

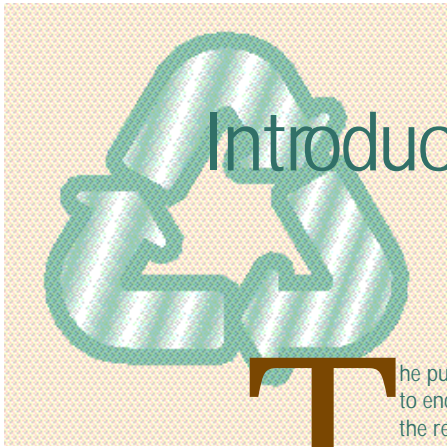
# Stretch Wrap Recycling

A How-To Guide



# Table of Contents

- 1 INTRODUCTION
  - Why Recycle Stretch Wrap?
  - Getting Started
  
- 2 MARKETS, MARKETS, MARKETS
  - Locating a Market
  - Surveying Potential Markets
  - Negotiating with Markets
  - Reclaimers as Markets
  - End-Users as Markets
  - Stretch Wrap Producers as Markets
  
- 6 DESIGNING A SUCCESSFUL STRETCH WRAP RECYCLING OPERATION
  - Working with Vendors
  - Warehouse/Distribution Center
  - Baling the Stretch Wrap
  
- 11 THE ECONOMICS OF STRETCH WRAP RECYCLING
  - Costs and Revenues
  - Avoided Disposal Costs
  - Challenges and Opportunities
  
- 14 CASE STUDIES
  - Stretch Wrap Recycling at Pepsi-Cola Allied Bottlers, Inc.
  - Stretch Wrap Recycling at Target Stores
  - Stretch Wrap Recycling at Anheuser-Busch, Inc.
  - Stretch Wrap Recycling at Spartan Stores, Inc.



# Introduction

**T**he purpose of this guide is to encourage and promote the recycling of a product commonly used by distributors in a wide variety of industries — stretch wrap.

Stretch wrap is most commonly made of linear low density polyethylene, or LLDPE. Most of us know it as the material that secures pallets of individual containers. Pallet stretch wrap is used by product manufacturers and distributors to bind shipping cartons to pallets going to a warehouse/distribution center (W/DC). It is also used at the W/DC to wrap pallets sent to outlets/customers.

This guide takes you step-by-step through the design and implementation of a stretch wrap recovery program — from locating markets and developing a collection system to assessing how a successful stretch wrap recovery program can affect your bottom line.

The guide is targeted primarily to firms with one or more W/DCs where products are received from manufacturers and then distributed to downstream outlets/customers. The fundamentals should assist any location receiving and unwrapping stretch film from pallets in developing a viable stretch wrap recovery program. Four case studies have been provided to demonstrate how a stretch wrap recycling program can be adapted to meet the needs of a given organization.

## Why Recycle Stretch Wrap?

Stretch wrap is one of the largest components of a W/DC's waste stream. Those that do not recycle stretch wrap must pay to have it hauled away with the rest of the trash and disposed. A large W/DC can generate thousands of pounds of stretch wrap per year — and that carries weight on the bottom line.

Recycling stretch wrap offers an attractive alternative to disposal. There are ready markets for clean material and many firms are especially interested in working with businesses. Also, stretch wrap is relatively easy to identify and recover. It arrives at the dock in a fairly clean, uncontaminated state. If kept that way, it has real market value. In fact, pound for pound, stretch wrap may be the most valuable scrap material a W/DC can recover.

## Getting Started

The steps in developing a stretch wrap recovery program are fairly simple.

- Find and survey potential markets.
- Design a collection and handling system tailored to your operation.
- Educate program participants.
- Implement a quality control program.

# Markets, Markets, Markets

Locating a **Market**

**Surveying** Potential Markets

**Stretch Wrap** Producers as Markets



**Negotiating** with Markets

**End-Users** as Markets

**Reclaimers** as Markets

**T**he first step in developing a stretch wrap recycling program is finding a market that will purchase or accept the recovered material. The market will dictate the price paid for recovered stretch wrap and the material specifications. Those two factors — price and specifications — will shape the recovery program.

It is a good idea to find a market located near where the plastic is being generated. Transportation costs can significantly affect the economics of recycling; the closer the market, the lower the transportation costs.

Having the market nearby will also facilitate site visits and exchanges between the W/DC and its market, which can enhance the program. Many firms purchasing stretch wrap like to visit their customers to help ensure that adequate quality control systems are in place. Similarly, it is important for the W/DC to know something about the firm that will be purchasing the stretch wrap. Ideally, your market will be stable and well established, helping to assure the long-term viability of the program. Ultimately, your market should be viewed as a business partner that shares a common interest in taking potential waste and turning it into new plastic products.

## Locating a Market

There are currently more than 280 firms in the United States that accept LDPE/LLDPE film, although only a handful of these companies are able to process the large amounts of stretch wrap recovered by large-scale distribution operations.

The American Plastics Council maintains a national database of post-consumer plastics handlers and reclaimers that is accessible through a toll-free hot-line — 1-800-243-5790. This service is designed to network buyers and sellers of recovered plastics and is continually updated as the business of plastics recycling grows.

## Surveying Potential Markets

Once you have identified a number of potential markets, conduct a market survey to determine which market is right for you. Here are some questions frequently asked in the market selection process:

- How long has the firm been in business? (Experience in processing plastic film is definitely an asset.)
- How long has the firm been reclaiming and marketing stretch wrap? (Specific experience with stretch wrap means the firm understands this material and is familiar with end-users and end-user requirements.)
- Has the firm worked with businesses like yours before? How willing is the firm to work with you to achieve market-quality material? (It may take time to develop a workable system to recover clean material that meets specifications.)
- Where is the firm located? (Remember, transportation costs affect the economics of recycling.)
- Will the firm provide any technical assistance? Balers? Collection containers? Signage? Educational materials?



## Markets

For the purposes of this guide, a “market” describes a series of businesses that process plastics into acceptable forms for manufacturers of recycled plastic products. That market could be either:

- a hauler — a company that transports recyclables to a handler;
- a handler — an intermediate scrap processor that will sort, bale and/or shred material;
- a reclaimer — a facility that converts post-consumer plastic into pellets ready for re-use in a new product; or
- an end-product manufacturer — a company that manufactures a finished product from post-consumer plastic.

## Negotiating with Markets

Here are some questions that you can ask once negotiations with a market begin.

- How is “clean” stretch wrap defined? Will the firm accept paper labels? Tinted film? (Unpigmented or colorless material typically has a higher value.)
- Where/how is the stretch wrap to be delivered? Who pays for transportation?
- Are there specifications for bale size? What types of bale strapping are acceptable?
- What is the minimum load size? Will the firm accept only full truckloads? Is there a minimum number of pounds per truck?
- What are the specifications for acceptable material? What happens to material that does not meet these specifications? Is it sold as lower quality or disposed of? Who takes responsibility for disposal?
- What is the end-use market for the recovered material?
- What kind of long-term agreement is the firm willing to make?
- What is the current price paid for stretch wrap? How often is the price subject to change?
- What has the price history been since the firm began purchasing stretch wrap? What are the firm’s projections for pricing?

The answers to these questions, plus information about internal costs that will be discussed later in the guide, will allow you to evaluate the economic feasibility of a stretch wrap recovery program.

## Reclaimers as Markets

A plastics reclaiming operation may include any or all of the following:

- shredding and granulating;
- washing and drying; and/or
- extrusion and pelletizing.

Because many W/DCs have the ability to sort and bale stretch wrap as part of their internal operation, using a reclaimer as a market may make the most sense. Reclaimers reprocess the recovered material for specific end-users, and usually will have tight specifications for contamination levels, bale sizes and minimum load shipments and little tolerance for poor quality.

## End-Users as Markets

In some cases, end-users that manufacture products from post-consumer plastic will have a fully integrated reclaiming operation and may be looking for clean material.

The manufacturers of film products, such as trash bags, may accept clean, recovered stretch wrap from their customers as a value-added service.

## Stretch Wrap Producers as Markets

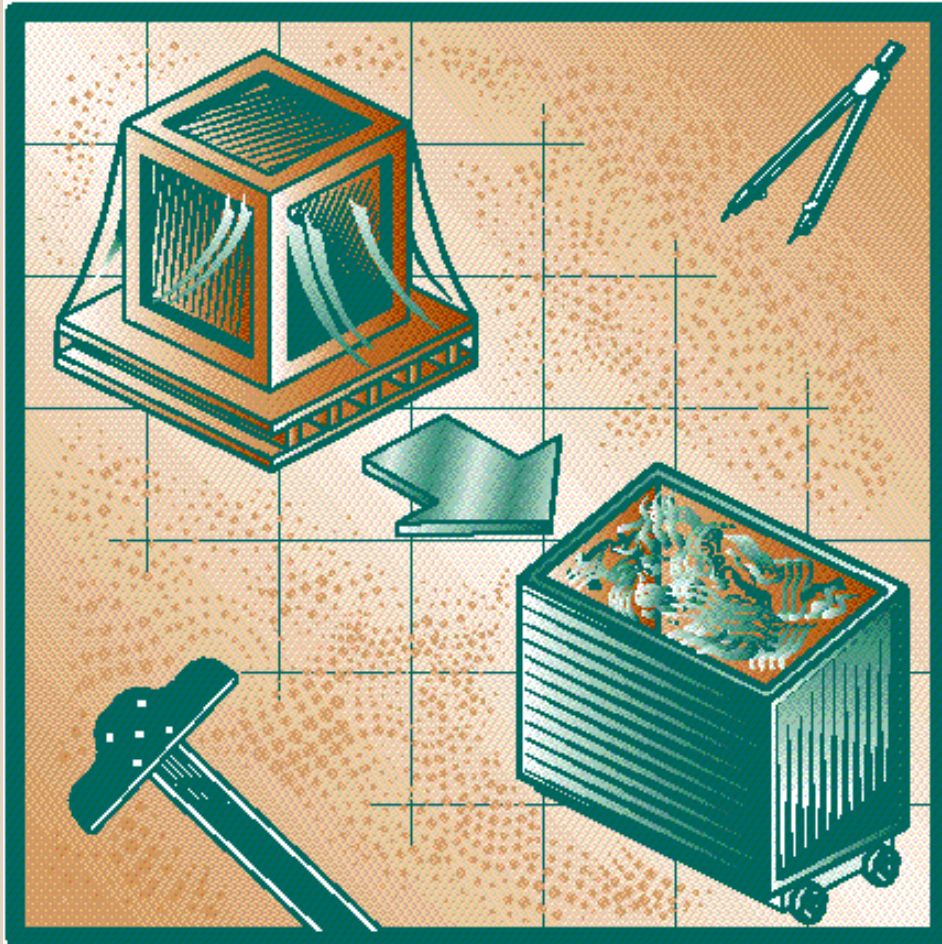
In the past few years, many stretch wrap producers have developed programs to take back the used stretch film from their customers. The film is then recycled back into new stretch wrap or other plastic products.

For small and medium-size stretch wrap generators, the recycling program offered by the stretch wrap producer may be the most economical and convenient recycling option.

# Designing a Successful Stretch Wrap Recycling Operation:

Quality Is the Key

Working with **Vendors**



**Baling** the Stretch Wrap

Warehouse/Distribution **Center**

# Working with Vendors

Quality control should begin before the first pallet lands on the receiving dock — with the product vendors who are using stretch wrap on pallets of goods destined for your business.

Start by writing letters to vendors explaining the requirements and specifications of your stretch wrap recovery program. Ask your vendors to keep tape and labels off the stretch wrap, and not to use tinted film. This will simplify recovery and increase the value of the material considerably. Just as important is letting vendors know how successful your stretch wrap recycling program is and that you appreciate the important role they play in its success.

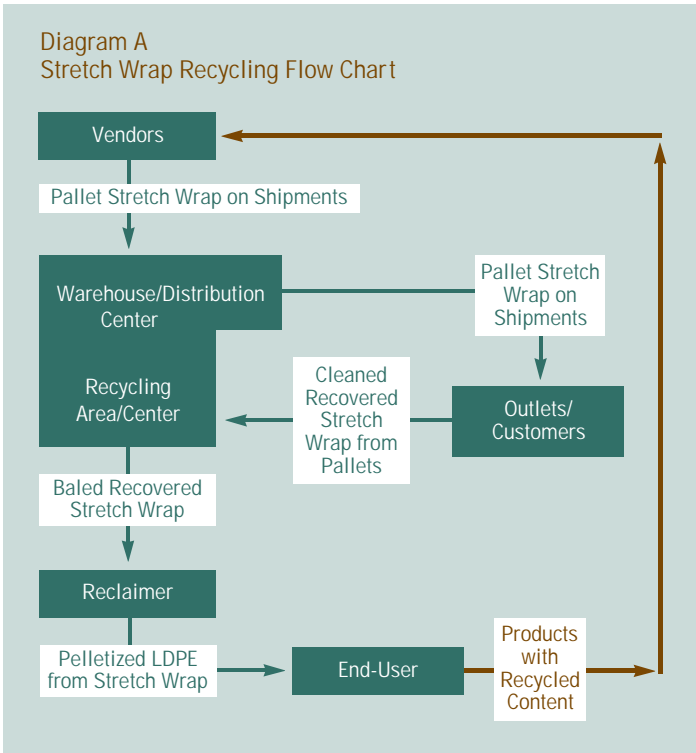
Once a market is located and the material specifications are understood, a system for collecting and processing stretch wrap can be put into place. The most efficient stretch wrap recovery operations are integrated with the recovery of other materials, such as corrugated cardboard and wooden pallets.

# Warehouse/Distribution Center

**Collection Containers**  
Collection containers for stretch wrap should be clearly labeled and conveniently located in the W/DC to accommodate warehouse operations.

- Stretch wrap may be removed from incoming pallets of goods near the receiving area. In this case, special containers for stretch wrap should be located near the receiving area.
- Wrapped pallets may be moved to other areas immediately. The stretch wrap can be removed later, when the pallets are broken down. To recover this film, collection containers must be appropriately located throughout the W/DC.
- Also, roll-ends and trim scrap may be recovered at the shipping area where stock is palletized and wrapped in stretch film for shipment to outlets.

Be sure collection containers are readily identifiable and clearly labeled. For example, a container labeled “Plastics Only” will draw all kinds of plastics. Containers designated



for stretch wrap recovery should be labeled “Stretch Wrap Only.” Color-coding collection containers may also be helpful. Some stretch wrap markets will provide containers and/or appropriate signage.

Even with clear labeling and optimal locations, however, your collection containers will not be used properly unless you take the time to train your employees.

#### Receiving Personnel

Employees handling incoming pallets have the first opportunity to recover stretch wrap and represent an important quality checkpoint.

If stretch wrap is stripped from pallets in the receiving area, it should immediately be placed in the appropriate recycling container. Stretch wrap is tacky and quickly picks up dust, dirt and other contaminants. Storing loose stretch wrap on the floor makes it difficult to clean. Labels are difficult to remove after the stretch wrap has been baled. If your market will not accept labels and tape, they should be removed from the stretch wrap at this point.

In some facilities, receiving personnel label incoming pallets to facilitate storage and tracking. If paper labels are used, they should be placed on the shipping boxes under the film. This will prevent having to pull labels off the stretch wrap later in the process. Using polyethylene (PE) or polypropylene (PP) labels can eliminate the problem and allows labels to be placed directly on the stretch wrap.

#### Shipping Personnel

Employees responsible for assembling pallet loads may also be stripping stretch wrap. This may take place throughout the W/DC, so containers for stretch wrap must be distributed accordingly. Remove the contents of these containers regularly to avoid overflow. Again, it is far more efficient to remove tape and, if necessary, paper labels as pallets are broken down, rather than waiting until after the film has been bundled up and mixed with other stretch wrap.

## Key to Quality

Enlist vendors’ help in troubleshooting material contamination and quality issues. For some stretch wrap recyclers, paper labels are a significant contaminant and must be removed. Although polypropylene (PP) and PE labels are more expensive than paper labels, they are compatible with pallet stretch wrap and do not have to be removed before the film is recycled.

# Participation

## Baling the Stretch Wrap

Baling operations for materials such as corrugated cardboard can be adapted for stretch wrap recovery with a few simple adjustments. As the stretch wrap is accumulated, it should be kept separate and clean. If the film is aggregated prior to inspection and baling, the storage containers should be clearly marked and kept free of dirt, moisture, waste and especially other plastics.

To lower the costs of storage and transportation, stretch wrap should be baled. Fortunately, no special baler is required; if a facility has a baler for cardboard, the same piece of equipment can be used for baling stretch wrap. However, balers specifically designed for stretch wrap will yield denser bales and lower transportation costs.

### Storage Required for Baling Stretch Wrap

#### Storage of loose material before baling:

- Loose stretch wrap is collected in gaylord containers (42" cube).
- A gaylord container typically holds 50 lbs of loose stretch wrap. Approximately 20 containers are required per bale of stretch wrap.
- Each container requires 12.25 sq ft of floor space; 20 containers require 245 sq ft.

#### Storage of baled stretch wrap:

- Typical bale weight is 900 – 1,200 lbs; typical bale dimensions are 3' x 4' x 6'.
- There are 38 – 42 bales per trailer truck.
- Space required to store one truckload of bales, assuming bales are stacked two high, is 240 sq ft.

Your employees hold the key to the success of your stretch wrap recycling program. Make sure they understand the importance of their contribution.

- Emphasize their role in helping your company achieve important environmental goals.
- Underscore that tape and paper labels are serious contaminants and must be removed.
- Discourage the use of recycling containers as trash receptacles — especially among those employees not directly involved in the recycling program.
- Recognize that ongoing employee education and motivation will be essential to long-term success.



## Troubleshooting

If a multi-material baler is used, it should be cleaned out when changing over from corrugated cardboard to stretch wrap. Care must be taken to keep the baler free of dirt and other materials so that clean stretch wrap will not be contaminated.

Segregated stretch wrap must be inspected and the contamination removed prior to baling. Contamination not removed previously must be removed by the baler operator prior to baling the film.

One of the best quality-control mechanisms is a conscientious baler operator who inspects the film as it goes into the baler. Remember, clean material will receive the highest price. Tape, strapping, labels and other contaminants must be removed whenever possible.

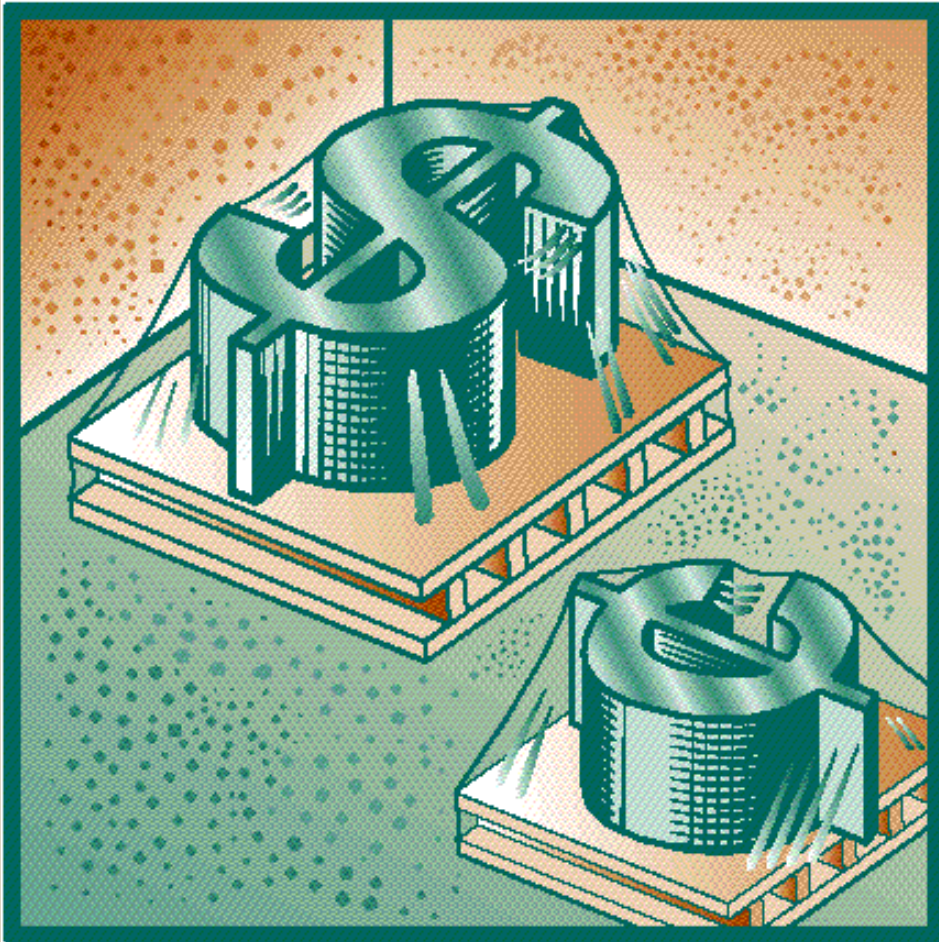
Bales should be stored indoors on pallets or concrete pads to keep them clean and dry. Bales stored outdoors should be placed on concrete pads and covered with tarps to prevent moisture accumulation and degradation caused by exposure to ultraviolet light.

The recycling center is the final opportunity for quality control. Stretch wrap that is highly contaminated or cannot be easily cleaned should not be sent on to your market. It is very important that sources of contaminated stretch wrap, i.e., loads from a particular area of the W/DC, be identified as quickly as possible. This will assure that a glitch in the system can be fixed before it becomes a serious problem and that the quality of the material sent to your market remains consistently high.

# The Economics of Stretch Wrap Recycling

Costs and Revenues

**Challenges** and Opportunities



**Avoided** Disposal Costs

## Costs and Revenues

The price paid for recovered stretch wrap is subject to negotiation and change. Some markets may be willing to offer a guaranteed floor price, while others may want to make price arrangements based on the going market value and the quality of the material. As a rule, however, markets will not accept poor-quality material at any price.

If your location already has a recycling program, many of the costs involved in stretch wrap recovery will be incremental costs of adding a material to an existing program. Start-up costs may include the purchase of new collection containers, signage and the development of an employee training program. (Table 1 lists major cost items. ) In calculating the annual cost of recovering stretch wrap, both the incremental costs and the start-up costs should be spread over the amount of material recovered. The cost of some items, such as containers, can be spread over their useful life. The more stretch wrap recovered, of course, the lower the per pound cost of recovery.

The economics of stretch wrap recycling can be divided into two broad areas: (1) costs and revenues associated with recovering the material and (2) the cost savings attributable to avoided disposal. In some areas, the recovery of stretch wrap is not economical unless cost savings from avoided disposal are included.

Table 1  
Cost Elements of a Stretch Wrap Recycling Program

Cost Element	Comment
Employee training	Includes meetings, signage
Special containers	\$45/container; 3-yr life
Baling labor and wire	\$7.50/bale incremental cost
Transport to market	Usually paid by the buyer
Collection labor costs <sup>1</sup>	Depend on program efficiency

<sup>1</sup> Collection labor depends on several factors, such as whether or not labels must be removed, location of stretch wrap containers for convenient access, etc.

## Avoided Disposal Costs

By removing stretch wrap from the waste stream, you will naturally save money. First, there is the cost of hauling trash to the disposal site. This is generally a fixed charge each time a trash container is picked up. Second, there is the tipping fee at the disposal site. This is a “per ton” fee, which can range from as low as \$20 per ton to as much as \$100 per ton or more, depending on the region of the country.

For example, if during the course of a year, 200,000 lbs of stretch wrap is recovered and the tipping fee is \$30 per ton, the avoided cost savings in tipping fees is \$3,000. In addition, you have reduced the number of container “pulls” by removing stretch wrap from your waste stream.

### Worksheet: Estimating Handling and Processing Costs

The following worksheet provides a format and example for calculating the economic benefits of recovering stretch film. The example assumes recovery of 200,000 lbs of stretch wrap per year.

	Per Pound	Annual
Revenues	\$ .035	\$ 7,000
Recovery Costs		
Employee training	\$ .005	\$ 1,000
Special containers	\$ .004	\$ 750
Baling labor and wire/strapping	\$ .008	\$ 1,500
Labor costs <sup>1</sup>	\$ .010	\$ 2,000
Subtotal	\$ .026	\$ 5,250
Net Revenue (Revenue – Recovery Costs)	\$ .009	\$ 1,750
Avoided Disposal Savings		
Hauling costs:		
40-cu-yd compactor container \$100/pull — 33 pulls per year (1 cu yd compacted film = 150 lbs)	\$ .017	\$ 3,300
Tipping fee \$30/ton	\$ .015	\$ 3,000
Subtotal	\$ .032	\$ 6,300
Net Benefit (Net Revenues + Avoided Costs)	\$ .040	\$ 8,050

<sup>1</sup> Extra handling plus transportation from receiving dock to baler. Will vary depending on the program.

## Challenges and Opportunities

The bottom line is that recycling must be seen as a firm-wide commitment — from the manager who recycles office paper to the warehouse employee who collects stretch wrap and bales cardboard — in order to maintain material quality and achieve program efficiency.

Recycling stretch wrap presents several opportunities. A well-run program can have hefty economic benefits. Diverting stretch wrap from landfills to the stream of commerce will save energy and preserve resources. A poorly run program will result in labor inefficiencies and low-quality recovered material.

# Case Study

## Stretch Wrap Recycling at Pepsi-Cola Allied Bottlers, Inc.

### Pepsi-Cola Allied Bottlers, Inc., Latham, NY: An Overview

PepsiCo, Inc. is involved through various divisions and subsidiaries in businesses relating to beverages, snack foods and restaurants, both domestically and overseas. PepsiCo's beverage business consists of Pepsi-Cola North America ("Pepsi-Cola") and Pepsi-Cola International ("PCI"). Pepsi-Cola manufactures and sells beverages, primarily soft drinks and soft drink concentrates, to licensed independent and company-owned bottlers. Worldwide sales of Pepsi-Cola beverages totaled \$32 billion in 1995.

Pepsi-Cola Allied Bottlers, Inc. ("Pepsi-Allied") is a licensed independent Pepsi-Cola bottler with nine facilities in New York, Connecticut and Massachusetts. Pepsi-Allied has been producing Pepsi, Diet Pepsi, 7UP and Schweppes beverages at its facility in Latham, NY since 1982. These beverages are packaged in aluminum cans, PET bottles and transfer tanks (five-gallon metal containers used in commercial sales of soft drinks). The products are shipped by truck to Pepsi-Allied's eight satellite warehouses. In 1995, Pepsi-Allied produced and shipped approximately 24 million cases of beverages.

### Pepsi-Allied Recycling Program

Recycling at Pepsi-Allied began in 1991 as landfill tipping fees in New York State began to increase dramatically. Up to that time, Pepsi-Allied had been recovering some corrugated cardboard, bottles and cans. In 1991, Pepsi-Allied began to recycle office paper, plastic strapping and stretch wrap.

The goal of Pepsi-Allied's recycling program was to take environmentally sound measures to reduce the amount of waste being landfilled from their Latham, NY facility. As a result of the

recycling program, the amount of waste being landfilled dropped from 504 tons in 1990 to 297 tons in 1991, a 41 percent decrease. In 1996, approximately 300 tons of waste were landfilled, even as production has increased by 50 percent.

Pepsi-Allied's Latham facility also provides a recycling marketing service to its eight satellite warehouses. These centers receive soft drinks and soft drink concentrates by truck from the Latham facility. Used pallets, transfer tanks and plastic shells (cases for shipping PET two-liter, sixteen-ounce, twenty-ounce and one-liter bottles) are backhauled from the satellite warehouses to Latham. In addition, any recyclables, such as cardboard or stretch wrap that a satellite warehouse cannot market locally can be backhauled to Latham as well. Table 2 shows the materials recycled by Pepsi-Allied (Latham, NY) in 1995.

Based on the current tipping fee of \$85 per ton at the Colonie, NY landfill, the avoided cost savings of recycling 702 tons of solid waste were approximately \$59,700 in 1995. Therefore, in addition to the materials shown in Table 2, aluminum cans and PET bottles were recovered by Pepsi-Allied.

### Stretch Wrap Recycling

#### Collection

Pepsi-Allied's Receiving Department receives approximately 20 to 30 truckloads of containers and other materials per day. Most of these goods arrive on pallets, and the type of packaging materials used to secure goods to pallets varies. Approximately 95 percent of the stretch wrap recovered was used to secure empty PET bottles and aluminum cans to pallets. The remaining 5 percent of recovered stretch wrap was used to secure miscellaneous other products received.

Personnel at the receiving dock strip the stretch wrap from the pallets, removing any paper labels, string and other contaminants. Most of the incoming stretch wrap is relatively clean, due to a special effort that Pepsi-Allied has made to get its suppliers to eliminate these contaminants. As a result, contamination levels are low and quality control does not seem to be a serious problem.

The stretch wrap is placed in gaylord containers near the receiving dock. Although these containers are not clearly labeled, workers recognize that they are to be used for stretch wrap. The

## The Economics of Stretch Wrap Recycling at Pepsi-Allied

Table 2  
Materials Recycled at Pepsi-Allied (Latham, NY)

Material	Amount Recycled in 1995
Old Corrugated Cardboard	351 tons <sup>1</sup>
Office Paper	2 tons
PET Strapping <sup>2</sup>	40 tons
Stretch Wrap	220 tons <sup>3</sup>
Wooden Pallets <sup>4</sup>	89 tons
Total	702 tons

<sup>1</sup> Includes cardboard received from satellite warehouses.

<sup>2</sup> 160 gaylord containers at 500 lbs = 40 tons.

<sup>3</sup> Includes 62 tons received from satellite warehouses for marketing by the Latham facility.

<sup>4</sup> 7,000 wooden pallets; 1 pallet = 25.5 lbs.

gaylords are moved by forklift truck from the receiving dock to the warehouse area at the end of each shift where the stretch wrap is baled.

### Processing

When enough gaylord loads of stretch wrap have been delivered to the warehouse area to make a bale, it is placed in a dedicated Piqua baler. The baler operator checks the stretch wrap being placed in the baler for contaminants, although at this point much of the stretch wrap has been pressed together in the gaylord containers and contaminants are difficult to see.

The baler may be operated by any of the warehouse area or receiving personnel. Pepsi-Allied cross-trains its employees and takes pride in the flexibility of its work force.

Bales of stretch wrap received from the satellite warehouses are given a cursory inspection, but they are not broken open for inspection and rebaled.

All finished bales weigh about 1,200 pounds. Bales are stored in the warehouse area until they can be shipped to market. In 1995, approximately 316,000 pounds of stretch wrap were recovered from the Latham facility and an additional 124,000 pounds of stretch wrap were received from satellite warehouses and were marketed through the Latham facility.

### Marketing

Pepsi-Allied markets its stretch wrap to a company that also handles its deposit returns (New York requires a deposit/return system for soft drink containers). Because Pepsi-Allied asks the company to remove the stretch wrap on a frequent basis, instead of waiting until a full truckload accumulates, it does not receive payment for its stretch wrap.

The recycling program at Pepsi-Allied is driven by a desire to be environmentally responsible and by the desire to avoid the local landfill tipping fees, currently at \$85 per ton.

The cost to Pepsi-Allied of recovering stretch wrap has not been calculated. According to the vice-president for manufacturing, the incremental costs of recovering stretch wrap are not significant. The receiving personnel, who previously would have placed stretch wrap in a trash barrel, now place it in a special gaylord container. The cost of additional containers, employee education and the amortized capital cost of the baler are reasonable, given the avoided landfill savings.

While the firm receives no revenue for its stretch wrap, the savings from diverting 158 tons of stretch wrap generated at the Latham facility, based on a tipping fee of \$85 per ton, was approximately \$13,430 in 1995. Savings were also accrued at the satellite warehouses, which sent another 62 tons of stretch film to Latham to be marketed.

In summary, Pepsi-Allied's experience shows that even a company generating relatively small amounts of stretch wrap can develop a recycling program that makes sense, both economically and environmentally.

For more information, contact:

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Mr. Jim DeStefano  
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One Pepsi-Cola Drive  
Latham, NY 12110-2306  
(518) 783-8811

# Case Study

## Stretch Wrap Recycling at Target Stores

### Target Stores, Dayton-Hudson Corporation: An Overview

Target Stores ("Target") is a part of the Dayton-Hudson Corporation. The Dayton-Hudson Corporation is a general merchandise retailer operating over 1,090 stores in 39 states. Of these stores, Target operates 733 discount retail stores in 39 states. Target is the third largest discount retail chain in the United States.

Target's Indianapolis Warehouse/Distribution Center (W/DC) and regional office is a 1.5-million-square-foot facility that receives merchandise from thousands of vendors and distributes it to 144 Target stores in Indiana, Michigan, Illinois, Kentucky, Wisconsin, Iowa, Tennessee and Missouri.

Table 3  
Materials Recycled at Target's Indianapolis W/DC (1995)

Material	Amount (tons)
Old Corrugated Cardboard	
W/DC	2,325
Stores	5,584
Aluminum Cans	1
Office Paper	2
Stretch Wrap	123
Scrap Metal	3
Pallets	4
Garment Hangers	5

<sup>1</sup> No figures are available for aluminum cans from soda machines. Proceeds from sale of aluminum cans are donated to charity.

<sup>2</sup> No figures are available.

<sup>3</sup> A small amount of scrap metal is taken by a local scrap metal dealer. No cash reimbursement. No figures are available.

<sup>4</sup> Wooden pallets are re-used or repaired through an outside contractor. No figures are available.

<sup>5</sup> Garment hangers are reused or recycled through an outside contractor. No figures are available

## Target Recycling Program

The recycling program at Target's W/DC recovers or re-uses a variety of materials that would otherwise be disposed of as solid waste. In addition to the material recovered directly from the W/DC, four items are backhauled from individual stores. These items are:

- old corrugated cardboard;
- wooden pallets; which are repaired and reused,
- merchandise case packs, which are re-used; and
- plastic garment hangers, which are reused until no longer serviceable, and then recycled.

Table 3 shows the materials recovered by the W/DC for 1995.

## Stretch Wrap Recycling

### Collection

The W/DC operates two ten-hour shifts per day, seven days per week. The facility's 82 receiving docks receive approximately 150 to 160 truck-loads of merchandise per day. Incoming merchandise is secured to pallets with stretch wrap and strapping. Products delivered to the W/DC are directed to one of two areas. "Flow-through" merchandise is received, repacked and sent directly to stores. "Pool stock" is held at the W/DC for shipment to stores at a later time. Personnel at the receiving dock strip the stretch wrap from the "flow-through" merchandise. The stretch wrap is placed in appropriately labeled containers. When the containers are full, they are taken by forklift to the baler.

Pallets with merchandise that is to be held in “pool stock” are generally not unwrapped when received. The pallets are immediately moved to the appropriate section of the warehouse for storage. When this merchandise is needed, it is unpacked for shipment to stores. The stretch wrap is removed and placed in containers located throughout the W/DC. When these containers are full, they are taken by forklift to the baler.

#### Processing

When the stretch wrap recycling program was begun, an attempt was made to train receiving personnel to eliminate paper labels and other contaminants before placing the stretch wrap in containers. However, this training effort proved awkward and complicated and was discontinued. At the present time, all stretch wrap is baled on the second shift and the baler operator has responsibility for checking for contaminants. This is the only quality check done on the stretch wrap. Because stretch wrap in the containers has been rolled together or “bunched,” it is difficult to see contaminants.

The stretch wrap coming from the receiving docks and other areas is baled in a vertical Cram-A-Lot baler made by J.V. Manufacturing Co. of Springdale, AR. The bales of stretch wrap, weighing approximately 1,000 lbs, are shipped by tractor/trailer, 38 bales per trailer, to the market.

#### Marketing

Target sells its stretch wrap to Poly-America. In 1992, when Poly-America agreed to purchase Target’s stretch wrap, Poly-America sent a representative to Target’s W/DC to explain and demonstrate to Target personnel the quality of stretch wrap Poly-America expected.

To monitor stretch wrap quality, Poly-America breaks open randomly selected bales from Target and counts contaminants such as paper labels and string. Poly-America then informs Target of the contamination levels. In this way, there is continuous monitoring and communication about the quality of the stretch wrap.

The price Poly-America pays for stretch wrap depends on the level of contamination of the stretch wrap and current market conditions.

## The Economics of Stretch Wrap Recycling at Target

Target’s recycling program is driven by Target’s desire to be environmentally responsible and to keep operating costs as low as possible. According to Target, the revenues it received for the sale of its stretch wrap exceeded its operating costs. It also benefited from lower disposal costs.

Target’s costs for solid waste disposal for 1995 consisted of an \$11.00 per ton hauling charge and a tipping fee of \$19.50 per ton. Total disposal costs were \$30.50 per ton. The cost savings of recycling 123 tons of stretch wrap were \$3,750.

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# Case Study

## Stretch Wrap Recycling at Anheuser-Busch Companies, Inc.

### Anheuser-Busch Companies, Inc., Merrimack, NH: An Overview

Anheuser-Busch Companies, Inc. is the parent company to Anheuser-Busch, Inc., the largest beer brewer in the world, and is the parent company to a number of subsidiaries that conduct other business operations, including those related to the manufacture of metal beverage containers, the recycling of metal and glass beverage containers, and the operation of nine theme parks. Anheuser-Busch Companies, Inc. reported total 1995 sales of 12 billion dollars. Anheuser-Busch breweries produced 87.5 million barrels of beer in 1995 in 12 plants across the United States, more than double that of its largest competitor.

The Merrimack, NH brewery, built in 1970, includes the Brewhouse, where beer is brewed, and the Packaging and Shipping Department, where the beer is packaged in glass bottles, aluminum cans and kegs and is then shipped to 18 beverage wholesalers in New Hampshire, Maine, Vermont and Massachusetts. The brewery

operates at three shifts per day, six days a week, throughout the year. Production of beer at the Merrimack Brewery is approximately 65,000 barrels per week.

### Anheuser-Busch Recycling Program

Recycling at the Merrimack Plant is carried out in both the Brewhouse and the Packaging and Shipping Department. Recycling in the Brewhouse is supervised by the Brewmaster and his staff. The primary materials recovered in the Brewhouse are spent grain from the brewing process and alcohol-bearing wastes, which are distilled into ethanol and sold as automotive fuel.

The Packaging and Shipping Department handles deliveries from 130 trucks per day, bringing bottles, cans, labels and other supplies. In general, the materials recovered are generated in two areas of operation:

- the receiving docks — pallets, stretch wrap, PET strapping, corrugated cardboard; and
- the packaging lines — glass, aluminum, PET strapping, stretch wrap and corrugated cardboard.

Materials recycled at the receiving dock are handled by receiving personnel and materials recycled on the packaging lines are handled by the line service personnel.

Table 4  
Materials Recycled at Anheuser-Busch (Merrimack, NH)

Material	Amount (tons)
Export Grade Fiber	1,725
#1 Kraft Board	530
Office Paper	12
PET Strapping	44
Aluminum Cans	51
Stretch Wrap	20
Spent Grain	86,000
Glass	4,194
Wooden Pallets <sup>1</sup>	14
Beechwood Chips	70
Clydesdale Straw	272
Alcohol-Bearing Wastes	550 <sup>2</sup>
Total	93,482

<sup>1</sup> 1,100 wooden pallets; 1 pallet = 25.5 lbs.

<sup>2</sup> 164,000 gallons; 1 gallon = 6.7 lbs; recovered as ethanol.

Source: Anheuser-Busch

The recycling program is supported by the Nashua, New Hampshire plant of Anheuser-Busch Recycling Corporation, a subsidiary that processes aluminum, steel, and glass containers, plastic, paper goods, and sorts re-usable glass bottles.

Table 4 shows the amounts of materials recycled in the Merrimack Plant in 1995.

## Stretch Wrap Recycling

### Collection

The Packaging and Shipping Department receives approximately 130 truckloads of containers and other materials per day. The type of packaging materials used to secure goods to pallets varies. For example, aluminum cans are secured to pallets with PET strapping. Bottles, bags of chemicals, boxes of cleaning materials and boxes of labels are secured to pallets with stretch wrap.

Incoming pallets are handled in one of two ways. Pallets of bottles and cans are disassembled on the receiving dock. The stretch wrap collected here is placed in appropriately labeled gaylord containers. Once the containers are full, they are taken by forklift to the recycling dock, where the stretch wrap is baled.

Pallets of chemicals, cleaning materials, and bottle labels are taken from the receiving dock directly to the packaging lines — three bottling lines and two can lines. Each of the lines has a “line service person” who keeps the line supplied with material. Line service personnel strip the

stretch wrap off the pallets delivered to the line and place it in gaylord containers. When these containers are full, they are taken by forklift to the recycling dock, where the stretch wrap is baled.

### Processing

Incoming stretch wrap contains small amounts of paper labels, string and other materials. Individuals collecting the stretch wrap — either personnel on the receiving dock or line service personnel — are trained to remove these contaminants before placing the film in the collection containers. Because employee turnover in the brewery is quite low, training costs are minimal.

The stretch wrap is baled in a Union Environmental Baler, which produces finished bales weighing about 1,500 lbs. The baler may be operated by any of the line service or receiving personnel. Bales are stored inside on the recycling dock until they are shipped to market.

### Marketing

From 1989 to 1993, the stretch wrap was sold to a firm that also purchased the brewery's PET strapping. One problem with this market was that the stretch wrap could be sold only in truckload lots, creating a storage problem for the brewery. In late 1993, an agreement with a new market, Rubbermaid, was executed. One advantage of the new agreement was that Rubbermaid was willing to pick up partial truckloads.

In 1995, 40,000 pounds of stretch wrap were recovered and sold for \$0.08/lb, generating \$3,200 in revenue.

In order to ensure that the stretch wrap met Rubbermaid's quality standards, a representative from Rubbermaid visited the Merrimack Brewery to review and critique collection and processing procedures and to inspect samples of the recovered stretch wrap. Samples were taken back to Rubbermaid's manufacturing plant to be sure they met the necessary quality specifications. Rubbermaid also provided a pamphlet describing the quality standards for recovered stretch wrap, including the materials regarded as contaminants. The stretch wrap currently recovered by the Packaging and Shipping Department is very clean.

Rubbermaid products made from the recovered stretch wrap include mop buckets and trash cans. These are now being purchased by the brewery's Packaging and Shipping Department, thus "closing the loop" on stretch wrap recycling.

## The Economics of Stretch Wrap Recycling at Anheuser-Busch

The recycling program at the Merrimack Brewery is driven by a desire to be environmentally responsible by helping to conserve resources and preserve the town of Merrimack's landfill space. The program was not promoted as a way to cut costs or generate revenues. In fact, the exact costs of the recycling program have not been calculated.

Line service personnel, who already move materials to and from the packaging lines, simply put the recovered stretch wrap in different containers. Similarly, the receiving personnel, who previously would have placed pallet wrap in a trash barrel, now place it in a recycling bin. The cost of additional containers and signage are assumed to be small. The baler used for stretch wrap is the same one used for corrugated cardboard. Anheuser-Busch regards the incremental cost of baling stretch wrap as reasonable. Efforts to quantify the exact costs of recycling are now under way.

It has already been pointed out that the firm receives \$0.08/lb for its stretch wrap and received an estimated \$3,200 in revenues in 1995. In addition, the savings of diverting the stretch wrap from the landfill, based on a tipping fee of \$65/ton, were approximately \$1,300. Therefore, the total economic benefit was \$4,500.

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# Case Study

## Stretch Wrap Recycling at Spartan Stores, Inc.

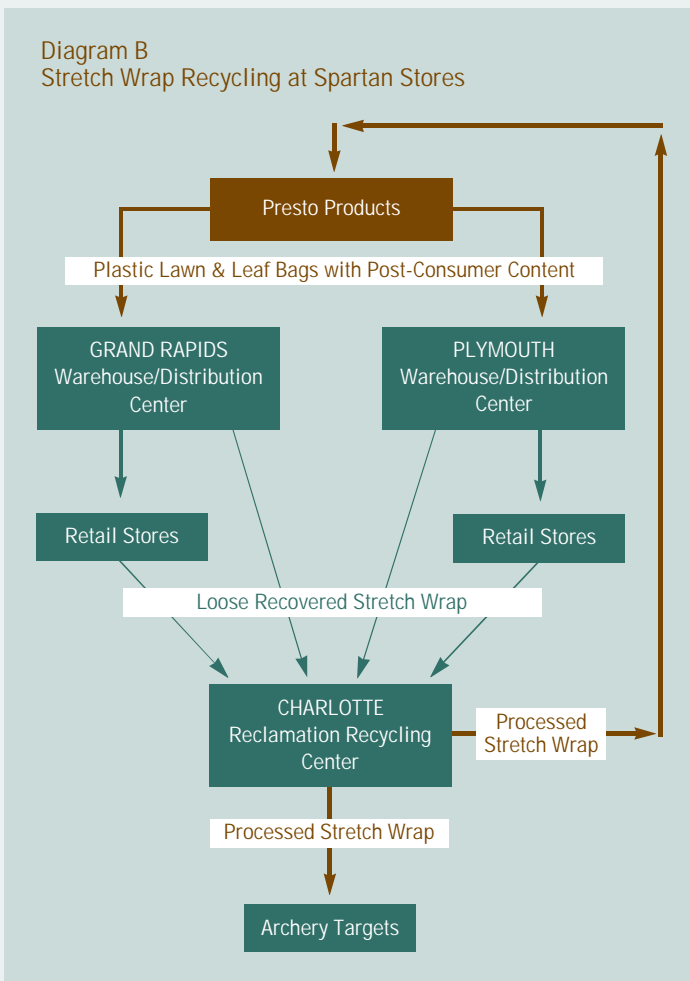
### Spartan Stores, Inc., Grand Rapids, MI: An Overview

Spartan Stores is the seventh largest wholesaler of grocery and related products in the United States, with fiscal year 1995 sales of \$2.5 billion. Spartan distributes to approximately 525 affiliated retail grocers and 8,600 convenience stores serving Michigan, Ohio, Indiana, Illinois,

Pennsylvania, Kentucky, Tennessee, and West Virginia. Spartan offers a number of services to its member stores, including the following:

- distribution services for dry grocery items, produce, meats, dairy products and frozen foods;
- reclamation services for damaged items;
- recycling services for corrugated cardboard (OCC), plastic film, stretch wrap and polystyrene (PS) foam;
- private label brands of many products; and
- support services of various kinds.

Diagram B  
Stretch Wrap Recycling at Spartan Stores



Participation in Spartan's recycling program is not mandatory for member stores. For example, some stores choose to bale their OCC and back-haul it to Spartan, while other stores collect and market OCC on their own.

Although there are a number of smaller chains of 10 to 20 stores within Spartan that may have their own distribution centers for certain products, Spartan Stores has three major facilities. On site at its headquarters in Grand Rapids, MI, is a W/DC for groceries, meats, produce and frozen foods and a transportation servicing facility for Spartan's tractor/trailers. The second facility is a W/DC in Plymouth, MI; the third is the Support Services and Reclamation Center (SSRC) in Charlotte, MI, serving the entire Spartan chain.

### The Spartan Recycling Program

Materials recovered by the Spartan recycling program are generated from four different areas of operation and include:

- motor oil and freon from refrigerator trucks, office paper from Spartan's headquarters, and pallets, stretch wrap and OCC from the W/DCs;

Table 5  
Materials Recycled by Spartan Stores, Inc. (1995)

Material	Tons Recovered in 1995
Stretch Wrap	275
Plastic Film Bags	375
Polystyrene Products	1
Corrugated Cardboard	40,000
Total	40,650

<sup>1</sup> Estimate not available.

- pallets, OCC, stretch wrap and plastic tote boxes from retail stores;
- PS foam and film bags accepted from customers at retail stores; and
- certain recyclables from the city of Charlotte, including natural high density polyethylene (HDPE) bottles, colored HDPE bottles, PS foam and film bags.

(Diagram B depicts the flow of stretch wrap in Spartan's recycling program.)

The heart of Spartan's recycling program is its Reclamation Center, located in Charlotte. The Reclamation Center has two functions. First, it receives and processes damaged food items from the W/DC and retail stores. It also receives and processes recyclable materials from the W/DC, retail stores and the city of Charlotte.

A summary of materials recovered by Spartan in 1995 is presented in Table 5 above. Table 5 does not include recyclables delivered by the City of Charlotte, white paper from headquarters, oil and freon from the transportation facility or materials that retail stores may have recovered and marketed independently.

## Stretch Wrap Recycling

Stretch wrap recycling involves three steps at Spartan: collection, processing and marketing.

### Collection

Eighty-five percent of the stretch wrap recycled by Spartan Stores is generated and collected in the W/DCs. The remaining 15 percent comes from the retail stores.

Hundreds of trailer trucks per day are unloaded at the W/DCs, bringing grocery items from thousands of vendors.

Virtually all incoming pallets are wrapped in low density polyethylene (LDPE) stretch wrap. Typically these pallets arrive with labels or loader tags already affixed to the film. Spartan has written to its vendors asking that the vendors not place paper labels and tape on the stretch wrap.

Each incoming pallet is given a computer-coded Spartan label to facilitate warehousing and inventory control. In order to avoid further contaminating the film, receiving personnel are asked to cut the stretch wrap and place the Spartan labels directly on the shipping boxes.

As the incoming pallet loads are broken down for distribution to retail stores, the stretch wrap is stripped off and placed in bins (usually gaylord boxes) located throughout the W/DCs. Employees are urged to remove tape and paper labels, the primary contaminants of stretch wrap, before placing the film in the bins. The film is collected in the bins and trucked to the SSRC for processing.

The second, and smaller, source of stretch wrap is retail stores. Each store receives pallets from Spartan's W/DCs that are covered in stretch wrap. In addition, the store also receives products directly from vendors, such as soft drink

distributors. An individual store may receive 20 or 30 pallets per day of incoming shipments.

Those stores that are recycling stretch wrap place the stretch wrap taken from incoming pallets into large plastic bags. The bags of stretch wrap, along with other recyclables, such as OCC, pallets, PS foam and film bags from customers, are placed in trailers destined for the SSRC for processing.

An exception to this are those stores serviced by Spartan's Grand Rapids, Michigan, W/DC. For those stores, recyclables are backhauled to the Grand Rapids W/DC where the stretch wrap, plastic grocery bags, and PS are loaded into a trailer provided by a local recycler that manufactures edge and corner protectors for shipping products.

#### Processing

The SSRC receives stretch wrap either in large bins from the W/DC or in clear film bags from some of the retail stores. The bins and bags are brought to a corner of the Reclamation Center. There, workers remove the stretch wrap from the bins and bags and inspect it. Tape is removed from the stretch wrap and the clean film is placed on a conveyor leading to the baler.

Spartan estimates that it costs about \$0.065 per pound to handle and process stretch wrap. This includes the cost of transportation from the stores to the SSRC, inspection and baling of the film and shipment to market.

#### Marketing

To provide an outlet for its recovered stretch wrap, Spartan uses two markets.

#### Trex, Inc.

Trex is located in Winchester, Virginia, where it recycles film plastics and sawdust into a composite lumber-like product. Spartan ships both baled stretch wrap and baled plastic bags to Trex. The convenience of using a single market for both materials is one of the reasons why Spartan switched to Trex from previous markets.

#### Ecologix

Ecologix is located in Holland, Michigan, less than thirty miles from Spartan's Grand Rapids, Michigan, W/DC. Spartan backhauls stretch wrap, plastic bags, and polystyrene foam from its associated stores that are serviced by the Grand Rapids, Michigan, W/DC to the Grand Rapids W/DC instead of to the SSRC. Those plastic recyclables, which have been placed into large plastic bags by Spartan's associated stores, are then transferred without further processing into a trailer provided by Ecologix at Spartan's Grand Rapids W/DC.

When the trailer becomes full, Ecologix replaces the full trailer with an empty trailer. Although Ecologix does not pay for the plastics that it obtains from Spartan, Spartan saves over \$200 per ton on shipping and processing costs, whereas it would only receive revenues of approximately \$80 per ton from other markets for its processed recyclables.

Ecologix, in turn, recycles the plastics that it receives into corner and edge protectors that are used in shipping furniture, paper, or other similar products where it is important to protect corners and edges, particularly in applications where products are shipped using source-reduced stretch wrap rather than full corrugated boxes.

## The Economics of Stretch Wrap Recycling at Spartan

Stretch wrap recycling is driven more by Spartan's desire to be environmentally responsible than it is by economic considerations. The recycling of stretch wrap is part of its overall recycling and environmental program, which has been largely initiated and championed by employees.

By Spartan's own estimate, it costs the company \$0.065 per pound to collect and handle stretch wrap, while it receives \$0.05 per pound from Trex. Spartan is cognizant, however, that there are avoided disposal cost savings realized by the program.

The current tipping fee at the Kent County Resource Recovery Facility is \$36.40 per ton. At the Grand Rapids W/DC, trash is collected in 40 yard compactors. The cost each time a compactor is hauled is \$110.10.

To estimate the weight of a cubic yard of film in a compactor, it is necessary to determine the degree of compaction. Loose waded stretch wrap weighs approximately 50 pounds per cubic yard. Alternatively, baled stretch wrap weighs approximately 375 pounds per cubic yard. Compacted stretch wrap falls somewhere in this range, depending on the compactor. Since compactors typically achieve three-to-one compaction, an estimate of 150 pounds per compacted cubic yard was assumed.

Table 6 shows Spartan's avoided cost savings for stretch wrap recovery based on the assumption that stretch wrap weighs approximately 150 pounds per cubic yard when compacted.

Table 7 summarizes the costs and revenues, including the cost savings from avoided disposal of the Spartan stretch wrap recycling program.

While Spartan benefits from recycling stretch wrap, economics are not the main reason why Spartan recycles. Spartan assumes the recycling program, of which stretch wrap recycling is a part, contributes significantly to customer and community goodwill.

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Table 6  
 Avoided Cost Savings for Stretch Wrap Recycling

Weight of Stretch Wrap Recovered	Volume of Stretch Wrap Recovered	Savings Hauling Costs <sup>1</sup>	Savings Tipping Fees <sup>2</sup>	Total Savings
1995 550,000 lbs	3,667 yd <sup>3</sup>	\$10,093	\$9,900	\$19,993 ( $\$0.036/\text{lb}$ )

<sup>1</sup> Assumed to be \$110.10 per 40-cubic-yard compactor load.

<sup>2</sup> Assumed to be \$36/ton in 1995.

Table 7  
 Summary of Economic Benefit of Recovering Stretch Wrap

Avoided Cost Savings	Revenues	Costs	Net Benefit
\$0.036/lb +	\$0.050/lb -	\$0.065/lb =	\$0.021/lb



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