charges are as much as three times as high for scrap as for virgin ore. Recently built basic oxygen furnaces are under construction (3) employing a modified process called Q-BOF, which can utilize up to 50% scrap and which give higher yields of steel with lower capital and operating costs and lower coke demand than conventional furnaces. Bethlehem Steel in Buffalo accepted scrap iron in the past, but claims that contamination from grease and paint result in air pollution problems when the scrap is remelted. "Tin" cans are actually mainly steel and constitute an important portion of reclaimed ferrous metal.

Locally Ajax Auto Supply and Genesee Scrap Metal accept junk cars delivered to them and charge if hauling is required. The cars are crushed and shipped out to various points, including Hamilton, Ontario. Ajax currently accepts all other junk metal, such as used appliances, but does not pay for it (as recently as October, 1971 it brought \$6 per ton). The other companies are charging to dispose of junk iron and steel.

Ajax also accepts cans, in amounts of a ton or more, but neither pays for them nor encourages their delivery. American Can Co. in Fairport does accept any amount of cans and will pay \$10 - \$15 per ton soon after delivery for a ton or more. (Smaller amounts are credited to local environmental groups and they are paid when amounts build up.) They do not, however, pay \$200 per ton for all-aluminum cans, as these are not sorted out. Although the market varies, American Can Co. will continue to accept any amount of cans, as will other branches and other can companies in a total of thirty-eight states.

Aluminum

Local scrap companies, such as Krieger's Waste Paper Co., will give 10¢ per pound or \$200 per ton for aluminum (cans, foil and foil containers, lawn chairs, kitchen utensils, "flying saucer" sled, etc.).

Brass and copper

All scrap dealers pay for these two metals and welcome them. Prices are good, but vary.

Lead

Some dealers buy lead storage batteries for \$1 each and resell them for the lead. The market fluctuates and the long term outlook for disposing of lead may be questioned in terms of increasing objections to the use of lead additives in gasoline. However, since chemists say that lead should be kept out of gas not only because it is a pollutant, but because it is a very valuable and essential resource, there would appear to be other demands for it, such as batteries, nuclear shielding, underground piping and cable cover.

Tin

While the steel part of "tin" cans is reclaimed, there are few remaining detinning plants which could reclaim the tin coating. Therefore, the tin from most cans is lost.

Rags

Rags, cotton preferred, are accepted for recycling by companies such as Krieger's and individuals often bring in pillows, cushions and old mattresses, as well as clothing.

Rubber

Methods for reclaiming rubber were not very successful until 1944 when Sverdrop and Elgin invented the "Reclaimator" process. This process carries out the required thermo-chemical relationship in less than five minutes, through a machine which generates its own temperature of "devulcanization" by mechanically working finely ground rubber (2). Auto tires, the main source of scrap rubber, have real value only when they are available near the reclaiming stations. Reclaimed rubber averaged 11.5¢ per pound in 1962, compared to 8¢ in 1947. Although there are technological advantages in using reclaimed rubber, economical factors (such as freight rates) have prevented extensive use except during World War II when an emergency need resulted in an increase, in the price paid, from \$15 per ton FOB Akron to \$25 per ton FOB anywhere in America. If freight rates were lowered or costs of manufacturing new rubber increased, recycling could be economically feasible.

At present it is impossible to recycle tires locally. The tire dealers return their used tires to their own distributors who in turn ship many of them to Akron. Dealers cannot take other junk tires from the public, however, and scrap dealers say that it would cost them money to ship tires to Akron.

Plastics

Extensive recycling of processing scrap from thermoplastics is practiced by manufacturers. However, the multitude of types of plastics, difficulty of distinguishing different types, the low percentage in municipal waste, low inherent value, and contamination make recycling of plastics from municipal wastes generally impractical at the present time.

Part II

Paper

Americans consume approximately 55 million tons of paper and cardboard a year or 120 pounds per person per year. This is 18% of all the paper produced in the world. Of this, 20% is made from recycled paper, compared to 40% during World War II. In 1966 the United States ranked twelfth internationally for percent of total wood fiber products produced from reclaimed pulp. Japan ranked first with over 45% recycled. The major problem with paper recovery is that 70% of paper waste products is discarded as trash.

Table 1. Paper consumption per individual by product type (2), (1969)

<u>Product</u>	<u>Consumption</u> Lbs	<u>Discard from home</u>
Newsprint	87	78
Groundwood paper	10	2
Book paper	48	24
Fine paper	23	8
Coated-industrial paper	58	25
Sanitary & tissue	31	15
Construction	15	-
Container board	115	11
Bending board	64	32
Building board	26	-
Other board	30	-

Table 2 lists some of the ways recycled paper can be used (2).

Table 2. Waste paper recycling chart

<u>Grade</u>	<u>Recycling use</u>	<u>Type of finished products</u>
Mixed paper	Roofing saturating felt Chipboard	Tar paper for roofs Paper cores for toilet paper, etc. Shoe boxes.
Magazines	Filler for cylinder Board grades	Food cartons such as soap and cereal Personal products cartons such as Kleenex
Newspaper	Deinked newsprint Insulating board Back line for cylinder board grades Building board grades Shredded paper Molded products	Printing newspapers Insulating houses Same as for (mixed) Building houses and inside walls Packing materials Egg cartons
Corrugated containers	Jute liner board .009 corrugated Medium For strength and drainage in cylinder board grades	New corrugated containers (boxes) Same final products as mixed news plus suit boxes, beer, solid fiber containers, carry-out car- tons for bottles and cans.

Table 2, continued

<u>Grade</u>	<u>Recycling use</u>	<u>Type of finished products</u>
New double Kraft lined corrugated cuttings	Same as for corrugated except higher grade uses or requiring less equipment.	
Groundwood shavings	Direct Kraft Pulp substitute. Building board (plaster board) Cylinder board grades	Building houses and inside walls. Same finished products shown for mixed, egg cartons, flower pots, etc.
White news blank	Ground wood pulp substitute.	Ground wood printing papers.
Publication blank	Liners for cylinder board grades	Same products shown for mixed.
Hard white shavings	Liners for cylinder board grades	Same products shown as mixed, for towels, etc.
No. 1 Flyleaf	Drinking grade for book paper	Printing papers
No. 1 Book-stock		

Figure 1 shows the projected demand and supply of fiber for pulping in the United States. It is clear that, if all factors remain constant, the United States will not have enough supply to meet demands. By 1985 the North American supply will not be sufficient to meet needs.

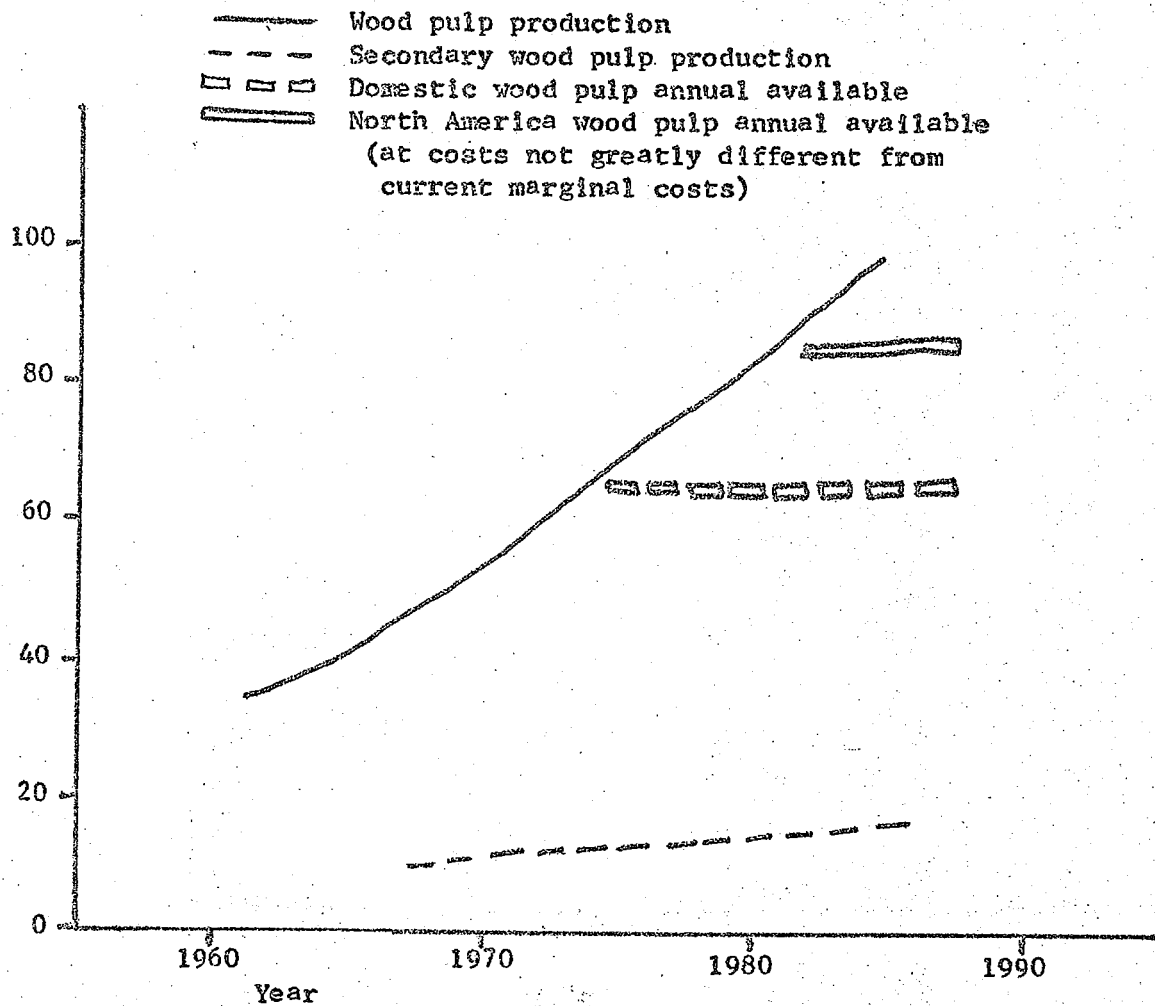
Certain things could alter this demand, such as 1) Imports from outside North America could increase, 2) Increased costs could cause more substitutes to enter the market, 3) Higher yields could increase the supply and/or 4) Substantial recycling could occur.

Local markets

The following local companies which collect and resell wastepaper in this area were contacted: Atkins, Baker Eli Sons, Gordon, Krieger and Spector. The Salvation Army trucks directly to U. S. Gypsum in Oakfield, New York. The current price paid by them for mixed, clean waste paper is \$6* per ton. It was impossible to determine the amount of wastepaper now collected in Monroe County because of discrepancies in reports. One dealer said he collected 150 tons per week, which was 90% of the waste paper in the Rochester area, while another said he handled 300-400 tons per week. The major, if not only, destination for this is chipboard or wallboard, for which heavy industrial paper and cardboard are preferred. Some dealers do not accept magazines and one does not take newsprint.

* Since this report was reviewed, the price paid for waste paper has increased to \$10.

Figure 1. Projected demand and supply of fiber for pulping in the United States.



References

- 1) Kupchik, G. J., Address to Congress on Environmental Health, A.M.A., April 26, 1971
- 2) U. S. Office of Science and Technology, Solid Waste Management: A Comprehensive Assessment of Solid Waste Problems, Practices and Needs, Washington, 1969.

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