

## TOOL 10. OTHER ECONOMIC BENEFITS OF RECYCLING

### INTRODUCTION

Recycling involves collection, processing, and end product use. The most economic benefit can be realized if all three components are developed locally. Although collection is always local, processing and end product use is not always economically feasible at the local level. This tool examines the economic benefits of recycling as well as the impact on solid waste collection and disposal. It should be noted that some of the economic benefits realized through recycling may not directly impact the community involved in materials recovery. Materials recovered in Wyoming may need to be exported to end product markets.

### JOB POSITIONS CREATED

#### Recyclables Collection

Job positions created by recyclables collection (including yard trimmings) may be new positions or may be filled by shifting personnel due to a decreased need in the solid waste/refuse collection system. If personnel are shifted, then there is not an economic benefit to labor unless the new positions result in higher pay. The number of collection positions created by recycling depends on the system chosen.

**Curbside Collection.** Recyclables collected curbside require, at minimum, a route driver. If the quantities and or participation rate is such that it is more efficient for the driver to stay in the collection vehicle, then a collector is added to the crew. A curbside sort system of recyclables recovery may necessitate that two collectors be added to the system. The system chosen depends on the vehicles used, the number of household participating in the program, the distance between households, the number of materials collected, labor union considerations, etc.

- **The most economic benefit can be realized from recycling if collection, processing, and end product use are developed locally.**

- **Jobs created by recycling may be new positions or may be filled by shifting personnel from other departments.**

**Drop-off Collection.** Recyclables collected through a drop-off system will create fewer jobs than curbside collection since the residents are responsible for transporting the recyclables. Labor for curbside collection would not be used.

Drop-off centers can be opened every day, once a week, once a month, or whatever is appropriate. One person could be responsible for drop-off centers in several communities by rotating the hours or days that the centers are opened. The centers can be staffed or unstaffed. Unstaffed centers result in higher levels of contamination in the recyclables and increase the possibility of vandalism and illegal dumping of non-recyclable materials.

### Recyclables Processing

A recyclables processing facility will create new jobs for a community. The number of jobs depends on the quantity of material collected, the method of recyclables collection, and the targeted market for processed materials. A processing facility will require skilled labor for management positions, equipment operation and facilities maintenance. Unskilled labor can be used for recyclables sorting and other needs.

**Recyclables Processing Facilities.** While there are many variations, recyclables processing facilities (RPFs) are designed to receive recyclable materials already sorted (either by the resident or the collection crew). This means that RPFs are required to do less processing than other types of facilities to prepare materials for market. The primary functions of RPFs are densifying materials to reduce transportation costs and removing contaminants to assure quality.

**Materials Recovery Facilities.** Materials Recovery Facilities (MRFs) are designed to process commingled recyclable materials. MRFs vary considerably in complexity, size and the variety of incoming materials. Employment at a MRF depends not only on the quantity of recovered

- **Recyclables collected through a drop-off system will create fewer jobs than curbside collection of recyclables.**

- **A recyclables processing facility will create skilled and unskilled labor positions.**

material processed but the degree of mechanization.

As the quantity of recovered materials increases so does the number of employees. Employment is also affected by the addition of recyclable materials types. The impact on employment depends on the technology of the MRF.

An increase in materials will have a greater impact on a low-technology (low-tech) MRF since this type of MRF relies less on mechanical sorting equipment and more on manual labor. Low-tech MRFs generally utilize magnetic separators to remove steel cans but sorters to separate the other materials.

High-technology (high-tech) MRFs take advantage of more mechanical and automated sorting and processing techniques. Besides magnetic separators, high-tech MRFs also use traveling chain curtains, air classifiers, or other types of separation equipment, which pulls off the lighter containers. An eddy current separator removes aluminum cans from plastic containers and an optical separator can be used to separate plastic resins.

An example of the difference in labor requirements of a RPF and MRF is shown in Table 10-1. These examples are from Tables 4-3 and 4-4 in Tool 4. Averaged U.S. data from the 1995-96 MRF report published by the Government Advisory Associates is also included.

**Composting Facility.** Active composting technologies can be classified into the following categories: windrow, aerated static pile, and in-vessel systems. The technologies vary in the method of air supply, mixing of the compost, the time required to produce a finished product and the capital and operating costs. The waste to be composted and end product specifications determine the composting technology chosen.

- **An increase in recyclable materials will have a greater impact on labor at a low-tech MRF.**

- **High-tech MRFs take advantage of more mechanical and automated sorting and processing techniques.**

Windrow composting is commonly used for yard trimmings. This method of composting requires minimal technology. The windrows are turned by standard equipment such as a front-end loader, or by specialized equipment designed specifically for windrows. Labor requirements include that for heavy equipment operation to turn the windrows and maintain the equipment and that to receive the yard debris and perform general upkeep at the facility. Depending on the size of the facility, one person may be able to handle all job duties.

Aerated static pile composting requires a higher level of technology since the compostable material is placed in piles that are mechanically aerated instead of being turned. This type of technology would eliminate the labor of turning the piles but would require personnel to constantly monitor the aeration system. Capital costs would be higher for this type of system.

In-vessel systems rotate or agitate the organic matter in an enclosed drum or silo. In-vessel systems control the compost process more closely than the other two systems resulting in less odors being emitted and faster completion of the composting process. This technology is more complicated and therefore more costly. The labor requirements for this system are similar to the other two systems.

Warren Air Force Base in Cheyenne is currently composting the organics generated at the base in a plastic Ag-Bag. This enclosed vessel, measuring five by two hundred feet and holding about 80 tons, produces compost in about 2 months.

A windrow system is included in example Table 10-1. It was assumed that a facility servicing 5,000 households would compost 1,300 tons per year. It was also assumed that one person could accept the compostibles at the gate, grind the material, if necessary, place it into windrows, periodically turn the windrows, distribute the finished product, and maintain the facility.

- **Composting with windrow technology is commonly used for yard trimmings.**

Table 10-1  
 EXAMPLES OF LABOR REQUIREMENTS  
 FOR RECYCLABLES PROCESSING

Facility Type	FTE	Average tons per year processed	Average tons processed per FTE	Source
RPF	4	3,900	975	Table 4-3
MRF	17	26,000	1,530	Table 4-4
MRF	23	28,860	1,260	GAA, 1995
Composting	1	1,300	1,300	FAL

FTE = full time equivalent employee

### Administrative Personnel

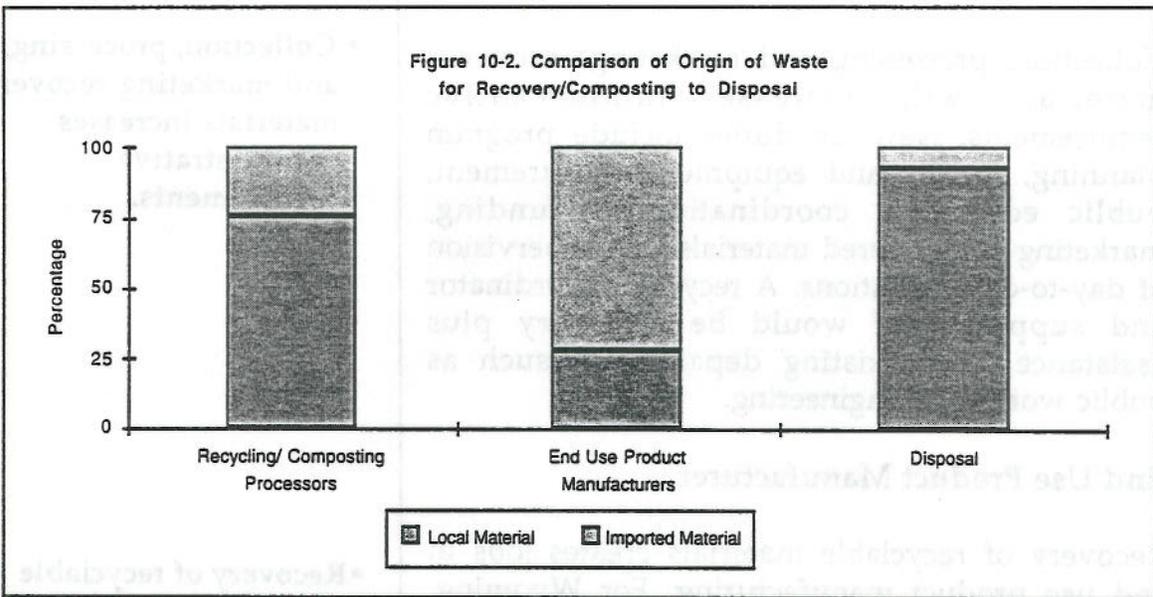
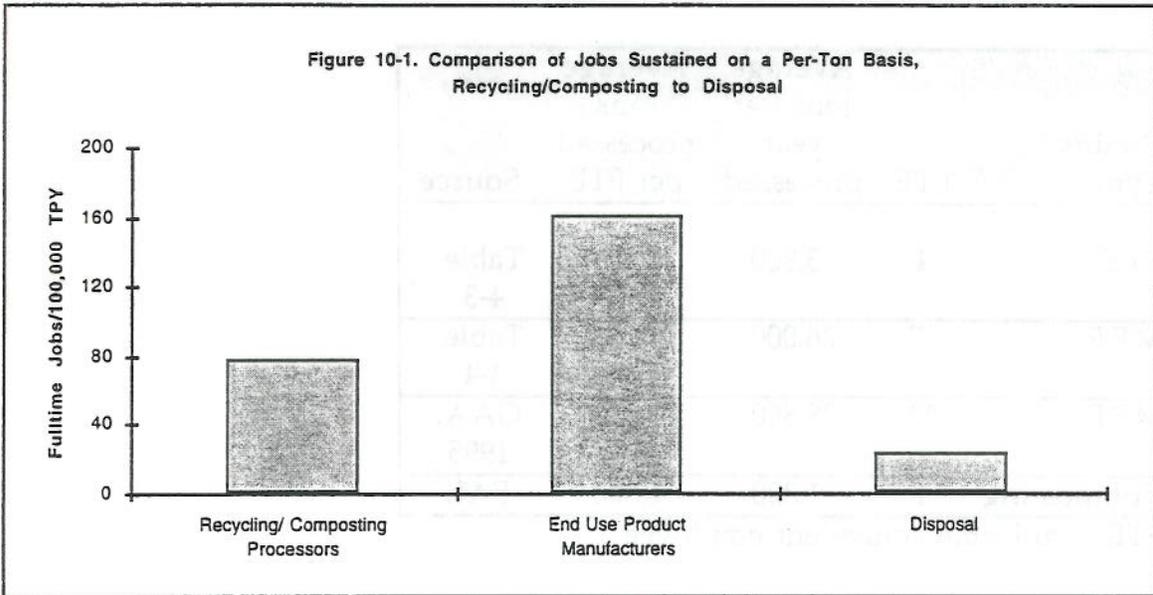
Collection, processing and marketing recovered materials will increase administrative requirements. New job duties include program planning, facility and equipment procurement, public education, coordination of funding, marketing of recovered materials and supervision of day-to-day operations. A recycling coordinator and support staff would be necessary plus assistance from existing departments such as public works and engineering.

- Collection, processing, and marketing recovered materials increases administrative requirements.

### End Use Product Manufacturer

Recovery of recyclable materials creates jobs in end use product manufacturing. For Wyoming, these manufacturing facilities are less likely to be local. To be more cost effective, manufacturing facilities are usually built in areas where there is an ample supply of raw materials. Since the raw materials for end use product manufacturing are supplied by human consumption, the facilities are located in the more populous regions.

- Recovery of recyclable materials creates jobs in end use product manufacturing.



Source: Institute for Local Self-Reliance, 1994.

A 1994 study done on the east coast showed that more jobs were sustained, on a per ton basis, through end use manufacturing than recyclables processing or disposal (Figure 10-1). The same study also showed that these manufacturers imported 75 percent of their raw materials from outside the region (Figure 10-2) (Platt, 1995).

### Recycling Facilities and Equipment

Constructing and manufacturing the facilities and equipment used in recycling also creates jobs. Recycling requires collection vehicles and containers, processing facilities (including MRFs), transport equipment for delivery of recyclables to end use markets, and secondary materials manufacturing plants. Significant job creation occurs in this area.

### JOB POSITIONS LOST

Materials collected for recycling and composting will decrease the amount of solid waste collected for disposal and some job losses will be experienced here and in related areas. It is reasonable to expect that in Wyoming the gain in the number of recycling jobs would be greater than the job loss in the solid waste system. If a community provided yard trimmings collection and no recyclables collection, then the gain/loss comparison would be closer. This reflects higher labor needs to collect and process recyclables than yard trimmings.

According to a North Carolina study done in 1994, for every 100 jobs created by recycling, an estimated 10 jobs are lost in the solid waste industry plus 3 jobs in virgin material extraction (such as timber harvesting or mining) industries within that state. Jobs loss in virgin material extraction industries not located in the state were not quantified. The study found that growth in recycling jobs did not increase or decrease average hourly wages in North Carolina (Shore, 1995).

- **Significant job creation occurs in constructing and manufacturing recycling facilities and equipment.**

- **Materials collected for recycling and composting will decrease the amount of solid waste collected for disposal which will impact jobs in the solid waste system.**

## LOCAL USES FOR RECYCLED RESOURCES

Locally, compost can be used as mulch or a soil amendment for recreational facilities or along the highways. Recovered newspapers can also be used within the community for animal bedding or fuel.

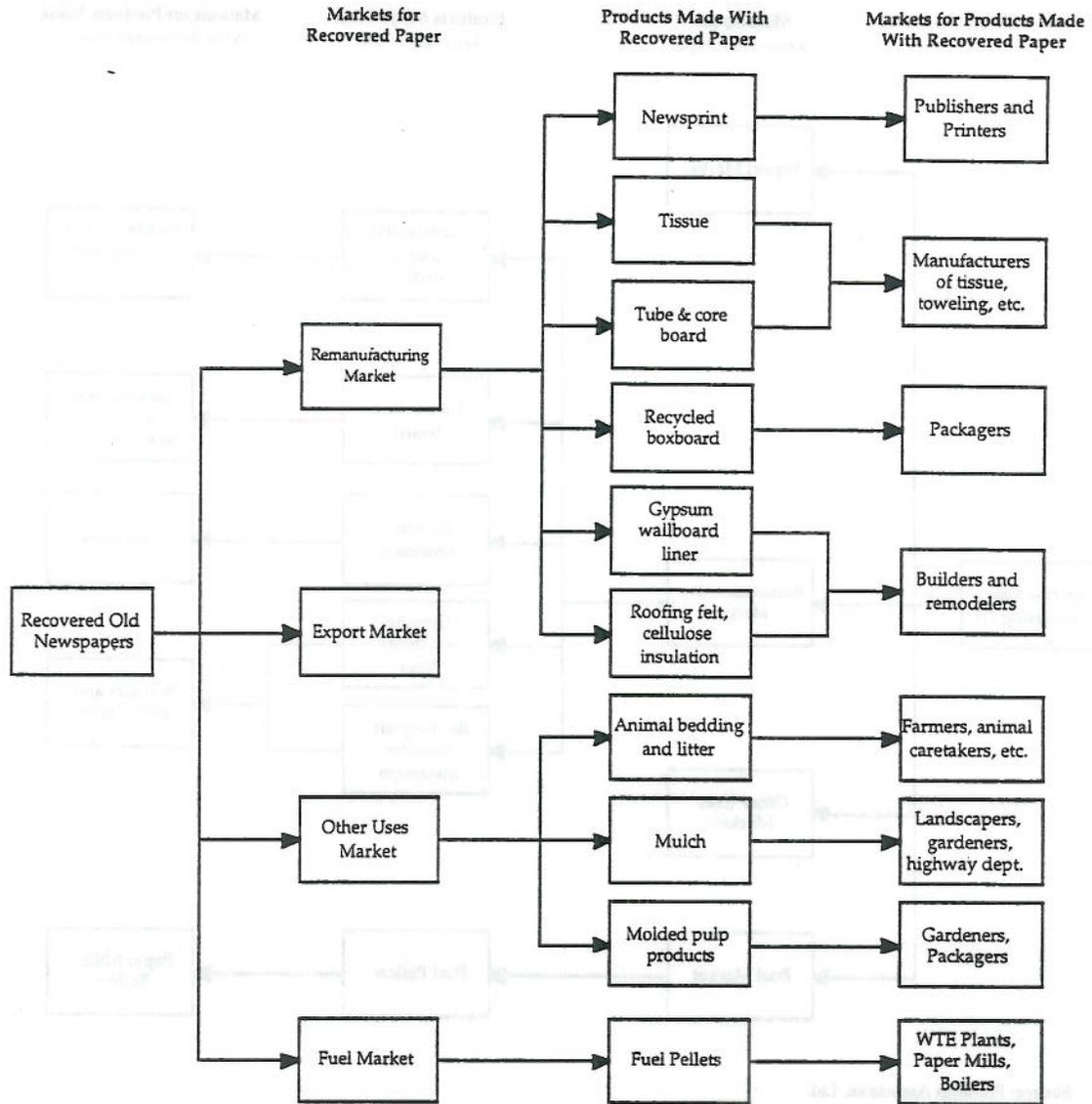
Figures 10-3 through 10-11 illustrate the potential uses for recycled materials. As mentioned previously, recovered materials are often shipped out of the region for end product use. This is particularly true for recovered containers. Detailed discussion of individual material uses can be found in *The Role of Recycling in Integrated Solid Waste Management to the Year 2000* Franklin, 1994.

Figures 10-3 through 10-11 include market identification for the following materials:

- newspapers (ONP)
- old corrugated containers (OCC)
- mixed papers
- glass
- HDPE
- PET
- residential steel
- aluminum cans
- compost.

Figure 10-3

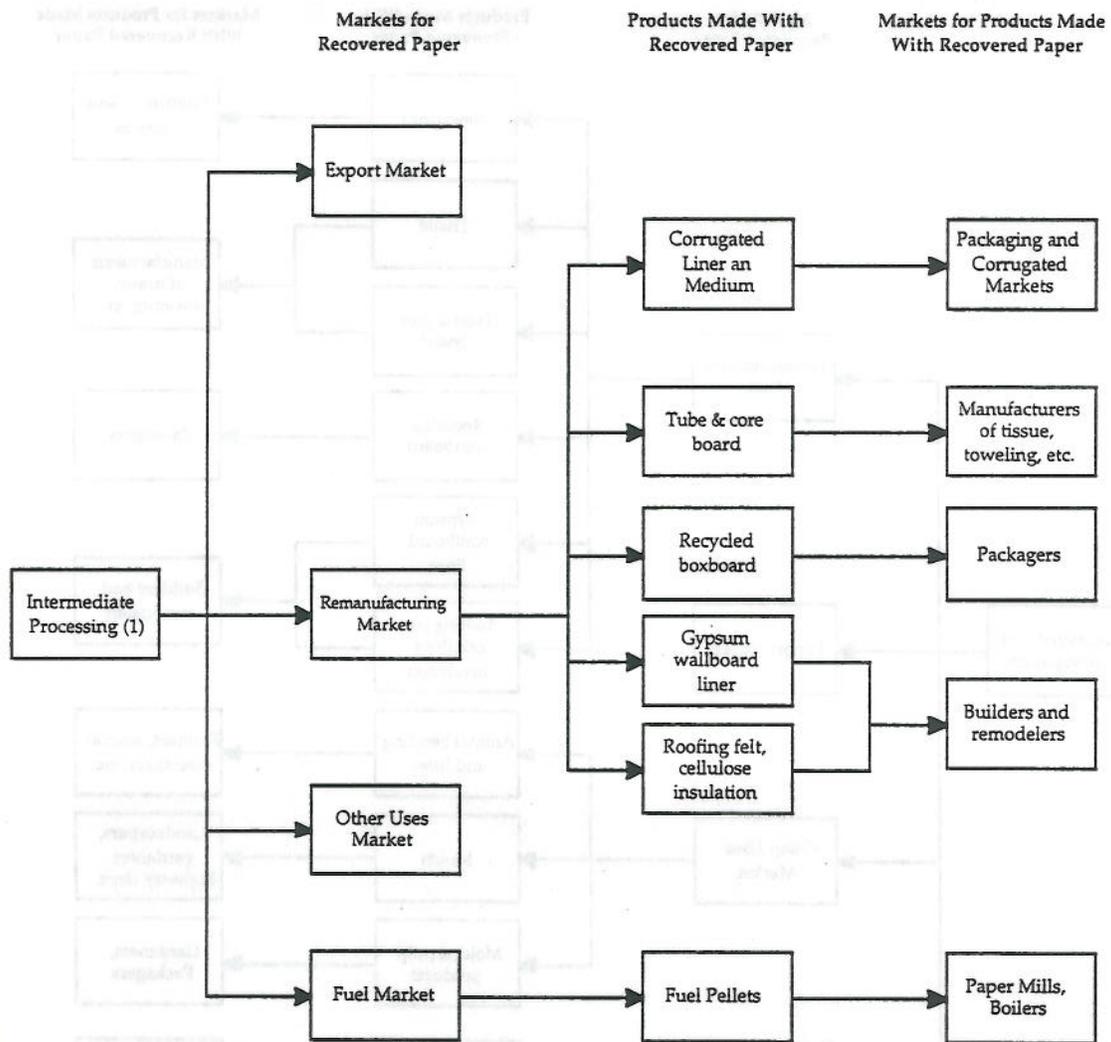
MARKET IDENTIFICATION FOR RECOVERED OLD NEWSPAPERS



Source: Franklin Associates, Ltd.

Figure 10-4

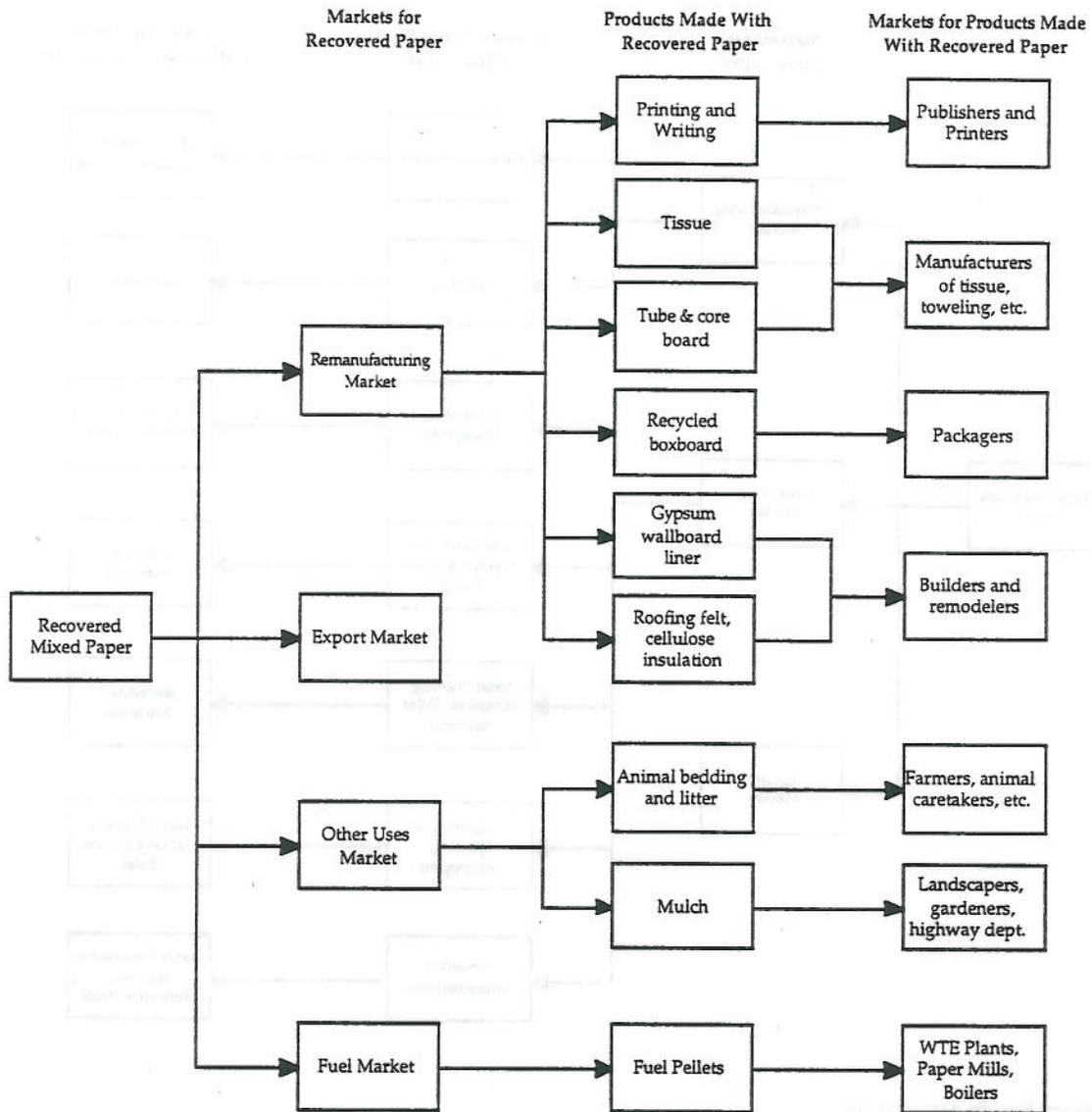
MARKET IDENTIFICATION FOR RECOVERED OLD CORRUGATED CONTAINERS



Source: Franklin Associates, Ltd.

Figure 10-5

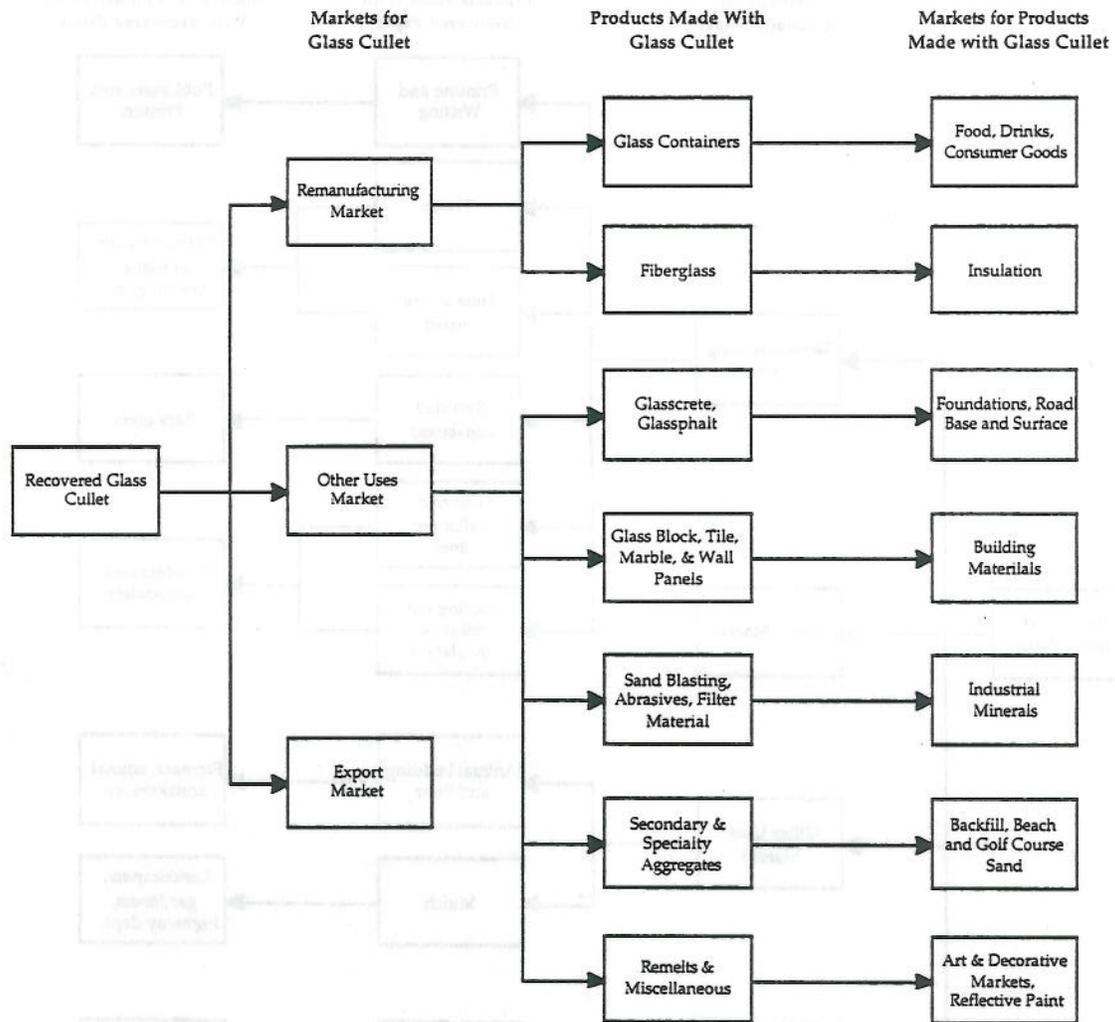
MARKET IDENTIFICATION FOR RECOVERED MIXED PAPER



Source: Franklin Associates, Ltd.

Figure 10-6

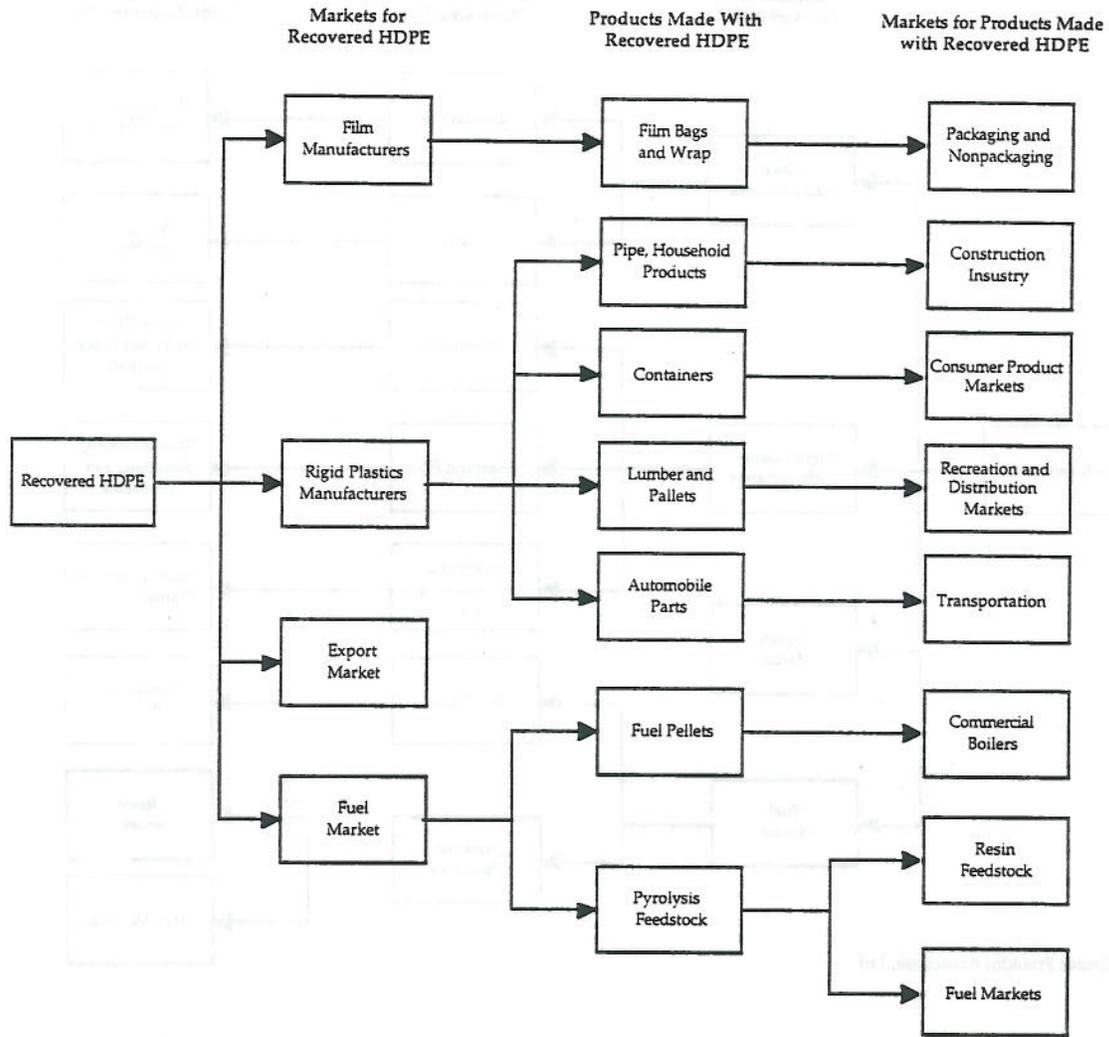
MARKET IDENTIFICATION FOR GLASS CULLET



Source: Franklin Associates, Ltd.

Figure 10-7

MARKET IDENTIFICATION FOR RECOVERED HDPE



Source: Franklin Associates, Ltd.

Figure 10-8

MARKET IDENTIFICATION FOR RECOVERED PET

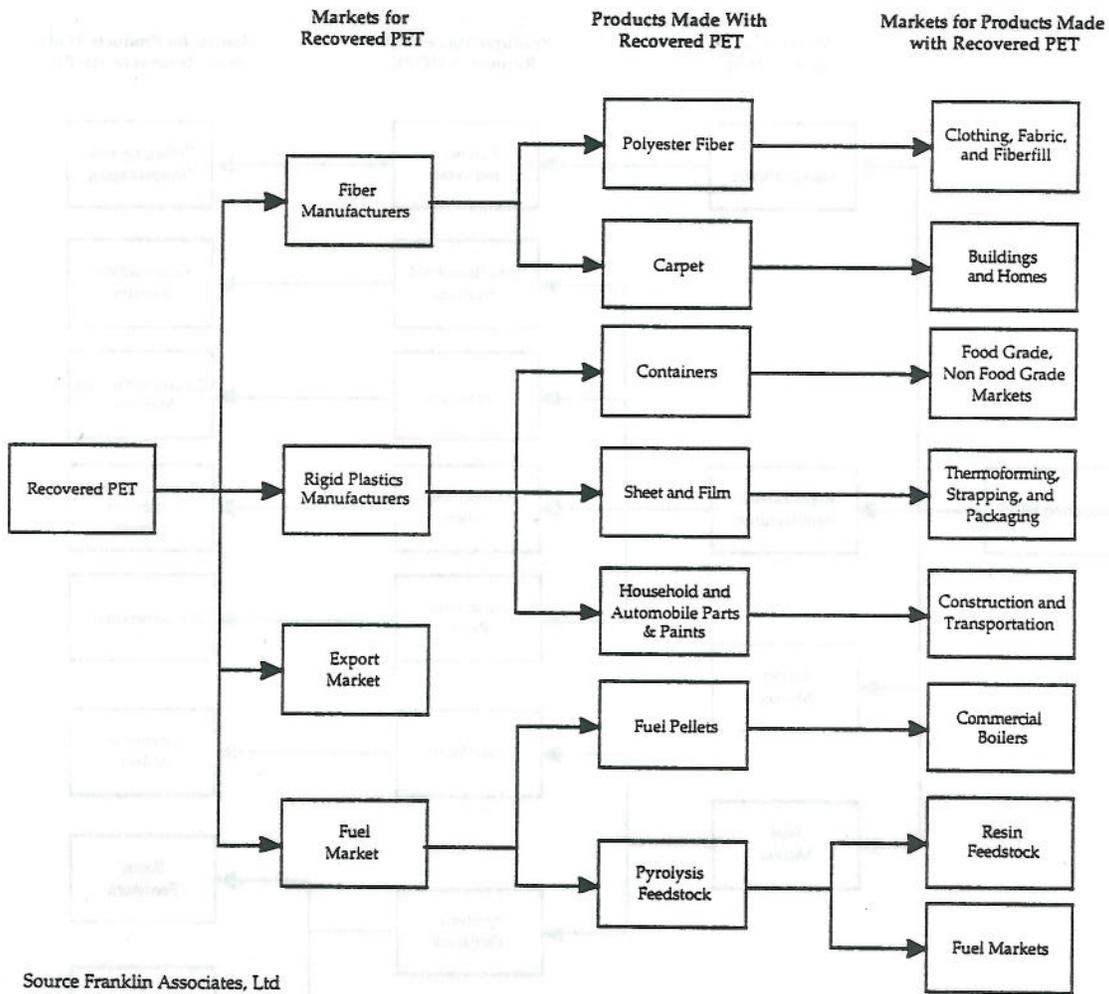
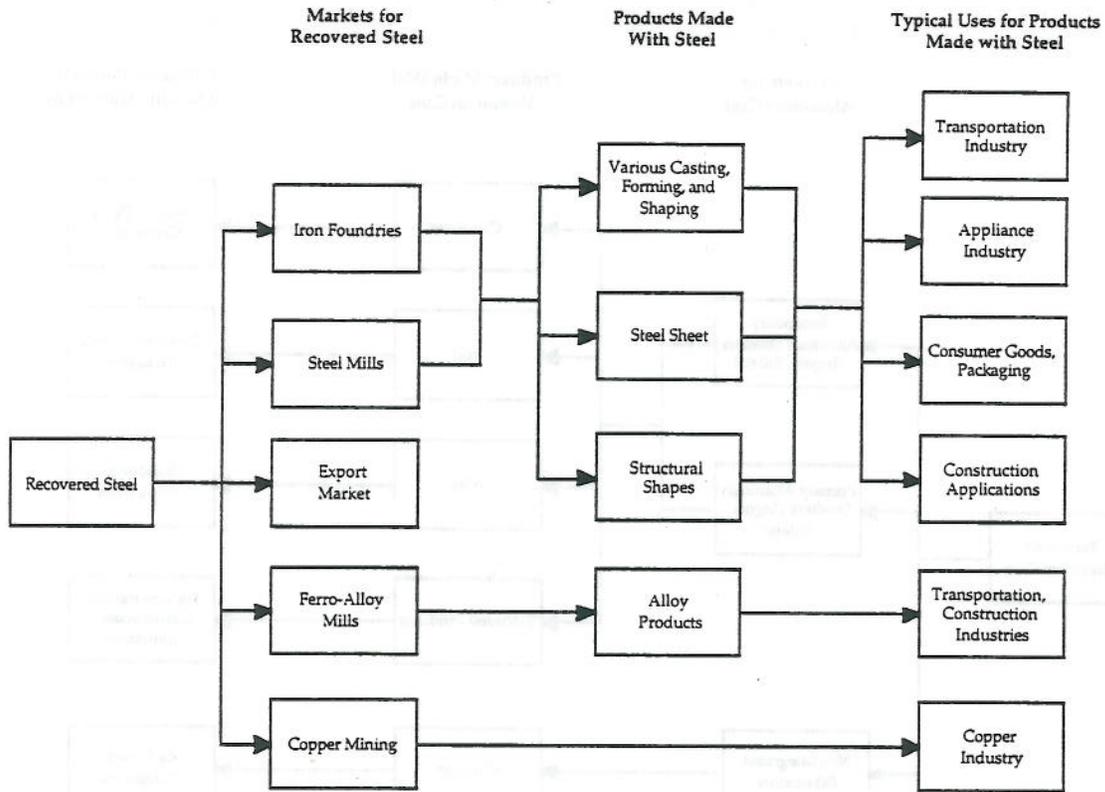


Figure 10-9

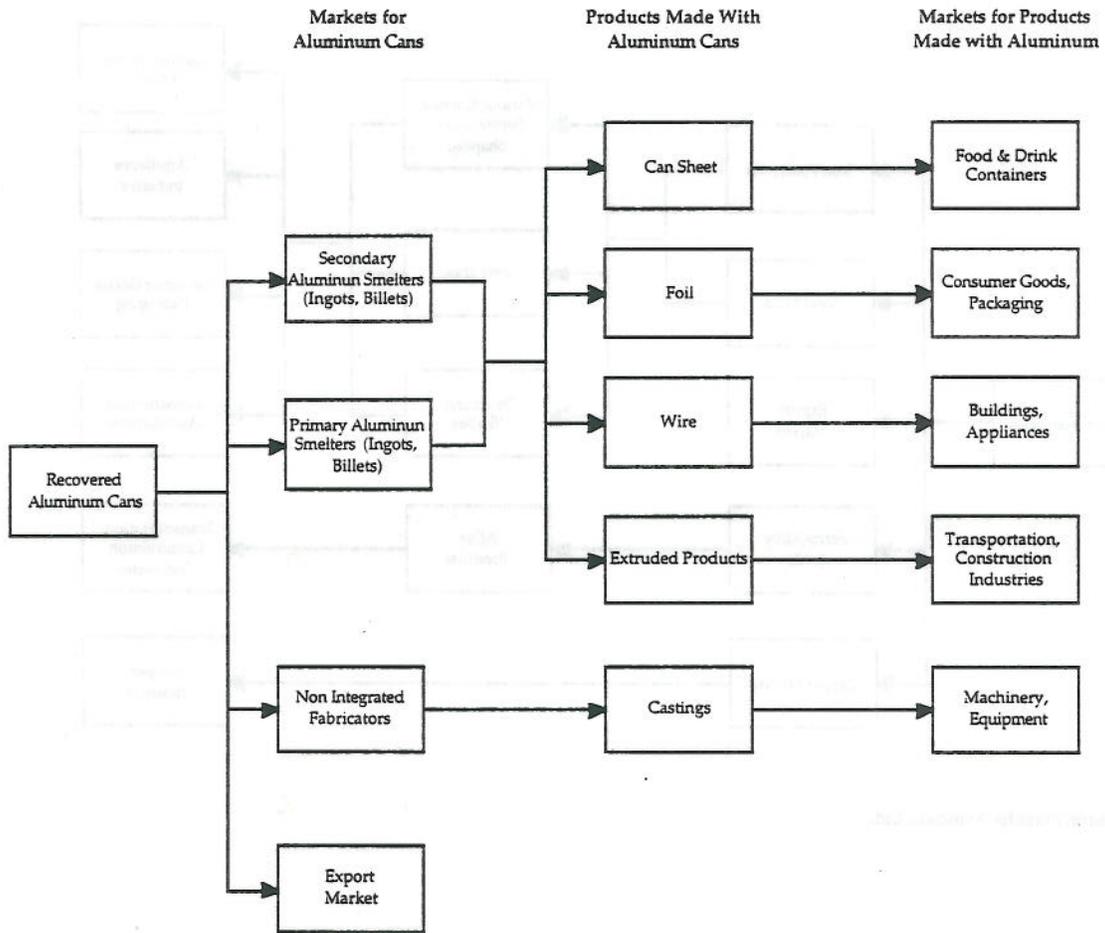
MARKET IDENTIFICATION FOR RECOVERED RESIDENTIAL STEEL



Source: Franklin Associate, Ltd.

Figure 10-10

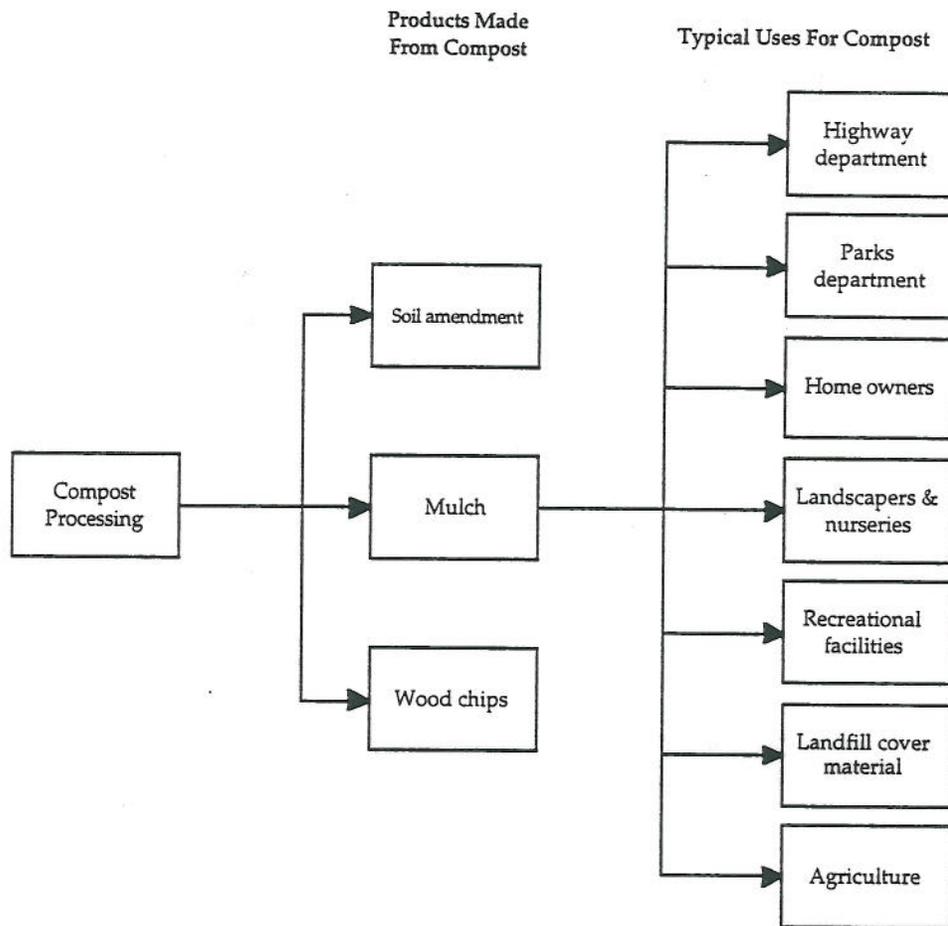
MARKET IDENTIFICATION FOR ALUMINUM CANS



Source: Franklin Associates, Ltd.

Figure 10-11

MARKET IDENTIFICATION FOR COMPOST



Source: Franklin Associates, Ltd.

