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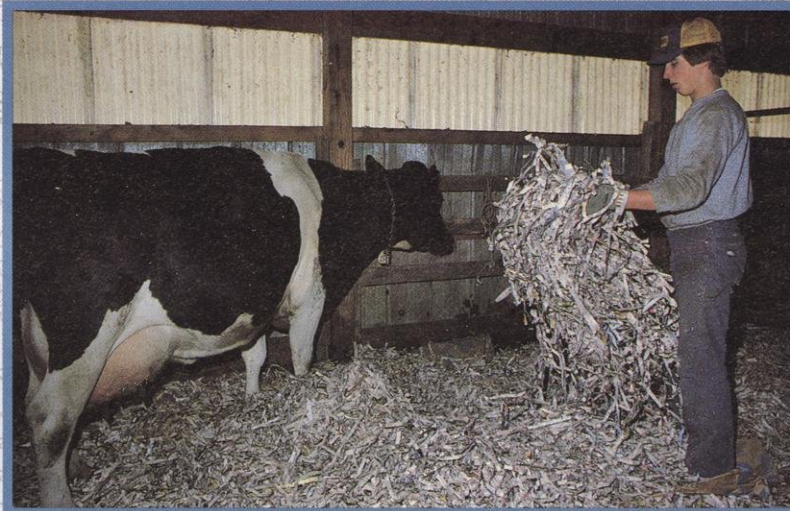
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Closing the Loop



TRADEY TEODÉCKI

BUILDING RECYCLING MARKETS IN WISCONSIN



The economics of recycling

SUPPLY, DEMAND, CONSUMER CONFIDENCE, BUSINESS INITIATIVE — ALL THE THINGS THAT KEEP OUR REGULAR ECONOMY ROLLING ALSO TURN THE RECYCLING LOOP.

You've cleaned out your used milk jugs, bundled up your old newspaper, and brought it all out to the curb or to a recycling collection center. You're recycling, right?

Yes, but...

There's more to recycling than just collection. The process of recycling begins with collection, but it's not complete until the cans, bottles or other items gathered are used as raw materials to make new products. When something has been fully

recycled, it has been collected, reprocessed and remanufactured into a new product.

When you prepare materials for recycling you switch hats — from consumer to supplier. A manufacturer or other business looks to you as a source of material for production. Paper mills want your newspaper to make tissue paper or newsprint. Glass manufacturers want your old spaghetti sauce bottles to make new pickle jars. Iron foundries want your tin cans to make metal castings for automobile parts.

You are now a source of raw material — and manufacturers will have the same concerns about you that they have about any supplier. Is the material you are supplying clean and properly prepared? Is it of high quality? Can you be counted on as a *reliable* source of this material?

The success of community and business recycling programs around the state hinges on the answers to these questions. It comes down to basic economics: There must be a demand for the recyclables you

If "raw materials" are to be recycled into new products, they first must be cleaned and sorted. Businesses require clean, steady supplies of bottles, cans, containers and paper or cardboard to keep production lines moving.



PHOTOS BY TRACEY TEODECKI

want to supply; there won't be a demand if the supply is erratic and of poor quality. Further, consumers must want to buy the products manufacturers make from recycled items; otherwise, manufacturers will have no incentive to produce products from recyclable materials.

It's all part of developing markets for recycling.

A market is born

Recycling has four stages:

- collection (also referred to as *recovery* of recyclables);
- separation by type (before or after collection);
- processing materials into reusable forms;
- purchasing and using the goods made with reprocessed materials.

Businesses that process recyclables into reusable forms — the third step in recycling



TRACEY TEDECKI

Collecting cans and bottles at the curb is only the beginning of the recycling process. Recyclables must then be sold to a manufacturer who will turn them into new items that consumers want to buy.

Buy recycled

Consumers can help close the recycling loop by buying products that are made from, or packaged in, recycled materials.

By purchasing products with recycled content you demonstrate that recycling is not a passing fad, and you create increased demand for the used materials separated for recycling.

Next time you shop, look for products made of materials that are being collected for recycling in your neighborhood — the most common items are glass, aluminum, steel, some paper and cardboard, and certain plastics.

cling — are referred to as markets. Steel mills are markets for steel (or “tin”) cans, when the scrap steel is used to make new steel. Glass manufacturers that remelt glass bottles and jars to produce new containers are also markets.

Unfortunately, markets do not exist for all recyclable materials. Take foam polystyrene, commonly referred to by the trade name Styrofoam. Cups, plates and other food service or food packaging items made from foam polystyrene can be recycled — but the high cost has made some entrepreneurs reluctant to try. In the latest version of *The Wisconsin Recycling Markets Directory*, a comprehensive listing of all markets for recyclable materials in the state of Wisconsin, there were 52 businesses that served all counties as markets for aluminum cans, while only eight companies were listed as statewide markets for foam polystyrene.

Amoco Foam Products Company in

Chippewa Falls, a manufacturer of foam polystyrene products for more than 30 years, recently added recycling to its production process. “The costs can be prohibitive,” admits Jack Felmlee, Amoco’s issues management regional director. “Costs for virgin material are so low that it costs as much or more for a finished product made of recycled material.” Felmlee adds that the company has had problems getting an adequate supply of used foam polystyrene, and that the quality of virgin material is often better than that of recycled material. “We can mix our recycled material with virgin in our foam insulation board,” he explains. “This allows us to meet our quality requirements and use the recycled material.”

A lack of markets can thwart even the most efficient collection program. Individuals and communities that collect recyclable items for which markets do not yet

exist may find themselves burdened with piles of unsalable material. Waste haulers, aware of the dearth of markets for certain recyclables, refuse to pick up the materials. Angry customers, unaware of the market situation, criticize haulers and community collection personnel, blaming them for the inability to recycle certain materials.

Markets for recyclable materials don't spring up overnight. Using recyclables in production requires patience and a willingness to experiment on the part of manufacturers and entrepreneurs. Trust needs to be built between suppliers of recyclables, the manufacturers who will buy the recyclables and turn them into new products, and the consumers who will purchase those new items. Building markets takes time.

The laws of supply and demand

Wisconsin citizens have embraced recycling with enthusiasm. In a November 1992 phone survey conducted by the Department of Natural Resources, 86 percent of people who responded said they recycle. Sixty-four percent said they recycle more today than they did two years ago, and 62 percent categorized themselves as strongly committed to recycling. A recent report detailing the generation and disposal of

Wisconsin's solid waste estimated that by 1995, 40 percent of the state's municipal solid waste stream will be recovered for recycling.

These statistics show that recycling is off to a great start in Wisconsin, but they don't point to the work that remains to close the recycling loop. The figures broadcast the success of the supply side of the recycling equation, but they don't reflect what's happening on the demand side.

Supply and demand for recyclable materials, as for any other commodity, are inexorably linked. The current and projected situation for the supply and demand of recyclable paper provides a good example of this interdependence. More than 300,000 tons of paper were recovered through recycling in Wisconsin in 1990. By 2000, that figure is expected to jump to more than 700,000 tons per year. Paper mills in Wisconsin and surrounding states are making changes that will enable them to take advantage of the increased supply: New mills are slated to come on line, and existing facilities are planning to retool and expand.

If all the new mills are built and the proposed plant expansions occur, the region's paper industry will increase its capacity to process recovered paper by 400,000 tons per year between 1995 and 2001.

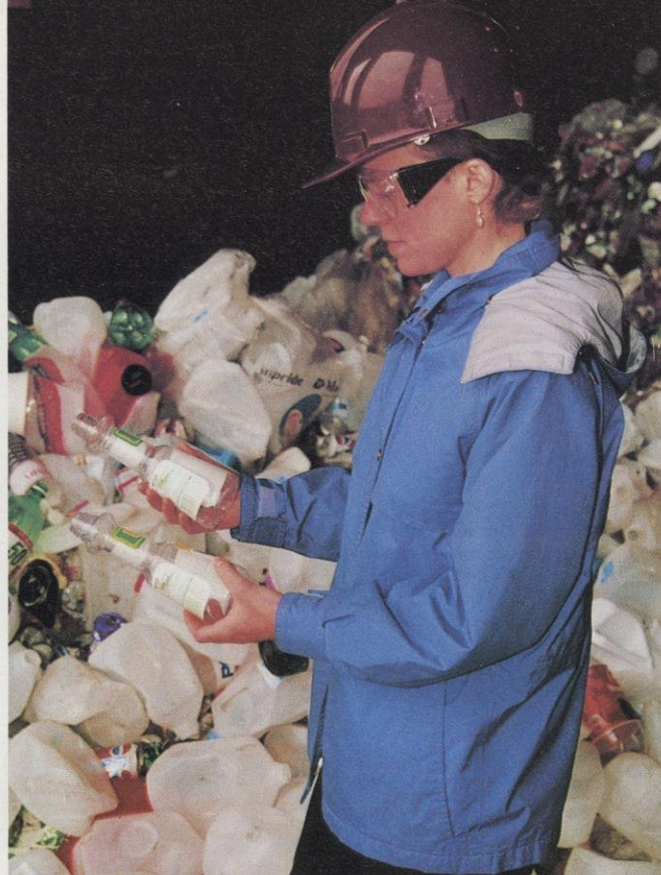
But, if the supply of recovered paper isn't steady enough to keep the mills operating at capacity, the mill owners may not be willing to make the capital improvements necessary for handling more recovered paper. Demand dwindles because the supply is erratic. And no one will want to collect recovered paper if the mills don't want to buy it.

A similar situation exists for recyclable glass. In order to use all of the glass projected to be recovered in Wisconsin by the

year 2000, glass container manufacturers serving Wisconsin will have to boost their use of recovered glass in production to 40 percent. Midwest manufacturers currently use an average of only 17 percent recovered glass, compared to a national average of almost 34 percent.

While the jump to 40 percent is technically possible, manufacturing plants hesitate to invest the time and money needed to make necessary plant changes to use more recycled glass. Before they take the step, they want to be assured of a reliable, steady supply of recovered glass.

It's a bit of a paradox. Communities, waste haulers, and other potential "sellers" of recyclables are concerned about the lack of markets for their materials, and therefore may not collect certain recyclable items. At the same time, mills and factories are unwilling to increase capacity to process recyclables — unless they are confident that they will have enough "raw material" to justify the expense.



PHOTOS BY DAVE BLESSUM

Look-alike plastic bottles can stump even solid waste experts like Janet Niewold. The bottles are the same size and hold the same brand of cooking oil, but they're made out of different resins, as the numbers on the bottoms indicate. Like oil and water, resins #1 and #3 don't mix. Sort plastics carefully when recycling.



The quest for quality

Contaminants are one of the biggest obstacles to recycling materials. Caps left on glass bottles sink to the bottom of a glass-melting furnace, where they collect and form pools of molten metal that can corrode the ceramic brick of the furnace bottom. Metal contaminants introduced into one company's furnace over a two-year period wore a hole in the furnace, causing 350 tons of molten glass to flow into the plant basement. The total bill for heat and fire damage was \$3.5 million.

Contaminants vary, depending on the method used to process the recyclables. Adhesives used in magazine bindings, ad-

In the loop

The familiar triangular symbol represents the cycle, or loop, a recycled item follows from producer, to consumer, to producer again. You've likely heard these two terms used to describe recycling:

In a **closed loop**, the recycled product returns to its original form: Old glass bottles are melted to make new glass bottles.

In an **open loop**, the recycled product is made into something else: PET plastic bottles are turned into fiberfill pillow stuffing and scouring pads.

dress labels or packing tape are difficult to separate from paper being pulped (broken down and mixed with water) for recycling. The "stickies" remaining after the pulping process show up in new paper as uneven, off-color imperfections, which can render the paper unsalable. Steel cans, however, are shredded and melted in a furnace; paper labels and adhesives are burnt off in the process. Consequently, most steel can mar-

find usable material. At the same time, we've got communities complaining about the lack of markets."

Gary Fish, owner of Midwest Plastics, a plastic reprocessor in Edgerton, Wis., supports Niewold's observation. "We're short about 90,000 pounds of used plastic a week," says Fish. "It's kind of sad. You hear stories about people who have all these milk jugs they can't get rid of, and I

gravel, and other foreign matter render entire batches of plastic useless at Fish's plant. Fish has to pay to dispose of the material in the Dane County landfill.

"We're paying three thousand dollars a week in landfill fees," says Fish. "It's ridiculous that we buy this stuff and then have to pay to throw it away."

Quantity counts, too

Even if a community, business, or other collector of recyclables can offer completely contaminant-free material, there's no guarantee of a market. Small communities in rural Wisconsin may find it difficult to generate large enough quantities of materials to make pick up attractive to a waste hauler. Stockpiling recyclables until there's enough to fill a semitrailer would appear to be the answer — except that few communities, small or large, have the space to safely store thousands of milk jugs or juice bottles. Communities that pool their recyclables can often create enough volume to make transportation more cost-effective.

When high transportation costs outweigh any potential revenue from the sale of recyclables, establishing *local* markets

Buy and sell

The *Wisconsin Recycling Markets Directory* is a comprehensive, up-to-date listing of organizations that buy or accept recyclable materials.

The directory helps municipal officials, community recycling coordinators, industries, and recycling organizations find buyers for recyclables. It's also useful for brokers and processors interested in selling scrap materials.

The directory is available in both a printed and computerized (IBM compatible) version. Users can search the listings by county to find a market that will serve their area. The directory is updated quarterly.

For more information, call the Department of Natural Resources at (608)267-7566.

kets do not require that labels be removed before collection.

Contaminants also come from incorrect sorting of recyclables. Plastic resins, such as polyethylene terephthalate (PETE, #1) and polyvinyl chloride (PVC, #3) have identical appearances, but cannot be processed together. It's not uncommon to find the same product packaged in look-alike bottles made from different resins. Here are other examples: Although window glass appears to be the same as the glass in bottles and jugs, it is made with a chemical that insulates and filters out the sun's harmful rays, and will not blend properly with container glass in a glass furnace. The resulting batch of glass is weak and of little use. A drinking glass has a different melting point from a glass bottle or jar, and may clog the glass furnace or cause flaws in the finished product.

"Quality control is the single biggest obstacle in the recycling process," says Janet Niewold, market development specialist with the Wisconsin Department of Natural Resources. "There are plenty of recyclers out there whose businesses are running into trouble because they can't

find enough people that will sell me good, clean material."

According to Fish, the hitch is quality. Incorrectly sorted plastics, as well as dirt,

A hay mow holds all the news that's fit to shred: The market for old newsprint got a big boost in Dane County when area farmers began using shredded paper as animal bedding. Demand for "old news" now exceeds supply.



PHOTOS BY TRACEY TEODECKI



The high cost of transporting recyclables eats up potential profits. Strong local markets for recyclables help keep transportation costs down.

may prove to be the most logical solution.

Animal bedding is a farm-tested and accepted local market for old newspaper. During the drought of 1988, farmers faced with a lack of straw tried using shredded newsprint as animal bedding. It proved to be more absorbent and often cheaper than straw. The result: More and more farmers began using the paper bedding, and the market price for newsprint rose. As of April 1993, Dane County's waiting list for old newsprint was six weeks long. With more than four million cows and cattle in the state, Wisconsin's beef and dairy farms could potentially use up to 800,000 tons of shredded newsprint a year, far more than the 227,700 tons projected to be generated in 1995.

Contaminated clear glass is used locally as an aggregate in the construction of road beds. The glass replaces quarry stone and other virgin materials. Crushed glass is also being used to replace aggregate in asphalt pavement, resulting in a new product, "glasphalt."

You are the supplier

As we generate more waste and mine more raw materials from the earth, it's time to rethink our definition of "garbage." Materials that traditionally have been land-filled and incinerated are not worthless. Today, technological advances and innova-

tions in collection and processing allow used materials to be recycled successfully. Recycling can be a viable, sustainable industry — if all the elements to support markets are in place.

When you separate your recyclables from other waste, think of yourself as someone who is doing more than just recovering materials. Think of yourself as someone who is supplying raw material to a manufacturer. A glass manufacturer can't make new bottles out of glass that's mixed with dirt and rocks. Paper mills can't make new paper out of newspapers that are soggy from being left out in the rain. *Evaluate your recycling habits with markets in mind.*

Remember, *reliable sources of quality materials will enable recycling markets to prosper.*

Keep it clean

Eliminate contaminants at the source by preparing your recyclables in a way that will make them most usable by the end market. Check with your local recycling program for specific guidelines on how to prepare items for recycling.

When in doubt:

- rinse clean all bottles, cans and containers
- remove and discard all caps, plastic rings and connectors
- flatten cardboard; make sure cardboard, newspaper and other paper is dry
- check the numbers on the bottoms of plastic bottles and containers and recycle only those types of plastics that your recycling program collects

Avoid throwing these items in with your glass recyclables:

- ceramic bottle caps
- lead collars on wine and champagne bottles
- ceramic cups and plates
- clay flower pots
- crystal
- light bulbs
- mirror and window glass

- heat-resistant ovenware
- drinking glasses
- dirt and rocks
- asphalt

Keep this stuff out of the recycling bins for tin and aluminum:

- plastic
- wood
- dirt
- original contents of cans
- plastic lids

Don't include these items in your bundles of newspaper and cardboard:

- plastic (bags, wrapping, sheets)
- blueprints
- carbon paper
- wax coated paper
- juice boxes

Sorting plastics takes a trained eye:

- check the numbers
- recycle only those plastics that your community can accept

Here a few of the more unusual contaminants Wisconsin recyclers have found in their bins: hand grenades, tennis shoes, golf clubs, lawn mowers and plastic dumbbells.



In their cups

A TOAST TO A NEW RECYCLING VENTURE THAT'S BEEN A TEAM EFFORT FROM THE BEGINNING.



NATIONAL W CLUB

Red and white may be the colors of choice for University of Wisconsin-Madison sports fans, but lately Camp Randall Stadium and the Fieldhouse have started to look a lot more green.

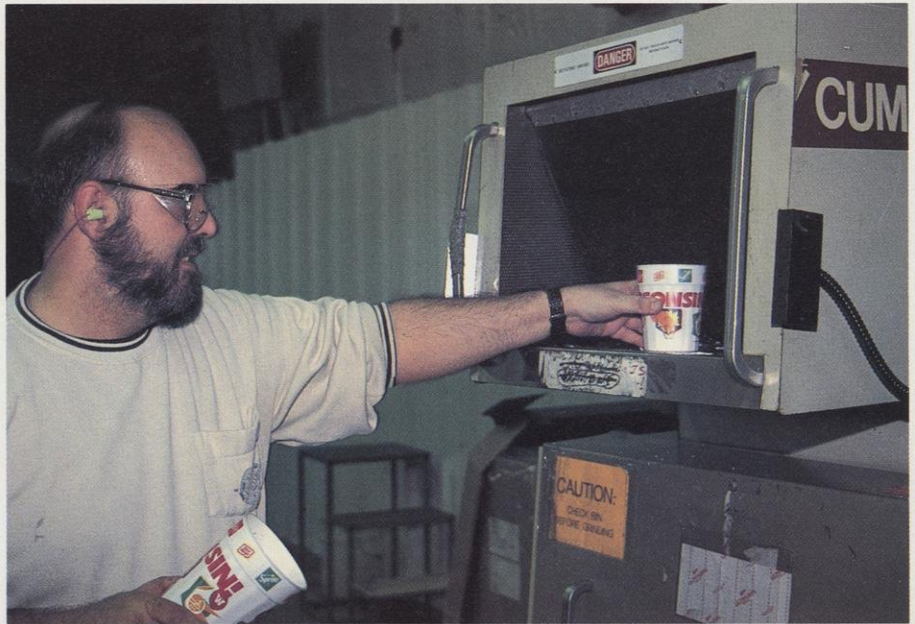
In 1990 the UW formed an alliance with EVCO, a plastics manufacturer in DeForest, to recycle the plastic beverage cups at UW-Madison football and basketball games. Used cups are collected at the stadium and fieldhouse in special 55-gallon drums placed near exits. The cups are then trucked to EVCO, where they are washed and ground.

The plastic chips are melted and molded into index card file boxes or magazine holders. EVCO hopes to place the products on retail shelves soon. Terry Murawski, executive director of the National W Club, a booster organization, says the plastic cups had been used for several years before he hit upon the idea of recycling them.

"My family and I are fairly sensitive to environmental issues," says Murawski. "I thought recycling cups would be a proactive, rather than reactive, solution to an environmental problem."

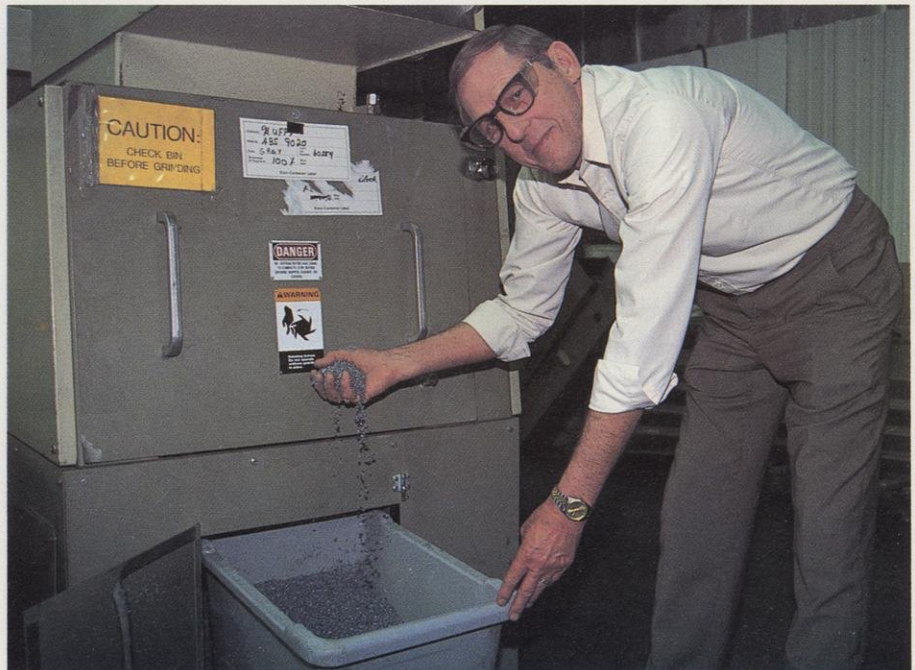
Murawski stresses that the cups can be both reused and recycled, two of the top three recommended solid waste management practices. "The cups are fairly inexpensive souvenirs because they can be taken home and used again and again," says Murawski. "But if someone doesn't want to reuse them, they can now be recycled."

Recycling the UW beverage cups presented an interesting challenge for EVCO, in part due to the problem of contaminants. "We're really trying to help the fans learn to sort the cups properly from the other material," says EVCO Project Engineer Rod Jonas. "We need them to put the



PHOTOS BY DAVE BLESSUM

Around the loop: Cups collected at Badger sports games (top)...are cleaned and ground at EVCO, a plastics manufacturer (middle, bottom)...





PHOTOS BY DAVE BLESSUM

...the ground plastic is melted, then formed into file boxes, magazine holders and other office products...

cups in the right bin, without the popcorn and the half-eaten hot dogs.”

Jonas says any non-cup material that is mixed in with plastic will cause problems in the end product. Contaminants can end up as black specks in the final plastic; cause blisters in the hinge of the index box, making it more susceptible to tearing; or cause the sides of the box to warp, making it difficult to snap the lid down tightly.

Manufacturing products from recycled material is nothing new to EVCO. The company’s “Alternatives” line offers desk and storage accessories made from recycled polystyrene and polypropylene, with as high as 75% recycled material, including 50% post-consumer content. Rod Jonas says the company is continually exploring possibilities for products made from recycled material.

Both the University and EVCO are continuing to refine the process for recycling the cups, and Murawski and Jonas seem optimistic about the future of the program. “The costs of this program are pretty minimal,” says Murawski, “but money isn’t really the issue here. We think recycling should be a way of life.”

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Market makers

A number of new and existing Wisconsin companies manufacture products from recycled materials. Meet a few who are making recycling work for their businesses:

BUSINESS	OLD ITEM	NEW PRODUCT
Waupaca Foundry Waupaca	tin cans	brake drums and other cast auto parts
American Woodstock Sheboygan	scrap wood	woodflour, used to make thermal plastic for car door panels
Amoco Foam Products Chippewa Falls	polystyrene trays, egg cartons, packing peanuts and other foam items	recycled resin to mix with new resins to make insulation board
Placon Corporation Fitchburg	plastic pop bottles	packaging for sporting goods, office supplies and hardware
NEW Plastics Luxemburg	plastic milk bottles	plastic lumber for decks
Humane Manufacturing Baraboo	tires	animal mats
Chicago Art Glass Plymouth	beer bottles	stained glass, paperweights, glass tile



...which are carefully examined for quality and strength before being sold. It takes about six cups to make a file box, 14 for a magazine holder. On a football Saturday, EVCO collects 20,000 to 40,000 cups for recycling.

The last leg of the loop — consumers purchasing items made from recycled materials — depends on you.