



- Commercial and Industrial Waste Reduction - OLD CORRUGATED CARDBOARD

FACT SHEET

North Carolina companies recycle more than 65 percent of the old corrugated cardboard (OCC) waste they generate, and well-established recycling markets facilitate diversion of OCC from the landfill. Many companies also have minimized the quantity of OCC they generate through source reduction strategies. Despite significant improvement by North Carolina companies, OCC still comprises 15 percent of the business waste stream in some areas. Facilities that have not already assessed the waste reduction opportunities for OCC should consider doing so for the following reasons:

- To avoid landfill disposal fees
- To earn revenues from recycling sales
- To reduce unnecessary purchases and product consumption
- To improve environmental performance of the facility
- To comply with local recycling goals or disposal restriction ordinances

This fact sheet reviews the choices available for facilities seeking to reduce the quantity of OCC generated.

■ **Getting Started: Evaluate Cardboard Usage**

- Review all applications of cardboard in the facility. Consider the purpose(s) of the cardboard and its fate when its function is complete.
- Use your best problem solving skills to develop ways to reduce the amount of OCC generated; for example, brainstorm with co-workers or a waste reduction team.
- Call your local recycling coordinator or the Division of Pollution Prevention and Environmental Assistance (DPPEA) to share ideas and ask questions.

■ **Source Reduction and Reuse: The Best Way To Reduce Waste**

Minimizing waste at the source is the most cost-effective way to reduce waste management costs and improve environmental performance. The following are among the many ways a facility can reduce the amount of cardboard it uses and generates as waste:

- **Eliminate** cardboard boxes where they are not needed; for example, substitute rubber, plastic, or metal bands where appropriate.
- **Reuse** incoming shipping containers to transport products.
- **Select more durable** cardboard boxes for extended life and reusability.
- **Substitute** other types of containers that are reusable, such as durable plastic crating.
- **Review cardboard package sizing** to determine if small boxes could be eliminated in favor of large boxes or bulk handling.
- **Work with vendors and customers** to reduce cardboard consumption and implement reusable systems.

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■ Establishing a Recycling Program

Corrugated cardboard waste that cannot be eliminated through source reduction or reuse should be recycled. In developing a recycling program, a facility will need to make decisions from various options available.

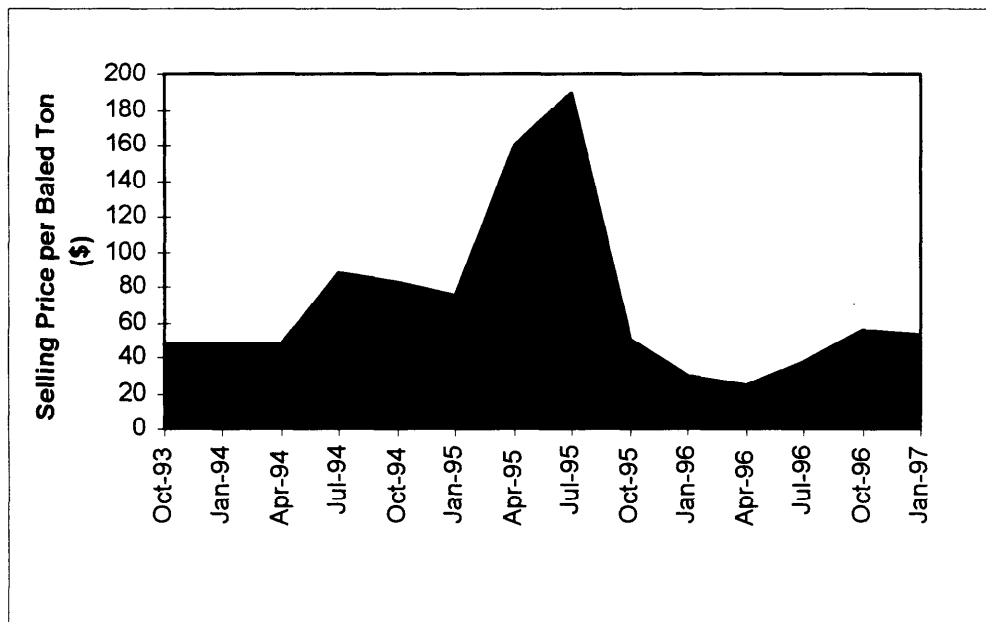
Recycling Decision: In-House or Contracted?

Many companies deliver corrugated cardboard to a designated bin or area at the facility and then contract for the material to be hauled for recycling. Cardboard haulers or recycling markets can be located in the Yellow Pages under "Recycling Center," through the local solid waste department, or by contacting DPPEA.

If you opt for a private hauler, be sure to get competitive bids to ensure that pricing is fair. The following information should be developed for each prospective hauler:

- **Material preparation requirements.** Usually only small haulers are willing to break down the boxes. Other contractors may require cardboard to be flattened and stacked or loaded into designated bins.
- **Collection containers.** Are they provided, and if so, at what cost.
- **Fees.** Determine hauling and disposal fees and frequency of collection. Facilities should carefully monitor OCC volumes to maximize container capacity. Haulers look to make money from the frequency of collection runs, regardless of the amount in a container.
- **Allocation of revenue.** If the processor or hauler pays for materials, establish how the price is determined and the payment schedule. Some processors provide free transportation. Figure 1 shows average prices in North Carolina from October 1993 through January 1997 for baled corrugated cardboard.

Figure 1. Average Corrugated Cardboard Prices in North Carolina



- **Terms of the contract.** A short-term trial contract (three to four months) enables the facility to evaluate the service and equipment. The contract should include a cancellation clause and clearly spell out the party responsible for equipment or container repair and cleaning. Long contracts may lock a company out of future waste reduction opportunities. A good option is a contract of one to two years with optional extensions.
- **Periodic weight data of the amount of cardboard recycled.** Material weights help you calculate the savings from recycling and report or publicize your accomplishments. Some processors estimate tonnage only, while others weigh materials. Request weekly or monthly receipts.

Recycling Decision: Loose, Baled, or Compacted?

Many companies are surprised to learn how much cardboard they generate. Table 1 lists estimated weights of loose OCC in containers of different sizes at 100 percent of capacity.

Bale the OCC? While many businesses recycle loose OCC, the economics of baling the cardboard should be evaluated. The first step in making such a determination is to get acceptable bale sizes and purchase prices from the local OCC recycler. If loose cardboard is currently selling at \$20 per ton, this same cardboard in baled form may bring \$30 per ton. Savings may also result from avoided hauling, by baling several materials for recycling, or by sharing a baler with another company. The following are some general guidelines.

- **Determining Baler Size.** Baler size is application-specific and is based on storage space constraints, OCC collection and handling methods, and buyer specifications. Assuming that it takes 40 minutes to load and strap a bale from a vertical baler (300- to 1,000-pound bales) and that all the OCC is at the baler location, at least one employee will be needed to load the baler and strap the bale. Unless the facility is generating very high volumes of OCC (greater than 25 tons a month), a vertical baler should have sufficient capacity.

- **Baler Cost and Bale Volumes.** Information concerning bale volumes and costs is provided in Table 2. Costs are average list prices in 1997.

- **Determining Other Costs of Baling**

- **Labor.** Assuming that loading and strapping a bale takes about 40 minutes, labor costs can be determined by this time requirement. Compare this time to the time required to collect and break down boxes and load your dumpster!

- **Baling Wire.** Wire

costs for different bale sizes vary between \$0.80 to \$1 .00 per bale.

- **Electrical Usage.** The kWh used will vary widely, although an estimate for one 750-pound bale was \$1.05. Balers often require 3-phase power.

- **Annual Maintenance.** Average annual maintenance would be 1 to 2 percent of baler purchase price.

Note that as other recyclable materials such as plastic film wrap, textile scraps, and other plastics can also be baled. the usefulness of a baler may be increased.

Table 1. Estimated Weights of Loose, Flattened Cardboard Boxes

Container size (yards ³)	100 percent full (pounds)
40	6,000
30	4,500
20	3,000
8	1,200
6	900

Table 2. Estimated Baler Costs

Bale Weight (pounds)	Feed Opening (inches)	Bale Volume (ft ³)	Average List Price (\$)	Motor (hp)
<i>Vertical Balers</i>				
300	36x15	15	5,000	5
800	48x28	48	7,900	10
1,000	60x28	50	9,200	10
1,200	72x28	60	10,000	10
1,500	72x32	84	21,200	15
<i>Horizontal Balers</i>				
1,200	28x50	52	26,500	25
1,500	46x50	57	37,000	30
2,000	45x60	64	48,000	40

Compact the OCC? Many companies that generate large quantities of cardboard choose stationary compactors attached to a 30-yd³ closed container, i.e., the type of compactor typically used for garbage collection at large

facilities. The hauler can help determine if the volume of OCC at your company merits a stationary compactor as well as give a cost estimate. If you produce large amounts of OCC, the costs and benefits of a stationary compactor can be compared to those of baling. Compacting reduces the number of pulls necessary for a container, which can save money. Facilities should carefully compare the higher cost of the compactor rental versus the potential savings from fewer pulls of loose loads.

Employee Education

The success of any waste reduction program depends upon employee participation and education for two reasons. First, employees that have first-hand experience with the applications of cardboard in a facility frequently have insightful suggestions to reduce waste. Second, employees need to be educated about new procedures and practices to ensure waste reduction efforts will be properly implemented and successful. Employee education efforts should take many forms - from announcements at staff meetings and individual instruction to signage and posters.

Sample Cost Analysis: Boxed Socks, Inc.

Boxed Socks, Inc., (BSI) manufactures socks for sale nationwide. Many of its raw materials come packaged in corrugated cardboard boxes. In fact, cardboard represents half the company's waste. BSI rents two 8-yd³ containers from a private waste hauler for \$25 per month per container, or \$2,600 per year. The hauler dumps the container twice a week and charges \$35 per container per dump, or \$7,280 per year. BSI is charged a tipping fee of \$30 per ton at the landfill. As each of 8-yd³ loads weighs about one half of a ton, the company pays \$3,120 annually in tipping fees.

After examining its waste stream and current waste costs, BSI determines that it can remove one of the garbage containers if it buys a baler. Despite the up-front expenses, the company would reduce garbage collection and disposal fees by half. Also, it could sell the OCC for about \$32 per baled ton and, thus, generate \$1,664 per year in revenue. BSI creates the analysis in Table 3 to evaluate the economics of an OCC recycling program.

As BSI would avoid **\$3,344** in costs annually (\$13,000 minus \$9,656) and conserve resources,

the company decides to work with its local city recycling coordinator to identify the best cardboard market and implement its program. The company also explores the possibility of further reducing OCC waste by working with suppliers to receive raw materials in reusable containers.

Table 3. Economic Analysis of OCC Recycling Program - Boxed Socks, Inc.		
Activity	Current Cost (\$)	Cost With OCC Recycling (\$)
<i>Total Waste Management Costs</i>		
Container rental	2,600	1,300
Container emptying and waste hauling	7,280	3,640
Disposal cost (tipping fees)	3,120	1,560
<i>Recycling Costs</i>		
Annualized cost of baler plus installation (5 year amortization period)		1,680
Additional labor and training		1,700
Electricity, maintenance, and baling wire		1,440
<i>Recycling Revenues</i>		
Revenues from sales of recyclables		1,664
Total Cost (total costs less revenues)	13,000	9,656
*Note that a general cost avoidance spreadsheet is available from DPPEA.		

The North Carolina Division of Pollution Prevention and Environmental Assistance provides free, non-regulatory technical assistance and training on methods to eliminate, reduce, or recycle wastes before they become pollutants or require disposal Telephone DPPEA at (919) 715-6500 or 800-763-0136 or E-Mail us at nowast@owr.ehnr.state.nc.us. for further information about issues in the Fact Sheet or to discuss any of your waste reduction concerns.

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