Show-Me Recycling

Angela Gehlert, MORA Executive Director

A few years ago phrases such as “climate change,” “global warming” or “carbon footprint,” were only heard in environmental circles. Today these issues are receiving worldwide attention in the media. Decision makers and citizens in every walk of life are faced with evaluating and perhaps changing their priorities when it comes to recycling and reducing waste and greenhouse gas emissions.

MORA’s Show-Me Recycling campaign is providing a snapshot of the many and varied programs that are part of Missouri’s new and expanding recycling industry. The Show-Me Recycling campaign highlights successful businesses and programs that expand Missouri’s economy, strengthen Missouri’s communities, and protect our environment.

Recycling Expands Missouri’s Economy!

American industries have invested billions of dollars in new equipment to use recyclable materials in the manufacturing processes. This investment demonstrates that recycling is economically and environmentally efficient and a viable contributor to our economy.

Over time $70 million dollars in Missouri landfill tipping fees have been distributed to Missouri’s solid waste management districts to further recycling efforts and achieve waste reduction goals. Missouri’s economy and blue collar workforce have benefited from this investment.

Employment

According to a 2005 Truman School School of Journalism study, Missouri’s recycling industry:

• Employs 28,026 workers.
• Produces annual sales of $5,122,436,000.
• Produces an annual payroll of $707,307,000.

A 2007 EPA study indicates that the recycling industry employs 1.1 million people in the United States.

Community

Missourians generate 6.15 lbs of waste daily, 37 percent above the national average of 4.5 lbs. Although we have done a good job of diverting waste, there is significant opportunity to initiate new programs and grow or expand existing programs.

Environment

As recycling business and recycled product manufacturers are established, a dynamic industry grows, money is invested in our communities and Missourians find jobs while protecting our natural resources.

To read about successful businesses or programs in your area or to find out more about the Show-Me Recycling project, visit the MORA website at www.MORA.org.
According to the Missouri Department of Natural Resource’s 2006-2007 Waste Composition Study, nearly 45% of the municipal solid waste deposited in Missouri landfills could be recycled, including metals, paper, plastics and glass. The study estimated more than 1.9 million tons of recyclable materials were disposed of in Missouri landfills each year. If recycled, the potential economic value of the materials as commodities would have been approximately $208 million dollars.

“The results of this study will assist Missouri’s 20 Solid Waste Management Districts in designing and implementing programs to reduce, reuse and recycle targeted materials within the municipal solid waste sector,” said Missouri Department of Natural Resources’ director Doyle Childers. Districts were organized to promote regional cooperation between cities and counties in addressing solid waste issues and to provide funding to assist with implementing waste reduction, recycling and solid waste planning activities. This study was conducted by the Midwest Assistance Program for the Missouri Department of Natural Resources Solid Waste Management Program.
As consumers, we have many choices in the products we purchase. Look for products that contain a high percent of recycled content. The “filled-in” recycling symbol means that the product has some recycled content, not just that it is recyclable.

Recycled content products are really everywhere! Not every brand or type of product uses recycled materials, but consumers have more choices all the time. Buying recycled may take a little detective work to find the many products already in the market that contain recycled materials. Look for the recycled content symbol and other recycling information about the product or package. Ask stores to carry more items with recycled content. Contact consumer information numbers and addresses on product labels to encourage the use of recycled materials, or thank those that already do.

Recycled products once cost more for some items made with recycled materials, but that’s no longer true for many common products. Now most recycled content products are priced competitively with their non-recycled counterparts. In fact, some recycled products are less expensive.

Recycled content products have the same quality and performance as equivalent non-recycled content products. American companies have invested heavily in technologies to use secondary materials in manufacturing processes to make new products. These products have to maintain quality specifications to be competitive in today’s marketplace. Increasingly, high performance products such as new construction and building products, carpet and automotive assembly components, are made with recycled materials once a part of our solid waste. Buying recycled products when we shop for home, work or school is one way that each of us can help the environment. Each time we buy recycled, we create additional demand for products that require more of the secondary materials collected in our local recycling programs. “Closing the Loop” is a very important part of the recycling process – and one that’s good for both our environment and our economy.

To locate vendors of recycled-content products that are being manufactured and distributed in Missouri visit the MORA website, www.mora.org, Related Publications section, EIERA Recycled Products Directory or visit www.dnr.mo.gov/eiera/mmdp-recycled-products-directory.htm.

Buying Recycled Products

Missouri is home to a number of important industries that use the commodities we recycle to make new products – from greeting cards and glass bottles to plastic decking. While not all recyclables are made into new products here in Missouri, a great many are. Other commodities are further processed, sorted and densified into upgraded materials that are converted into new products in other parts of the nation. Your community may have a scrap dealer to buy and process metals, paper, and other materials into industrial raw material grades that are shipped to various manufacturers.

There may also be a material recovery facility, or MRF, to take materials directly from residential and commercial collection programs, and process these commodities into a form that can be readily marketed. The industry user and the “middleman” processor are important components of the recycling process which contribute to the Missouri economy, and the viability of the recycling system.

The last, and most important component of the recycling system is YOU! We are all consumers of goods and services, and our purchasing choices influence the economy. Our choices also influence the recycling system. The last component of the recycling process involves purchasing recycled content products and packaging – closing the recycling loop. Without consumer purchases of recycled content products we lose the markets for the materials we collect and reuse. It’s important to be informed about choices in products and packaging. Making conscience and informed decisions to purchase recycled content products and packaging whenever practical, will help the recycling system sustain itself. Not only will your decision to choose recycled help the environment, it will support recycling businesses as well. A list of recycled products that can be purchased at local stores can be found on page 8.
Did you know worms are some of nature’s very best recyclers? Worms are cold-blooded animals that need food, water, air, and a place to live. By vermicomposting with red worms you can convert your kitchen waste into a nutrient rich soil for your plants and will also reduce the food waste stream to the landfill. Instead of throwing away stale bread, leftover broccoli, coffee grounds and filters (also tea bags) - let your worms do the recycling! Composting with worms is fun for kids too! Vermicomposting can be done indoors and requires minimal maintenance.

The most common variety of worm used to compost is the Eisenia fetida, also called a red wiggler or manure worm. Another type of worm that is used for composting is Lumbricus rubellus. These two types of worms adapt well in a worm bin and will produce a large amount of high value compost called castings (worm poop)! Never use garden worms because they will not thrive in a worm bin. The ideal temperature for your worms is 55-77 degrees.

To Get Started, You Will Need:

- Worm bin
- Bedding (shredded newspaper, peat moss or coconut fiber)
- Red worms (about one pound/800-1,000 worms)
- Worm food
- Water spray bottle
- Bucket of water
- Handful of dirt (worms need to digest food)
- Small garden rake

You can purchase a worm bin over the Internet or build your own.

You can use a 12-14 gallon plastic storage container with a tight fitting cover, drill 10-20 small holes (1/4”) around the side of the bin for aeration about 1-2 inches up from the bottom. You will also need to drill small holes on the bottom and have a tray to catch the liquid fertilizer produced by the worms called “worm tea”. Bedding is easily made by ripping up five pounds of old newspaper (just the black and white sections) into one-inch wide strips. Place the shredded newspaper in a bucket, with about one to two gallons of water and soak thoroughly. Drain the excess water from the paper until it feels like a damp sponge. Put the soaked paper in the worm bin so that it’s still fluffy. Worms need moist bedding to breathe through their “skin” and they also eat the cellulose fiber. You can also use peat moss or coconut fiber. Add a handful of dirt for them to use with their gizzard for digestion.

Feeding worms is the fun part! There is a worm to daily food ratio. The ratio is two pounds of worms for each pound of food; your box will easily handle five pounds per week (but do not overfeed the box - stop for a week or more if the worms cannot keep up with your supply and add more shredded moist newspaper). Worms eat almost all fruits and vegetables, such as citrus and melon rinds, lettuce, potato and carrot peelings, bread, coffee grounds and filters, tea leaves and bags, crushed egg shells, cereal, and leaves. Never add meat, fish, dairy products, bones, or fatty foods (butter, oil, etc.) because these may cause an odor. After the worms are established and reproducing, the population density in a well-operated bin should be about one pound of worms per square foot of surface area of worm bin.

Add food by lifting up the bedding, depositing the scraps, and always covering it with the damp bedding. This will prevent any odors or fruit flies. When adding banana and apple peels, remove the stems to help prevent fruit flies. Try to place food in alternate areas of the box. Check the bin every two weeks to make sure the bedding does not dry out. Take a spray bottle of water and add moisture as needed. Use your garden rake to “fluff” the bedding and to add oxygen. If the bedding gets too soggy, mix in dry shredded newspaper until the excess moisture is absorbed.

After 4 to 5 months, the worm population will have grown and most of the food scraps and older bedding will have been converted into worm castings and will need to be harvested. To harvest your worm castings, begin feeding on one side of the worm bin and the worms will move to the food source. Take the worm castings and put the castings around your indoor and outdoor plants or trees. You can also use the liquid “worm tea” that drains from the bin, to water your plants.

Worm Farmers

Missouri Recycling Association 2008

Wanted:

Worm Farmers

For more information on worm farms or to purchase bins and worms go to these Web sites: www.wormdigest.org, www.cityfarmer.org www.wormwoman.com
THE IMPORTANCE OF REUSING OR RECYCLING ELECTRONIC EQUIPMENT

Many state and local government agencies are concerned about how to ensure proper management of older electronic equipment. While end-of-life electronics currently comprise only a small amount (1 to 2 percent) of the municipal waste stream, that percentage is expected to grow dramatically in the next few years. Electronic products often contain hazardous and toxic materials that pose environmental risks if they are landfilled or incinerated. Televisions and video and computer monitors use cathode ray tubes, which have significant amounts of lead. Printed circuit boards contain primarily plastic and copper, and most have small amounts of chromium, lead solder, nickel, and zinc. In addition, many electronic products have batteries that often contain nickel, cadmium, and other heavy metals. Relays and switches in electronics, especially older ones, may contain mercury. Also, capacitors in some types of older and larger equipment that are now entering the waste stream may contain polychlorinated biphenyls (PCBs).

Because of the presence of these hazardous or toxic substances, state and federal hazardous waste regulations may apply to disposal of certain types of electronic equipment. These regulations make businesses potentially liable for improper disposal of electronics. One state has gone so far as to ban landfilling or incineration of certain types of electronics, such as TVs and monitors (because of the lead-containing CRT) and batteries. For more information go to www.epa.gov/wastewise/pdf/wwupda14.pdf.

Reusing and recycling electronic equipment is beneficial alternative to disposal. Reuse and recycling reduces the amount of toxic and hazardous substances that may enter the environment through disposal. By extending the useful life of products, reuse conserves the energy and raw materials needed to manufacture new products, and doing so reduces the pollution associated with energy use and manufacturing. Recycling electronic equipment also conserves energy and raw materials and reduces pollution in manufacturing by allowing product constituents, such as metals and plastics, to be reclaimed and used in other products.

OPTIONS FOR END-OF-LIFE USERS:
Dave Beal, EPC, Inc.

First Option: Reuse

Reuse is the environmentally preferable option for managing older electronic equipment. Extending the life of old products minimizes the pollution and resource consumption associated with making new products. Reuse also gives people who cannot afford new products access to electronic equipment at reduced or no cost. Many nonprofit and charitable organizations are able to accept working electronic equipment, particularly computers, and offer them to schools, community organizations, and needy individuals. Throughout the country, these
organizations help match equipment donors with recipients, and provide computers, training services, and access to the Internet. Many local charitable organizations such as Goodwill and Salvation Army accept, resell, or donate older electronic equipment. These and other nonprofit organizations may be able to provide documentation of your donation, so that it may be applied toward your federal income tax return. Large companies in particular, can take advantage of the 21st Century Classrooms Act for Private Technology Investment. Under this legislation, corporations can deduct from the full purchase price of computers if the equipment is no more than two years old. Corporations can utilize annual depreciation deductions and receive tax benefits.

Second Option: Recycle

If electronic equipment is too old to be reused or is broken beyond repair, you may send it to one of the many companies that specialize in disassembling electronics, salvaging parts and selling reclaimed materials. Many types of electronic equipment, such as computers, monitors, printers and scanners contain materials suitable for reclamation and use in new products. These materials include plastic, glass, steel, aluminum, copper, gold, silver and other metals. Since electronics recycling operations typically require a mix of automated processing and manual labor, there may be a charge associated with recycling your computer. Before choosing a recycler, check to make sure that the firm meets all applicable state and local regulatory requirements and that it properly manages the recovered materials. You can find out more about e-scrap recycling by visiting the Department of Natural Resources Web site or the e-cycle Missouri Web site at www.ecyclemo.org/. These Web sites will help you answer questions about transporting and recycling electronic equipment. Some communities have ongoing programs to collect electronic equipment from their residents, while other communities sponsor collection events during the year.

If you own a computer, ask the manufacturer or the retailer that you purchased the computer from to take the computer back. A small, but increasing number of computer manufacturers are providing this service for households. Take back and asset management services are already available for large purchasers of computer equipment.

Questions to Consider

Whether you are an individual with a single item or a small business with many different types of electronics, you should ask a reuse organization or a recycler questions about what will happen to your electronic equipment. The following are some questions to consider when selecting an electronics recycler.

• What does the organization do with the electronic equipment it receives? Does it refurbish the equipment and sell it to another user? Does it dismantle the equipment and sell the disk drives, memory chips and other components? Does it send materials to a metals reclamation plant or smelter? Does it process the plastic, metal and glass for shipment to other companies that use the materials to produce new recycled products?
• How much of the equipment does the organization send to disposal (landfill or incinerator)? If some material is sent to disposal, who is responsible for paying related transportation and disposal costs?
• If donated, does the organization provide you with documentation of your donation so that you may apply it toward your federal tax return?
• Does the organization have the necessary state and local permits or otherwise meets the relevant state and federal requirements for transporting and handling hazardous materials and end-of-life electronic equipment?
• For small businesses: Does the organization provide you with a complete inventory of the equipment you are sending to be recycled, including property tags? Does the organization provide a certificate that indicates how much material was received and how it was processed? This information is important for your tax records and to contest any future liability claims.
• Does the recycler have a documented hazardous waste disposal plan?
• Does the company offer data security?
• Does the company offer environmental liability protection?

If so, consider the following information:

One way to make recycling electronic products easier is to make wise purchasing decisions. Instead of buying new electronic products, consider repairing or upgrading your current system. If you decide to buy new equipment, ask the equipment manufacturer about reuse and recycling options such as product take back programs. To promote the use of reused and recycled products, purchase equipment designed for easy repair and upgrade. Consider installing software that runs on older systems, which will enable the next user to make maximum use of an older computer. You may also consider leasing equipment that can be returned to the manufacturer when it is no longer needed.
RECYCLING AND REUSE ADD VALUE TO THE U.S. ECONOMY

The recycling and reuse industry in the USA consists of approximately 56,000 establishments that employ over 1.1 million people, generate an annual payroll of nearly $37 billion, and gross over $236 billion in annual revenues. This represents a significant force in the U.S. economy and makes a vital contribution to job creation and economic development.

Recycling is a Diverse Industry

An EPA study identified 26 different types of recycling organizations, some of which might not commonly be seen as “recycling” businesses, such as steel mills, plastic bottle manufacturers, and pavement producers. Recycling is an integrated system that starts with curb-side collection of materials by municipalities, involves processing of recycled materials, and leads to manufacturing of new products with recycled content.

Four major manufacturing industries account for over half of the economic activity of the recycling and reuse industry: paper mills, steel mills, plastics converters, and iron and steel foundries. But the recycling industry also includes companies that are quickly finding a market niche, including computer demanufacturing, organics, composters, and plastic lumber manufacturers.

Local Recycling and Reuse Spur “Downstream” Economic Impacts

Investment in local recycling collection and processing, as well as strong government policies, spurs significant private sector investment in recycling manufacturing and promotes economic growth. The study tallied this “indirect” impact of recycling on support industries, such as accounting firms and office supply companies, for a total of 1.4 million jobs supported by the recycling and reuse industry. These jobs have a payroll of $52 billion and produce $173 billion in receipts.

Recycling Manufacturing Industry
Employment by Major Material Group

<table>
<thead>
<tr>
<th>Material Group</th>
<th>Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organics</td>
<td>10,000</td>
</tr>
<tr>
<td>Glass</td>
<td>25,000</td>
</tr>
<tr>
<td>Nonferrous metals</td>
<td>125,000</td>
</tr>
<tr>
<td>Plastics</td>
<td>200,000</td>
</tr>
<tr>
<td>Paper</td>
<td>150,000</td>
</tr>
<tr>
<td>Fero Metal</td>
<td>250,000</td>
</tr>
</tbody>
</table>

EPA Study, updated July 23, 2007
### Recycled Products

#### Packaging

<table>
<thead>
<tr>
<th>Product/Package</th>
<th>Examples</th>
<th>% Recycled material/Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GROCERY STORE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steel cans</td>
<td>Canned vegetables, coffee</td>
<td>25% cans, steel scrap</td>
</tr>
<tr>
<td>Glass jars/bottles</td>
<td>Sauces, pickles, mayo, jellies, beer, juices</td>
<td>Typ. 30%; other glass jars</td>
</tr>
<tr>
<td>Aluminum cans</td>
<td>Soft drinks, cat food, beer</td>
<td>100%, other alum. cans, scrap</td>
</tr>
<tr>
<td>Paper towels, napkins</td>
<td>Some brands of towels, napkins</td>
<td>100% office paper</td>
</tr>
<tr>
<td>Paperboard boxes</td>
<td>Cereal, dry grains, cake mixes</td>
<td>100%, office paper, newspaper, crackers, cookies</td>
</tr>
<tr>
<td>Tissue/toilet paper</td>
<td>Most brands of toilet paper</td>
<td>100%, office paper</td>
</tr>
<tr>
<td>Disposable diapers</td>
<td>Many brands of diapers</td>
<td>100%, office paper</td>
</tr>
<tr>
<td>HDPE Plastic bottles</td>
<td>Laundry detergent, shampoos, cleaners</td>
<td>Type 25%; HDPE milk jugs</td>
</tr>
<tr>
<td>PET plastic bottles</td>
<td>Liquid soaps/detergents</td>
<td>25%; soft drink bottles</td>
</tr>
<tr>
<td>PET plastic boxes</td>
<td>Berry/tomato plastic boxes</td>
<td>100%; soft drink bottles</td>
</tr>
<tr>
<td>Egg cartons</td>
<td>Most fiber egg cartons</td>
<td>100%; newspaper</td>
</tr>
</tbody>
</table>

#### OFFICE SUPPLY STORE

<table>
<thead>
<tr>
<th>Examples</th>
<th>% Recycled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office/copier paper</td>
<td>20% - 100%</td>
</tr>
<tr>
<td>File Folders</td>
<td>Office paper, corrugated</td>
</tr>
<tr>
<td>Padded mailing envelopes</td>
<td>Newspaper, office paper</td>
</tr>
<tr>
<td>Note pads</td>
<td>Office paper, newspaper</td>
</tr>
<tr>
<td>Scissors</td>
<td>Steel cans, steel scrap</td>
</tr>
<tr>
<td>Overhead transparencies</td>
<td>PET soft drink bottles</td>
</tr>
<tr>
<td>Plastic mailing envelopes</td>
<td>HDPE milk jugs</td>
</tr>
<tr>
<td>Desk furniture</td>
<td>Steel, alum. Plastic, wood</td>
</tr>
<tr>
<td>Desk top organizers</td>
<td>Steel, plastic</td>
</tr>
<tr>
<td>Mailing tubes</td>
<td>Corrugated boxes, office paper</td>
</tr>
</tbody>
</table>

#### MASS MERCHANDISER / RETAILER/ BUILDING SUPPLIES

<table>
<thead>
<tr>
<th>Examples</th>
<th>% Recycled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Garden “Soaker” hose</td>
<td>Recycled tire rubber</td>
</tr>
<tr>
<td>Rubber door mat</td>
<td>Recycled tire rubber</td>
</tr>
<tr>
<td>Lawn edging</td>
<td>Recycled HDPE plastic</td>
</tr>
<tr>
<td>Flower pots</td>
<td>Polystyrene or HDPE</td>
</tr>
<tr>
<td>Truck bed liner</td>
<td>HDPE plastic</td>
</tr>
<tr>
<td>Compost/mulch</td>
<td>Recycled organics</td>
</tr>
<tr>
<td>Sleeping bags (fiber fill)</td>
<td>PET plastic bottles</td>
</tr>
<tr>
<td>Backpacks (polyester)</td>
<td>PET plastic bottles</td>
</tr>
<tr>
<td>Fleece sweaters/jackets (polyester)</td>
<td>PET plastic bottles</td>
</tr>
<tr>
<td>Residential carpet (polyester)</td>
<td>PET plastic bottles</td>
</tr>
<tr>
<td>Garbage cans, wastebaskets, buckets</td>
<td>PP, HDPE</td>
</tr>
<tr>
<td>Thermal insulation</td>
<td>Newspapers (blown in)</td>
</tr>
<tr>
<td>Thermal fiberglass insulation</td>
<td>Glass containers</td>
</tr>
<tr>
<td>Gypsum wallboard</td>
<td>Newspapers/corrugated</td>
</tr>
<tr>
<td>Lawn Patch (grass seed/mulch)</td>
<td>Newspaper</td>
</tr>
<tr>
<td>Ceramic Tile</td>
<td>Glass containers</td>
</tr>
<tr>
<td>Glass decorative blocks</td>
<td>Glass containers</td>
</tr>
<tr>
<td>Three-ring binders</td>
<td>Cardboard, Kraft paper, vinyl, HDPE, or PET plastic</td>
</tr>
<tr>
<td>Outdoor furniture</td>
<td>HDPE plastic</td>
</tr>
<tr>
<td>Steel garden tools</td>
<td>Food/aerosol/paint cans</td>
</tr>
<tr>
<td>Ceiling Tiles</td>
<td>Phone books</td>
</tr>
<tr>
<td>Steel interior framing studs</td>
<td>Food/aerosol/paint cans</td>
</tr>
</tbody>
</table>

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**ONLINE RESOURCES**

- American Forest & Paper Association  
  www.afandpa.org
- American Plastics Council  
  www.plastics-info-com
- Aseptic Packaging Council  
  www.aseptic.org
- Can Manufacturers Institute  
  www.cancentral.com
- Glass Packaging Institute  
  www.gpi.org
- Missouri Department of Natural Resources  
  www.dnr.mo.gov
- Missouri Recycling Association  
  www.mora.org
- National Association for PET Container Resources  
  www.napcor.com
- National Recycling Coalition  
  www.nrc-recycle.org
- National Soft Drink Association  
  www.nsda.org
- Solid Waste Association of North American  
  www.swana.org
- Steel Recycling Institute  
  www.recycle-steel.org
- Composting Council  
  www.compostingcouncil.org
- US Environmental Protection Agency  
  www.epa.gov
The Commodity By Commodity Story

Paper

How What You Recycle Becomes a New Product
Donna Uter, AbitibiBowater - Recycling Division

Paper recycling begins with you. Paper is all around us, making up over 40% of our daily trash. Each person in America uses about 700 pounds of paper a year, and a good deal of it is used only once or for a short term like old newspapers, magazines, catalogs and junk mail. Paper companies recognize the environmental and economic benefit of recycling our waste paper and continue to find ways to use more post consumer paper fibers to make their new paper products.

In 2005, the American Forest and Paper Association reported a record 51.5 percent of the paper consumed in the U.S. (51.3 million tons) was recovered for recycling. Paper recovery now averages 346 pounds annually for each man, woman and child in the United States. While this is a significant accomplishment, we can do more. The paper industry goal is 55 percent recovery by 2012.

Many communities in Missouri offer paper recycling through their drop-off or curb-side programs. In the Kansas City and St. Louis areas Paper Retriever bin make paper recycling easy, while offering great fundraising opportunities. Recycled paper collected in Missouri feeds mills all over the United States and Canada. These recycled fibers are used by the mills to make new paper products like newsprint, paper towels, and copy paper.

Paper collected from recycling centers and bins is delivered to a recycling center or a material recovery facility to be sorted and baled for transportation to a paper mill. We can track how the paper is recycled into new newsprint after baled.

Once the baled paper reaches the paper mill, it takes a conveyor ride into the pulper where it is sprinkled with warm soapy water. The pulper stirs the paper in the water to gently separate the fibers making a slurry of pulp, looking like a thick milk shake. The slurry is pushed through screens that clean out large ink pieces, staples and other contaminates. The pulp is further de-inked through a centrifuge then flotation processes to take out most of the ink and glue from envelopes, stamps and mailing labels. The fibers are then rinsed to remove the final small ink particles.

The clean fibers are sprayed onto screens called forming wires, and run through rollers to remove the water and create a strong interlocking mat of clean fibers. The “mat” of fibers then moves through felt covered drying rollers that press the new sheet to a unified thickness, drying it and giving it a smooth surface.

The new paper is then wound into big rolls, with over a mile of paper on each roll. The rolls of new newsprint are cut to the specific width each newspaper company needs to print their new newspapers.

The American Forest and Paper Association (AF&PA) reports over 40% of paper that is manufactured in the US today is recovered for recycling by the paper industry. But recycling will never entirely replace using trees for paper making. One reason is that there is simply not enough recovered paper to meet the world’s demand for paper. Some paper is too contaminated to be reused. About 80% of all recovered paper can actually be recycled, the remaining 20% of the bale is trash such as plastic, adhesives, paper clips and staples, ink, clay coatings and other non-paper items that are caught during the screening process. Successful paper recycling programs encourage participants to reduce trash in their recycled paper.

Did you know this about paper recycling?

• The first paper was made of recycled material? About 200 BC, the Chinese used old fishing nets to make the first paper and old rags and plant fibers were used to make the first paper in the United States.
• One ton of recycled paper uses 64% less energy, 50% less water, produces 74% less air pollution and creates 5 times more jobs than one ton of paper products from virgin wood pulp.
• De-inked paper fiber is the most efficient source of fiber for the manufacturing of new paper products. Each ton (2000 pounds) of recycled paper can save 17 trees, 380 gallons of oil, 3.3 cubic yards of landfill space, 4,100 kilowatts of energy, and 7,000 gallons of water, and produces 60 pounds less of air pollution compared to traditional virgin fiber processes!
• Enough paper is collected for recycling each year to equal a boxcar train 7,600 miles long.
• Everyday, Americans buy 62 million newspapers and throw out 44 million.

Sources for additional information:

www.paperrecycles.org  This site has information for teachers on paper and paper recycling and includes interactive features, statistics, and a step-by-step guide for developing or improving a recycling program at your school.

www.paperretriever.com  This site offers classroom activities and resources and a map to locate a paper recycling bin near you.

www.afandpa.org  The American Forest & Paper Association’s Web site has information on how to start or improve a recycling program in your school or community.

www.epa.gov/students  The EPA’s student center has activities and learning tools for students and teachers.
Steel Recycling Facts

- Steelmakers recycle more than 68% of the steel they produce because they rely on scrap steel to produce a high-quality end product.
- The amount of steel, by weight, recycled annually in the U.S. equals about 1/3 the amount of municipal solid waste landfilled each year.
- Americans use about 100 million steel cans every day.
- The U.S. food industry uses about 28 billion steel cans each year to package more than 1,500 food products.
- American-made steel cans contain about 25% recycled steel.
- Recycling one ton of steel saves mining 2,500 pounds of iron ore, 1,000 pounds of coal and 40 pounds of limestone.
- The energy conserved by recycling one pound of steel cans is enough to light a 60-watt light bulb for more than one day.

Aluminum Cans

Several generations of Americans have grown up with the recyclable aluminum can. Popular for carbonated soft drinks and other beverages, aluminum cans are recycled today at an impressive 62.5 percent rate. That’s nearly four times the recycling rate of 25 years ago. Aluminum industry sources indicate that more than 10,000 recycling centers exist nationwide to purchase and recycle aluminum cans from the public and organizations. Over 80 billion aluminum soda cans are used every year, half of which are currently recycled. Due to the properties and value of aluminum, aluminum containers can be recycled virtually endlessly into cans or other aluminum products.

Aluminum Recycling Facts

- In America, 1,500 aluminum cans are recycled each second!
- Making cans from recycled aluminum cuts related air pollution by 95% compared to making aluminum from raw materials (bauxite ore).
- Since 1972, some 594 billion aluminum cans have been recycled. Placed end to end, these cans would stretch to the moon and back 190 times!
- The aluminum beverage can returns to the grocery shelf as a new, filled can in as little as 60 days after being recycled.
- In theory, a consumer could purchase basically the same recycled aluminum can from the grocer’s shelf about six times per year.
- An average aluminum beverage can in the U.S. contains about 51% post-consumer recycled aluminum.
- Aluminum cans are lighter than cans of several years ago. In 1972, there were 22 cans per pound. Today, it takes just over 33 cans to equal one pound of aluminum.
- Last year 54 billion cans were recycled saving energy equivalent to 15 million barrels of crude oil.

Steel Cans in Solid Waste

Steel cans account for about 1.5 percent of municipal solid waste by weight, and a slightly higher proportion (about 1.8 percent) of landfilled MSW volume. Over 94 percent of steel cans are used for food products packaging a variety of products, including fruits, vegetables, soups, meats, juice, pet food, coffee and cookies. Most of the remaining are used for other consumer products (cleaning products, paint, adhesive bandages, aerosol products, etc.). Very small proportions are used for beer and soft drinks. Individual consumers are the source of most of the steel cans found in MSW. Less than 15 percent of commercial and industrial wastes are comprised of steel cans.

Steel cans degrade very slowly (by rusting) in the environment. Steel cans are noncombustible and pass through a waste-to-energy incinerator in bottom ash. Some waste-to-energy facilities use magnets to separate steel cans (and other ferrous metals) from incoming wastes or from ash prior to disposal.

Steel Can Recycling

Nationwide, about 54.4 percent of all steel cans are recycled. Many recycling programs, both drop-off and curbside, collect "commingled cans" (mixed steel and aluminum containers) or, "commingled containers" (mixed steel, aluminum, and plastic containers), and use a simple magnetic conveyor to separate them during processing. Small quantities of aluminum (e.g., from steel/aluminum "bi-metal" cans) or non-container steel are readily accepted by steel furnaces, and the quantity of tin in steel containers is too small to cause any problems during steelmaking.
PET Plastic Container Recycling Facts

- PET is the most recycled plastic worldwide. A form of polyester, PET bottles are recycled into polyester carpeting, textiles, car parts, new PET plastic bottles, pallet strapping and thermoformed sheet products.
- 1.272 billion pounds of PET was recycled in the United States in 2006, a 24% recycling rate.
- Since 1978, packaging redesign has lightened the weight of a 2-liter soft drink bottle by about 30% and eliminated the base-cup, which was made from a plastic other than PET.
- One domestic automotive manufacturer uses the equivalent of 50 million PET bottles annually to make components of new cars and trucks. New vehicle parts made from recycled PET bottles include grills, bumpers, trunk liners, fan shrouds, wheel liners and seats.
- Both Coca-Cola and Pepsi use recycled content plastic bottles in various brands of beverages.
- Recycled PET is also used in making new bottles for some types of consumer products, as well as in products ranging from basketball backboards to overhead transparencies.
- It takes 36 2-liter PET bottles to make one square yard of polyester carpet.

HDPE Recycling Facts

- 28% of HDPE bottles are recycled back into new bottles with recycled content, 17% recycled into film products and 15% into drainage pipe. Other uses include plastic pallets, plastic lumber and outdoor products.
- A developing industry for HDPE is the manufacture of plastic lumber. While more expensive than wood, it is much more durable and has a longer product life. It also is not subject to rotting, insect damage, and splintering.
- Milk, water and juice jugs comprise about 44% of HDPE containers, with about 37% used for cleaners, shampoos and detergents. Injection molded tubs used for ice cream, margarine, and yogurt are about 12% of HDPE container plastic use. Despite being the same plastic, injection-molded containers are typically not compatible with recycling of blow-molded bottles and jugs.

Plastic Information and Tips

by Stan Cope, Central Paper Stock

Plastic is all around us. It forms much of the packaging for our food and drink. For many of us, it is throughout our home, our work place, our car and the bus we take to and from work. It can be in our clothing, eyeglasses, teeth, computers, phones, dishes, utensils and toys. The list goes on.

Plastic is versatile, lightweight, flexible, moisture resistant, durable, strong and relatively inexpensive. It can be chemical resistant, clear and opaque and practically unbreakable. These are wonderful useful qualities, and plastic plays many important roles in life on Earth.

Fortunately, consumers have a way to identify the type of plastic in many products, especially food storage containers and packaging. Many, but not all, such plastic products have a number - the resin identification code molded, formed or imprinted in or on the container, often on the bottom.

This system of coding was developed in 1988 and is voluntary for plastic manufacturers, but has become relatively standard on certain plastic products. Consumers can then inform themselves of the characteristics of plastic.

The seven plastic resin codes are each briefly described in the next column to provide a quick snapshot detailing the name of the resin and the typical products it is found in.

PET or PETE - Polyethylene terephalate

Used in soft drink, juice, water, beer, mouthwash, peanut butter, salad dressing, detergent and cleaner containers.

HDPE - High density polyethlene

- Used in blown molds for opaque milk, water and juice containers, bleach, detergent and shampoo bottles, garbage bags, yogurt and margarine tubs, cereal box liners.

V, Vinyl or PVC - Vinyl Polyvinyl chloride

- Used in toys, clear food and non-food packaging, some squeeze bottles, shampoo bottles, cooking oil and peanut butter jars, detergent and window cleaning bottles, shower curtains, medical tubing, and numerous construction products (pipes, siding).

LDPE - Low density polyethlene

- Used in bags from groceries, dry cleaners, bread and frozen food, most plastic wraps, squeezable bottles (kool aid bottles) and toys.

PP - Polypropylene

- Used in bottles, yogurt and margarine tubs, medicine and syrup bottles, straws, Rubbermaid and other opaque plastic containers, including baby bottles.

PS - Polystyrene

- Used in Styrofoam containers, egg cartons, disposable cups and bowls, take out food containers, plastic cutlery, compact disc cases and nursery pots.

Other - The catch all category; often indicates the presence of polycarbonate, which is used in most plastic baby bottles, water storage containers, compact discs, metal food can liners, some juice and ketchup containers, cell phones, computers and some food packaging. (PE is blended in under the same category as well.) Important Note: A few other types of plastics that fall under code 7 are acrylonitrile styrene (AS) or styrene acrylonitrile (SAN) and (ABS) which is an even tougher plastic, used in toys, pipes, golf club heads, automotive parts and protective head gear.
Glass Containers
by Carrie Ray, Strategic Materials

Glass containers go from the recycling bin to product on a store shelf in as little as 30 days! Because glass is 100% recyclable it can be recycled again and again with no loss in quality or purity. Glass is impermeable and does not deteriorate nor does it corrode, making it one of the safest packaging materials. Glass packaging ensures freshness and taste – there are no interactions between glass containers and products to affect the flavor of food and beverages.

Glass is made from sand, soda ash, limestone and “cullet” - the industry term for furnace-ready recycled glass. These materials are mixed, or “batched,” and heated to a temperature of 2600 to 2800 degrees Fahrenheit and molded into the desired shape. Cullet has always been part of the recipe in manufacturing glass. Because cullet melts at a lower temperature than is required to melt raw materials alone, cullet saves natural resources and energy needed to heat a furnace.

Quality is very important to recycling glass containers into new ones. Items like ceramic dishes, window glass, ovenware such as Pyrex, mirrors and crystal cannot be accepted for container glass recycling because they melt at different temperatures than container glass or they produce damaged new containers. Color sorting containers is also important because it ensures manufacturers that new bottles match the color standards required by glass container customers. Approximately 80% of glass containers recovered from recycling programs are made into new glass bottles. Recycled glass can also be used to manufacture fiberglass insulation, reflective beads for highway safety products, tiles and flooring, abrasive materials and decorative applications.

Glass Recycling Facts

- According to the Glass Packaging Institute, recycled glass is substituted for up to 70% of raw materials.
- Glass container companies employ about 18,000 workers and represent a $5.5 billion industry with 49 glass manufacturing plants in 23 states.
- Energy usage drops about 2-3% for every 10% cullet used in the manufacturing process.
- For every ton of glass recycled, over a ton of raw materials are saved, including 1,300 pounds of sand, 410 pounds of soda ash, 380 pounds of limestone and 160 pounds of feldspar.
The impact of climate change is dramatic – intense, more frequent storms, flooding of coastal areas, increased rain in some areas and decreased rain in other regions.

Most people don’t realize that solid waste reduction and recycling help address global climate change. How? The manufacture, distribution and use of products – as well as management of the resulting waste – all result in greenhouse gas emissions. Waste prevention and recycling reduce greenhouse gases associated with these activities by reducing methane emissions, saving energy, and increasing forest carbon sequestration.

Companies and communities can now take positive actions to reduce waste and their climate footprint. The US Environmental Protection Agency, through its WasteWise program helps develop strategies to implement waste audits, recycling programs and energy use reduction. For more information, please go to: [http://www.epa.gov/wastewise/about/overview.htm](http://www.epa.gov/wastewise/about/overview.htm).

Recycling reduces production costs, use of natural resources, volumes of waste in landfills. EPA and its partners have developed several tools to help individuals and organizations determine the greenhouse gas (GHG) impact of their purchasing, manufacturing, and waste management actions. Several of these tools are based on EPA research on emission factors, as reported in Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks and associated reports.

Steve Fishman, EPA, Region 7

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Missouri endangered species include the Jumping Field Mouse, the Niangua Darter and the Short-eared Owl. For more information, visit [epa.gov/climatechange/index.html](http://epa.gov/climatechange/index.html).
Several trends in landfills are operating at the same time. As our population grows and is more prosperous, people demand more products and produce more waste. The character of this waste is changing. Electronics and plastics are a growing segment of the waste stream that needs separate efforts to increase recycling and discourage disposal. The landfill itself, which has been designed for the past 15 years to keep moisture out, now can be a bioreactor where gas production is stimulated and collected for flaring or use.

Landfills are larger and are being fed through transfer stations which provide an opportunity to segregate selected waste streams and keep them out of the disposal stream. Communities, individuals and companies are increasing their participation in recycling programs and that reduce costs and wastes while preserving landfill space. Paper, plastic and cardboard have joined metal and aluminum as valued commodities that reduces energy and natural resource demands for consumer products and raw materials. This makes landfills safer and reduces their potential to produce methane that is not controlled. The Missouri Department of Natural Resources, along with the Solid Waste Planning Districts and local governments are committed to finding and implementing environmentally sound strategies to manage Missouri wastes.

Landfills are the second largest contributors of methane, a greenhouse gas 21 times as potent as carbon dioxide, to our atmosphere. Under the Clean Air Act, landfills with a million cubic yards of waste in place have to design and implement a gas collection scheme to capture and either flare or use the collected methane. This requirement was designed to reduce air emissions but has proven to also reduce greenhouse gas emissions.

EPA created the Landfill Methane Outreach Program (LMOP) to work with landfill owners and operators of all sizes to assess their potential for gas collection and utilization, to assist them to find firms that will assist with the development of the resource, and to recognize those facilities that follow through and collect their gas. In Missouri, LMOP has identified 18 candidate landfills and 7 that have gas collection systems including the granddaddy of them all at Fred Weber in St. Louis.

Few remember the floods in Missouri in 1993. The weeks of rain saturated the ground and enabled gas to migrate far from disposal areas to threaten buildings in at least two cities, farms, homes and trailer parks. There were reports of children lighting matches on old fills and watching the methane emissions flare as the emanated from the ground.

This illustrates the potential and the problem of just covering old landfills and not collecting the gas for some beneficial purpose. The best strategy is to recycle as much as possible to avoid all of the landfill siting, management and maintenance issues. If we are to solve the climate change problem, we must reduce the methane emissions from all landfills and prevent future releases.

by Steve Fishman, EPA, Region 7

Recyclable Materials in Landfills
Missouri Department of Natural Resources

A solid waste composition study recently completed for the Missouri Department of Natural Resources found a significant percentage of the municipal solid waste deposited in Missouri’s landfills has the potential to be recycled.

The Midwest Assistance Program Inc. conducted the 2006-2007 Missouri Municipal Solid Waste Composition Study for the department’s Solid Waste Management Program. The department will use the information gathered from this study to help plan waste reduction programs, measure the effectiveness of current waste reduction programs and target recoverable materials that have the potential to be recycled.

Using recovered materials in manufacturing new products saves energy, money and reduces greenhouse gas emissions. If recyclable materials in Missouri’s municipal solid waste were recovered instead of disposed of, nearly 28 billion BTUs of energy could have been saved, equivalent to the annual amount of energy used by 262,000 houses. This would amount to cost savings of more than $500 million, based on the average cost of propane for 2006 and 2007. Today, an important aspect of recycling is its potential to help prevent global climate change. By diverting waste from landfills, the amount of methane produced by landfill sites is reduced. Methane is a harmful greenhouse gas and a major contributor to global climate change. Also, recycling rather than producing them from virgin materials produces less carbon dioxide and other greenhouse gases during the manufacturing process. “If the more than 1.9 million tons of municipal solid waste materials were recycled and used in new products instead of using virgin materials, more than 1.1 million tons of greenhouse gas emissions could have been avoided,” said Department of Natural Resources director Doyle Childers (complete report at www.dnr.mo.gov/env/swmp/pubs-reports).
Leadership in Energy and Environmental Design Certification

LEED Grows a Profitable Green Building Industry with Recycling at its Roots!
Jean Ponzi, EarthWays Center, St. Louis-Jefferson Solid Waste Management District.

The U.S. Green Building Council has established national standards for environmentally sound building design and construction, as well as everyday operational practices. These LEED (Leadership in Energy and Environmental Design) standards are being widely applied across the building industry, in both commercial and residential developments.

LEED is a point-based rating system geared for use by building professionals and owners, to guide building project planning and implementation. Rigorous documentation as LEED criteria are achieved can enable project leaders to earn LEED certification for a building. If certifying is not a goal, the LEED standards can be applied as best practice guidelines, to make any building a more energy efficient, healthier, sustainable working or living environment.

Several specific sets of LEED guidelines are currently in use or are being piloted, including:

- LEED-NC - for new commercial construction
- LEED-CI - for renovation and maintenance of individual commercial interior spaces
- LEED-EB - for operation and maintenance of existing commercial buildings
- LEED-H - for new home construction
- LEED-ND - for planning and development of neighborhoods, or whole communities

Additional specialized LEED rating systems are in the works for schools and health care facilities.

The U.S. Green Building Council’s LEED rating systems are developed through a consensus-based process by teams of individuals representing all aspects of the building industry. Independent third-party verification of all LEED project applications has firmly established the credibility and value of LEED certification, nationwide and abroad.

Recycling and waste reduction practices are integral to the LEED criteria. Establishment of a collection system for all commonly recycled commodities is a non-negotiable requirement for earning LEED certification for any commercial building!

Optional LEED points may be earned by:

- Documented diversion of construction and demolition waste
- Purchasing of recycled-content furnishings, office supplies, and building materials
- Use of salvaged or reconditioned building materials
- Documenting percentages of waste diversion through recycling or composting, relative to daily practices of building occupants
- Documented recycling of special wastes such as light bulbs, batteries, shipping pallets, etc.
- Documented composting of landscaping waste, during construction and routine maintenance
- Use of composting toilets!

LEED’s emphasis on recycling and waste reduction practices, including recycled-content purchasing, is helping to drive associated industries. The high profile of the green building movement nationally is giving a huge boost to the public education power of recycling professionals, reaching individual, business and government audiences. For more information on the U.S. Green Building Council and LEED, visit www.usgbc.org.
In Support of the Basel Action Network, we pledge the following.

- We do not export or landfill hazardous eWaste.
- We do not allow eWaste we handle to be sent to prisons for recycling.
- We commit to ensuring that the entire recycling chain, including owsntream intermediaries and recovery operations are meeting all applicable environmental and health regulations.
- We provide visible tracking of hazardous eWaste throughout the product recycling chain.
- We extend the life of useful products through a reuse program that supports local nonprofits, school districts and the general public.

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