

# KEEPIN' IT IN THE LOOP

a recycling activity and learning  
guide for educators and students  
grades 4-8



<http://dnr.wi.gov>

**Wisconsin Department  
of Natural Resources  
PO Box 7921  
Madison, WI 53707**

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# Introduction



## TO EDUCATORS:

This study guide is designed to help you and your students begin thinking about recycling—why it's important, and how resources can be conserved and protected. It is intended to help you and your students understand what solid waste is, where it comes from, why it's a problem and what can be done about it. This guide includes an overview of solid waste and recycling, a glossary of terms, suggested activities, and a list of related Wisconsin Model Academic Standards (WMASs) for Science, Environmental Education, Social Studies, Math, Family and Consumer Education and Health. There is also a resource section with a list of recycling publications, other curriculum and recycling organizations for the state of Wisconsin.

Consider talking with your students about solid waste, recycling and waste reduction before beginning your lessons to learn what they already know and what they think about it. Where are their trash and recyclables taken?

Have they ever visited a landfill? What did people do before there were plastic bags, aluminum cans or trash removal services? Do people in other countries make as much trash or recycle as much as Americans do? By finding out your students' thoughts and opinions, you can help them connect new concepts with what they already know.

We encourage you to adapt the activities to meet your students' needs. You are welcome to reproduce any part of this guide for distribution to students and other educators.

### Note:

- Words that appear in **bold and italics** are defined in the Glossary of Terms.
- Sections marked with an \* are based on materials from the *A-Way With Waste* curriculum guide, a program of the Washington State Department of Ecology, or from materials of the California Integrated Waste Management Board.

The recycling activities in this guide are written for 4th to 8th grade students; however, many of the activities are suitable for older or younger students. There is also a K-3 supplement for this guide, DNR publication #CE-2004 2007.

At the beginning of each activity you will find a list of relevant Department of Public Instruction (DPI) Wisconsin Model Academic Standards. The following letters are used to identify the appropriate subject(s): SC=Science, EE=Environmental Education, SS=Social Studies, M=Math, FCE=Family and Consumer Education and H=Health.



People in Wisconsin throw out everything from toothbrushes to old TV sets, food scraps to plastic bags, cell phones to oil filters. If you added up all the waste from your house, from the store where you shopped and from the restaurant where you ate, it would amount to 4.7 pounds per person of solid waste thrown into the trash every day. Multiply that by 365 days per year, then by 5.4 million Wisconsin citizens, and your results would show that

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## WISCONSIN GENERATES MORE THAN 4.6 MILLION TONS OF TRASH EACH YEAR.

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This is called **municipal solid waste**. This much **trash** is enough to pile a typical city street 3 feet deep, curb to curb, for 500 miles—more than the distance from Superior to Chicago! Or, if compressed, the way it is in landfills, that much waste would bury a 200-acre farm under 28 feet of trash each year. The previous information covers municipal solid waste—the residential and commercial waste we personally produce every day. Another category of waste is called **non-municipal waste** or **industrial waste**. This is the waste industries, power plants and paper mills generate as they produce the products we use. It represents about 9.31 pounds per person per day. The good news is... we recycle 49 percent of the industrial waste we generate.

## Where does it all go? →

About 60 percent of Wisconsin's trash or municipal solid waste ends up in the state's 41 or so licensed municipal landfills. A **landfill** is a place where trash is dumped, compacted and covered with dirt. Covering the trash controls blowing paper, odors, insects and rodents and keeps water out of the landfill. All of the licensed landfills in Wisconsin are sanitary landfills—designed, built and operated according to state-of-the-art standards to prevent pollution problems.

Approximately 40 percent of the rest of our trash gets **recycled**, composted or combusted with **energy recovered**. It's taken from your house or a drop-off site to one of the 150 or so **material recovery facilities** throughout the state. Here cardboard, newspaper, magazines, office paper, bottles and cans are sorted and sold to manufacturers who make new products out of them. Tires, vehicle batteries, motor oil and major appliances are also recycled, and about half the yard waste is managed "at home" by people who leave grass clippings on their lawn and **compost** leaves and herbaceous plants.

Unfortunately, some waste is still dumped along roadsides, in public parks, or in other non-approved locations. Except for household wastes discarded on the homeowner's property, it is illegal to discard or incinerate **garbage**, trash, industrial waste, farm chemicals and other waste in places that aren't approved by the state.



The **open burning** of garbage and recyclables is prohibited in the state of Wisconsin. Burn barrels and burn piles often emit acid vapors, cancer-causing tars, and “heavy metals” such as lead, cadmium and chromium, as well as unhealthy levels of

carbon monoxide. These **toxins** are spread to us when they fall on crops we consume and also directly through the air we breathe.

Discarding waste in unsafe ways and in non-approved places can endanger the environment upon which we depend. Thus, each of us becomes responsible for what we throw away and the impact this waste may have, on our environment and ourselves.

#### FOR MORE INFORMATION

on open burning, please visit the WI DNR website: <http://dnr.wi.gov/environmentprotect/ob/>

#### NOT IN MY BACKYARD!

Finding places to put landfills is not easy. Few people are eager to live near a landfill, an attitude sometimes called the NIMBY phenomenon—“Not In My Back Yard!”

Many people believe that the construction and operation of a landfill results in traffic, noise, dust, litter, aesthetic loss, declining property values, **groundwater** contamination and other hazardous waste pollution. While these fears may have been justified in the past, modern landfill design, construction and management are now able to minimize most of these problems. Unfortunately, the NIMBY phenomenon also applies to the siting of recycling centers and municipal composting facilities.

## What’s the Problem?

Over the last three decades, public awareness of environmental problems has increased; stricter federal regulations regarding the siting, construction, daily operation, closure and post-closure monitoring of landfills have been developed; and the amount of municipal solid waste generated in the United States has increased at a rate faster than our population growth. This combination of factors has caused the cost to operate a landfill to increase, the number of landfills to decrease and a subsequent shortage in landfill capacity in many parts of the country.

The public believes that we are running out of space for landfills. Technically, we have many sites to locate modern, sanitary landfills that will meet state and federal requirements. These new **sanitary landfills** are designed to be clean and to contain and collect **leachate** and **methane gas** that result from the decomposition of **organic** materials or the gradual breakdown of **inorganic** materials. However, the economics of landfill operation and the politics of landfill siting make it difficult to get new landfills built—as no one wants a landfill near them, and everyone hates to pay more for trash disposal.

The amount of **natural resources** we throw away is another part of the solid waste problem that is not so apparent. Wisconsin’s trash contains enough energy to heat over 350,000 homes a year, and even though we’re recycling tons of metals, glass, plastic and paper, we are still throwing away a lot of valuable natural resources. Not only do we need to recycle more, we need to move beyond recycling and do more to reduce waste before it is produced.



Wisconsin’s trash contains enough energy

# » WISCONSIN'S RECYCLING SUCCESSES «

Wisconsin's nationally recognized recycling program was signed into law on Earth Day April 22, 1990 and fully put into action by 1995. Wisconsin was the first state to have statewide bans on landfilling large appliances, used motor oil, vehicle batteries, yard waste, steel containers, aluminum cans, corrugated paper, glass containers, magazines, newspapers, office paper, and plastic containers. Over 90 percent of households in Wisconsin recycle, which helps divert 1.6 million tons of materials from landfills each year. Not only is recycling the right thing to do, it adds to the 5.4 billion dollar environmental industry in Wisconsin and supports thousands of jobs.



## What is required to be recycled in Wisconsin?



- Aluminum containers, glass containers, steel containers, containers made from a combination of steel and aluminum (bi-metal cans)
- Plastic containers #1 through #7. Currently a variance issued by the DNR allows plastic containers #3 through #7 to be landfilled or incinerated. If at some future time, the DNR determines that adequate markets for these plastics exist, they will be banned from disposal.
- Magazines and other materials printed on similar paper
- Newspaper and office paper
- Major appliance including air conditioners, clothes washers and dryers, dishwashers, refrigerators, freezers, stoves, ovens, dehumidifiers, furnaces, boilers, and water heaters
- Yard waste, including grass clippings, leaves, yard and garden debris
- Lead acid vehicle batteries, automotive waste oils and waste tires (except when incinerated with energy recovery)



## Who has to recycle?

Wisconsin's recycling requirements apply to everyone in the state, and at all locations. This includes schools, public places, businesses, special events, homes and apartments. The responsibility to ensure that recycling options are available at all locations lies with a local **Responsible Unit** (RU). An RU can be a municipality, county or tribe's solid waste management system or other unit of local government that is responsible for the planning, operating and funding of a recycling program. Each RU must develop and implement a recycling program to manage the banned materials generated within its region in compliance with state laws.



**THE BENEFITS** Recycling saves natural resources, contributes to improved air and water quality, and reduces the need for landfill expansion and construction by “saving” landfill space. Recycling also benefits Wisconsin’s economy through the creation of new industries, business opportunities and thousands of good paying jobs.

**THE FUTURE** Wisconsin has a strong, successful residential recycling program. However, it is clear that more effort is needed to improve and increase recycling in non-residential places. Areas for improvement include business recycling (offices, gas stations, stores), construction and demolition waste, electronics, recycling when people are traveling and at special events. As Americans progressively generate more waste, traditional methods of waste diversion—recycling, reusing and composting—need to be improved by alternative approaches to waste reduction.

# What else can we do with waste?



Wisconsin already reuses, recycles, composts or recovers energy from almost 40 percent (by weight) of its residential and commercial waste each year, and 49 percent of its industrial waste (that figure would increase if you add the 1,167,300 tons of municipal waste water sewage sludge that is land spread annually). This reduces the need for landfill space, saves the cost of disposal and reuses valuable natural resources. The overall goal of Wisconsin's recycling law is to reduce the volume of discarded items.

The following list includes options for managing solid waste, and are listed in order from most to least desirable:

**Reduce** the quantity of waste produced. For example, some products and packaging are designed to use less material, to be recyclable or to contain fewer hazardous chemicals. We can produce less waste through selective shopping. Also, we can encourage reduction by expressing our views about products and packaging to retailers, industry and government.

**Reuse items.** Food containers, old furniture, clothes, tires, appliances and automobiles, or their parts, industrial shipping containers (barrels, pallets, cardboard boxes) and many more items can be reused.

**Recycle.** For instance, recycled newspaper can be made into newsprint, paper bags, house insulation, egg cartons, animal bedding or cardboard. Glass and aluminum from beverage containers can be made into new containers. Cooking oils and meat fats can be made into chemicals and cosmetics, coal ash into shingles, and concrete and plastic bottles into artificial lumber, carpeting and winter jackets.

## **Compost organic wastes.**

Gardeners know both the ease and the value of composting food and yard wastes to create rich **humus** that improves soil fertility and texture. Some businesses also can compost their organic wastes. For example, cheese whey, organic sludge from paper mills and sewage treatment plants, and the remains from processing fish can be composted. Food wastes from grocery stores and restaurants are also able to be composted.

**Incineration of waste with energy recovery.** Each ton of solid waste has the energy equivalent of 70 gallons of gasoline—that's pretty valuable considering the rising costs of gasoline worldwide.

**Landfill non-recoverable items.** We may always need landfills, but Wisconsin is working to decrease this need. Using the techniques described above, Wisconsin aims to reduce the need for landfills.

**Incineration of waste without energy recovery.** Though this may be the lowest ranking option for disposal of waste, it is sometimes the only option for safe disposal of medical and hazardous wastes.

None of these options is the sole solution to our waste disposal problem. Each option has side effects that must be considered when we are selecting the best solution to each solid waste problem.



## What can we do?

### What could you do to voice your opinion about solid waste issues in your community?

#### Here are some ideas to consider:

- Buy long-lasting products rather than items that have a shorter life span and end up as waste sooner.
- Buy goods in returnable and recyclable containers.
- Learn where you can take items to be recycled and show your support by recycling and buying items made with recycled content.
- Composting food wastes, leaves and grass clippings.
- Find other people in your town who are interested in reducing waste, promoting recycling, inventing new uses for old materials and fighting litter. Work together with these people to promote waste reduction and recycling.
- Take an active interest in how your solid waste management dollars are spent. Compare your community's hauling and disposal costs with those of neighboring towns. Investigate the quality of your local landfill and the measures being taken to make it as safe and long-lasting as possible.
- Learn how nature recycles materials. Is much wasted? (e.g., mushrooms recycling soil nutrients)

You can start by looking at what you throw away at home. Each person's "drop in the bucket" adds up to create the trash problem. If each drop becomes smaller, the problem will be reduced.

Everyone produces some waste, but you don't have to be a "super consumer." One way to help the issue is to think about the goods, services and activities you buy or support. In what ways do they contribute to the solid waste problem? How could you purchase and dispose of items in other ways that would generate less trash?



Source: *Waste Management World*,  
September-October 2005

#### IN FACT

In 2004, two-thirds of beverage containers used were not recycled in the United States. Had they been, the energy saved could have supplied power for more than 2 million homes for one year.

Wisconsin's solid waste management goal is to find the best political, economic, social and personal ways to manage our waste while keeping the environment healthy. Each of us contributes to the solid waste problem.

## EACH OF US CAN HELP SOLVE IT.



**Biodegradable:** the property of a substance that permits it to be broken down by microorganisms into simple, stable compounds such as carbon dioxide and water. (see *decompose*)

**Bottle Bill:** a law requiring deposits on beverage containers like aluminum cans and plastic bottles which may discourage littering and landfilling. More accurately called a Beverage Container Deposit Law.

**Composting:** a waste management process that creates an optimal environment for decomposition by layering organic wastes like food scraps and grass clippings so they will decay into a fertile humus.

**Conserve:** to protect from loss or depletion. Conservation is the wise use of natural resources to minimize loss and waste.

**Consumer:** one who uses up or expends goods, such as food, electronics, textiles, and other products.

**Decompose:** to break down into component parts or basic elements; to rot. Decomposition is an organic process necessary for the continuation of life since it makes essential nutrients available for use by plants and animals.

**Disposable:** usually made for one-time use, or limited usage before disposal. (e.g., disposable paper cups)

**Dump:** an open, unsanitary disposal site used before the existence of present day licensed and controlled burial sanitary landfills.

**Durable:** designed to last a very long time.

**Energy recovery:** the generation of energy by burning solid waste.

**E-waste:** electronic items that are at the end of their useful life.

**Fossil fuels:** an energy source such as coal, oil or natural gas, formed in the earth from plant or animal remains, and are considered to be finite, or non-renewable natural resources.

**Garbage:** spoiled or waste food that is thrown away. Generally defined as wet food waste and excludes dry material (trash). The term is often used interchangeably with the word "trash."

**Groundwater:** water beneath the earth's surface that fills the spaces, and flows in between soil particles and rock. Supplies wells and springs. Two out of every three Wisconsin citizens drink groundwater.

**Hazardous materials:** toxins that can cause special problems for living organisms or the environment because they are poisonous, explosive, burns or dissolves flesh or metal, ignites easily with or without a flame, or carries disease.

**Humus:** organic material consisting of decayed vegetable matter that provides nutrients for plants and increases the ability of the soil to retain water.

**Hydrocarbons:** an organic compound (such as acetylene or butane) containing only carbon and hydrogen and often occurring in plastics, petroleum, natural gas, and coal.

**Industrial waste:** the waste that industries (e.g., power plants and paper mills) generate as they produce the products we use.

**Incinerator ash:** the sometimes hazardous bi-product from incinerators that burn waste. Incinerator ash can contain levels of lead, cadmium, benzene and dioxin.

**Inorganic:** being or composed of matter other than plant or animal organisms.

**Landfill:** a site for the controlled burial of solid waste.

**Leachate:** liquid that has percolated through solid waste and/or been generated by solid waste decomposition, and contains extracted, dissolved or suspended materials. May contaminate ground or surface water.

**Litter:** waste materials discarded in an inappropriate place. Littering is illegal in Wisconsin.

**Materials recovery facility:** a facility designed to sort and transport recyclable materials such as paper, aluminum, glass and plastic to facilities where they will be reused.

**Methane gas:** a colorless, odorless, flammable and potentially dangerous, gaseous hydrocarbon (CH<sub>4</sub>) present in natural gas and formed by the decomposition of organic matter. Can be used as a fuel.

**Municipal solid waste:** all solid, semi-solid, liquid and gaseous wastes; including trash, garbage, yard waste, ashes, commercial waste, and household discards such as appliances, furniture and equipment.

**Natural resource:** a valuable, naturally occurring material such as soil, wood, air, water, oil or minerals.

**Non-renewable resource:** a natural material that, due to its scarcity, the great length of time required for its formation, or its rapid depletion, is considered finite in amount (e.g., coal, copper, petroleum).

**Non-municipal waste:** *see industrial waste*

**Open burning:** the burning of any combustible material outdoors without any air pollution controls in place. Burning in an unconfined area, a container or a pile are all considered to be open burning. Open burning of recyclables is illegal in Wisconsin.

**Organic:** derived from living organisms.

**Pollution:** harmful substances deposited in the environment that can lead to a state of dirtiness, impurity or unhealthiness.

**Recycle:** the collection and reprocessing of manufactured materials for remanufacture, either in the same form or as part of a different product.

**Raw material:** an unprocessed natural resource or product used in manufacturing.

**Recycled:** to have been passed again through a series of changes or treatments in order to regain material for human use.

**Reduce:** to lessen in extent, amount, number or other quantity.

**Renewable resource:** a natural resource derived from an endless or cyclical source (e.g., sun, wind, water, fish, trees, cotton). With proper management and wise use, the replacement of these resources by natural or human-assisted systems can equal or exceed their consumption.

**Responsible Unit (RU):** A municipality, county, tribe, solid waste management system or other unit of local government that is responsible for planning, operating and funding a recycling program. Each RU in Wisconsin must develop and implement a recycling program for managing state mandated recyclables generated within its region.

**Reuse:** to extend the life of an item by using it again in some way, such as, repairing it, modifying it or creating new uses for it.

**Reusable:** *see reuse*

**Sanitary landfill:** a specially engineered site for the disposal of solid waste on land. These landfills are constructed in a way that reduces hazards to health and safety.

**Solid waste management:** the controlling, handling and disposal of all solid waste. One goal of solid waste management is to reduce waste to a minimum.

**Source reduction:** a reduction in the amount of, and/or toxicity of a waste before it enters the waste stream; also called waste prevention.

**Sustainable:** a method of harvesting or using a resource so that the resource is not depleted or permanently damaged.

**Toxins/toxic:** a poisonous substance that is usually very unstable, or harmful when introduced into human, animal or plant tissue.

**Trash:** material considered worthless, unnecessary or offensive, that is usually thrown away. Trash is generally defined as dry material and excludes food waste (garbage) and ashes. However, the term is often used interchangeably with the word "garbage."



# E-waste Not, E-want Not

**What is E-waste?** Discarded electronics—generally referred to as 'e-waste'—can include any of our electronic waste items such as CDs, DVDs and DVD players, computers, television sets, video games and cell phones. In 2003, the United States had over 3.2 million tons of electronic waste! The e-waste pile is growing around the world and statistics show that it runs into millions of tons annually. More and more countries are drafting legislation for the environmentally-friendly disposal of this waste. Disposal techniques vary widely from country to country because it includes materials which are valuable and recyclable, as well as toxic. While modern technologies allow for nearly hazard-free recycling of e-waste, precautions must be taken to control harmful emissions and toxins that cause detrimental impacts on health and the environment. Electronic circuit boards, batteries, and Cathode Ray Tubes (CRTs) can contain **hazardous materials** such as lead, mercury and chromium. If improperly handled or disposed, these toxins can be released into the environment through landfill **leachate** or **incinerator ash**. Businesses and large generators of electronic waste are already required to comply with federal and state laws concerning the proper disposal of electronics, but there are currently not any laws to govern the disposal of residential electronics in Wisconsin.

**Learning Objectives:** To help students comprehend issues surrounding electronic waste in our society and how its disposal affects our quality of life as well as the environment.

**Subjects:** Science, Social Studies, Environmental Education, Family and Consumer Education

**Wisconsin Model Academic Standards:**  
C H.8.2, SC C.8.2, SS D.8.11, SS A.8.11, EE A.8.2, EE A.4.4, EE A.8.2., FCE intermediate A.2, A.3.

**Grades:** 6-8

## GOING BEYOND

1. Does your community have a computer recycling program? If not, draft a letter to your local solid waste manager asking if they are developing a computer recycling program and express your support for such a program.
2. Investigate other states in the US and other countries that have electronics and/or computer landfill policies. Write a paper comparing the similarities and differences of these policies.
3. Find out when your school's computers or other electronic items (e.g., TVs, fax machines, copiers) are up for replacement and find resources to help them be recycled and/or disposed of in an environmentally friendly manner.
4. Compare past and present technologies related to electronics and describe the effects of technological change, either beneficial or harmful, on people and the environment.
5. Have each student write a one page "reflection" on their thoughts regarding e-waste and the activity they completed.

**Materials:** "Know Your Role" handout, electronics background information, large sheet of paper, markers

**Procedure:** Provide a copy of the electronics recycling background information to each student. Divide students into groups of four to eight individuals and hand out the "Know Your Role" handout. Give each group a large sheet of paper and markers. Have the students read the background information and their roles. Explain to the students that they are the person identified on their role description and that they have been invited to participate in a group discussion on drafting a computer disposal policy for the state of Wisconsin. Give the groups 30-45 minutes to discuss their stances on the issue and to record on the large sheet of paper ideas for a computer disposal recycling policy that meets most of their groups' concerns.

**Policies Can Address:** What types of electronic waste will be included in the policy? Who will the policy affect? Who will be responsible for the costs of recycling the items (i.e., consumer, manufacturer, store that sells items) and why? How will you gain support of your policy from the public, manufacturers, and electronics stores?

**Afterward**, each group can present their ideas to the class. Follow-up questions after the presentation of policy ideas can include:

- What went well doing your group discussions?
- What was a challenge?
- How are some of the groups' policies the same?
- How do they differ?



# E-WASTE NOT, E-WANT NOT

## E-WASTE WHAT?

Student Handout no.1

### WHAT IS E-WASTE?

E-waste is electronic waste (electronic equipment) that is thrown away. It includes many types of electronics from computers and their monitors, to cell phones and stereos. Unfortunately, electronic waste is among the fastest growing waste types in the United States.

### WHY IS E-WASTE A PROBLEM?

As technology quickly develops, people are constantly getting new equipment and stop using their old equipment. An electronic product may contain more than 1,000 different substances, some of which can be harmful to human and environmental health. If old equipment is not properly recycled, these substances could get into the air, soil and water.

### WHAT ARE MY OPTIONS?

The best option for all electronic equipment is reuse, either by selling or donating it. Using equipment again extends the life of the product and makes it available to others who can still use it. However, sometimes reuse is not an option. If equipment is beyond its useful life, people can do their part and recycle it responsibly. Together, we can make a difference in the fight against e-waste!

### WHAT HAZARDOUS MATERIALS ARE IN ELECTRONIC PRODUCTS?

Electronic products such as printed circuits, Cathode Ray Tubes (CRTs) and Liquid Crystal Displays (LCDs) screens often contain a lot of heavy metals and other substances. These substances are known to cause harm to humans and the environment when thrown away and not reused or recycled. Cadmium, lead, mercury, and arsenic are some of these substances.

From 1975 to 2004, the sales of personal computers (PCs) were estimated at 1.4 billion. In the five year span from 2005 to 2010, it is estimated that PC sales will reach 1.3 billion units, or nearly as many as the first three decades since the PC was introduced to the market.

Source: Consumer Electronics Association and Computer Industry Almanac, 2006

### WHAT RECYCLABLE MATERIALS ARE IN ELECTRONICS PRODUCTS?

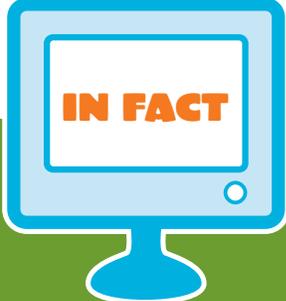
Consumer electronics contain a variety of recyclable materials like metals, glass, and plastics. All of these materials can be reused to create new products, which decreases the need to mine the earth for raw resources.

### ARE CONSUMER ELECTRONICS MANUFACTURERS DOING ANYTHING TO MAKE A CHANGE?

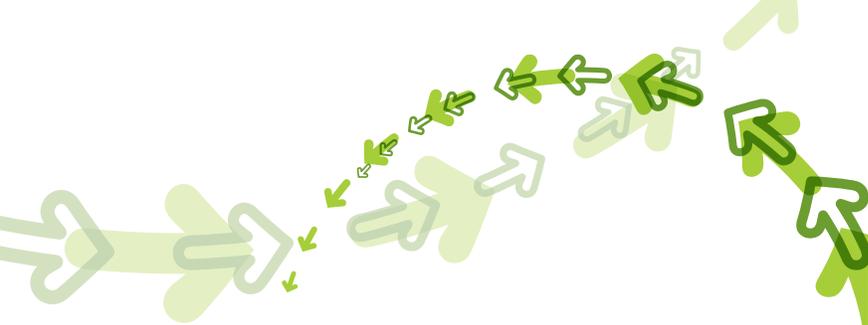
Manufacturers are taking action to help with e-waste in a number of ways, from changing product designs to offering reuse and recycling programs. Many manufacturers are working to "design out" hazardous materials and "design in" environmentally-sound materials, including recycled content. They are also always changing product designs in order to make electronics products easier to recycle. Finally, many manufacturers offer recycling services free of charge or for a small fee.

### WHERE DOES E-WASTE GO NOW?

Up to 75 percent of unused computers are stored in the closets, basements and offices of the original owners. Fifty percent of computers being recycled are still in good working order and could be reused. It has been reported that 85 percent of computers that are "thrown in the garbage" end up in a landfill. According to a US Environmental Protection Agency (EPA) report from 2002, up to 70 percent of heavy metal (lead, mercury, cadmium, etc.) contamination in US landfills comes from electronic products that are disposed of incorrectly.



**IN FACT**



### HOW MUCH E-WASTE IS PRODUCED EACH YEAR?

The EPA predicts that nearly 250 million computers will become useless between the years 2005 and 2010. In California alone, 6,000 computers become useless each day. Less than ten percent of computers are currently being recycled. The rest are put in storage, thrown away in landfills, incinerators or sent to other countries as hazardous waste.

### WHAT ELECTRONIC EQUIPMENT IS RECYCLABLE?

Many components of electronic equipment—including metals, plastic, and glass—can be reused or recycled, while others may present environmental hazards if not managed correctly.

*Source: Rethink Initiative, 2006*

### WHAT CAN I DO ABOUT IT?

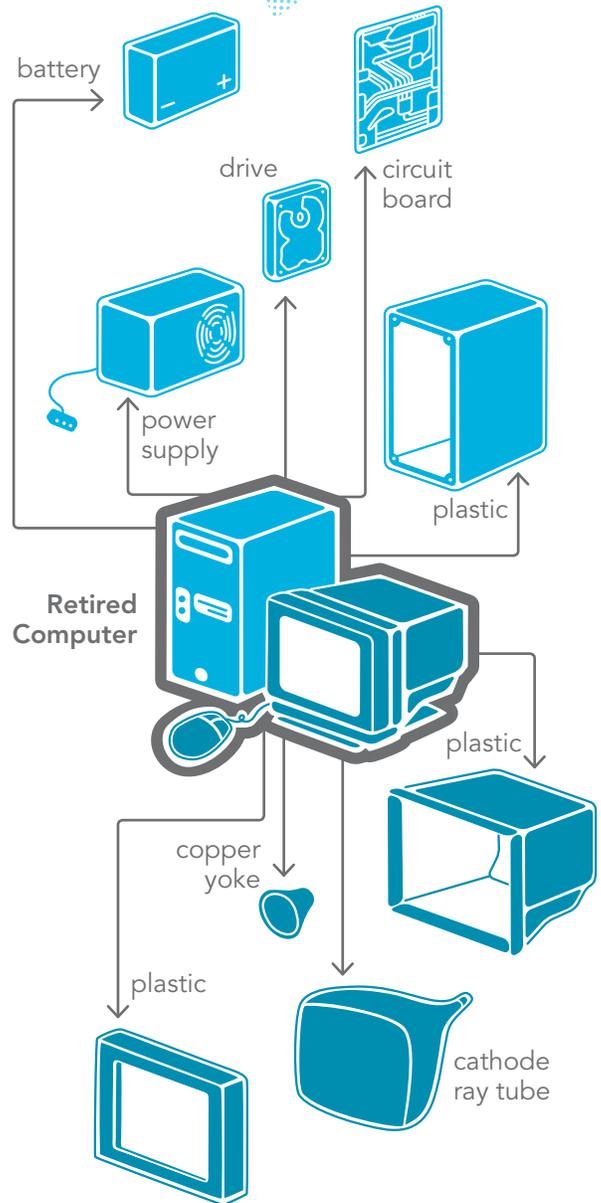
**Reduce:** Maintain and keep equipment as long as possible. A typical computer's life span is 2-3 years, but can be extended by 1-2 years with some upgrading. Buy a good monitor; it can last 6-7 years or more, and keep it for use with your next computer. Consider leasing a computer so you can trade it in for a new one at the expiration of the lease. Be sure to always use a surge protector power strip with all electronic equipment.

**Reuse:** A more recent computer can often be fixed, upgraded and reused instead of being replaced.

**Recycle:** Electronic equipment can be recycled for the recovery of metals, plastics, glass and other materials. You can ship your equipment directly to a recycler, or you may also be able to take advantage of manufacturer trade-ins to get credit towards buying new products. Also, old, rechargeable batteries can be recycled through many stores that sell new ones.

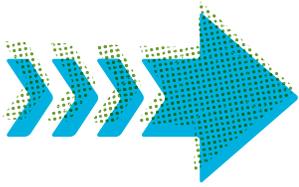
## WHAT'S INSIDE?

A BRIEF LOOK AT THE MATERIALS THAT CAN BE RECOVERED FROM YOUR COMPUTER.



### MARKETABLE MATERIALS THAT CAN BE RECOVERED FROM E-WASTE:

- |                                       |                              |
|---------------------------------------|------------------------------|
| Crushed glass                         | Power supplies               |
| Circuit boards                        | Copper yokes                 |
| Scrap metal                           | Fluorescent tubes            |
| Wire                                  | Batteries                    |
| Hard drives and other types of drives | Ink jet and laser cartridges |
|                                       | Plastic                      |



**E-WASTE NOT, E-WANT NOT**  
**KNOW YOUR ROLE**  
Student Handout no. 2



### CONCERNED CITIZEN

Your name is Sara Stevens and you are a citizen of Vernon County, Wisconsin. About 5 years ago you purchased what you thought was a top of the line computer system. Now in only five years, it is four times slower than any of the current computers on the market and doesn't have the capacity to meet your needs. You have a new computer in mind, but are concerned with the lack of options for recycling your old computer. You have contacted the local county waste manager and state officials about recycling options, but haven't had any luck with an answer for where to take your computer. You have read that the disposal of computers in landfills can cause harm to people and the environment. You have agreed to sit in on a focus group to talk about forming a statewide policy on computer recycling. You feel very strongly that computer manufacturers are liable for recycling computers.

### HEAD OF COMPUTER MANUFACTURING COMPANY

Your name is Bob Biggins and you are the owner of a worldwide computer manufacturing company. Your company, Orange Computers, makes millions of computers annually and distributes them all over the world. You feel very strongly that computer recycling should be dealt with by the consumer and not by the manufacturer. You have heard of other countries attempting to pass policies with manufacturers paying for the cost of computer recycling, and it makes you very nervous. If a policy like this was passed in Wisconsin, you are afraid that more states would adopt similar policies and this could cost your company millions of dollars in profits. You have been invited to sit in on a focus group to talk about forming a statewide policy on computer recycling, but aren't very happy to be attending.



### COUNTY SOLID WASTE MANAGER

Your name is Chuck Composten and you are the solid waste manager for Pierce County, Wisconsin. Your job involves supervising all of the county's waste disposal needs and complying with Wisconsin's waste and recycling laws. You have had many contacts from citizens recently wanting options to dispose of their used computers and electronics in an environmentally sound manner. Recycling is the law in Wisconsin, but the law only requires aluminum, plastic, glass, and paper to be recycled. Residential computer recycling is optional in the state and county, so there is little funding available for a recycling program. You support the ideas for a statewide policy as long as the funding doesn't result in an increase in state and local taxes. If computer recycling became a state-wide policy, environmental grants might become available to cover some but not all of the costs.

### OWNER OF ELECTRONICS STORE

Your name is Melinda Deevdee and you are the owner of a statewide chain of electronics stores in Wisconsin. Your stores are called Electronics-N-More, and you have the best selection of computers in the state. Overall, your stores sell the most computers in the state and you'd like to keep it that way. You have initiated a voluntary computer trade-in incentive program for people to bring in their old computers and get money off the purchase of a new one. The old computers you receive are sent to developing third world countries that disassemble the computers, create new systems and recycle what they can't use. You'd like to see more options available like this in the state, but are reluctant to have to carry the burden of the cost anymore. If you could pass on the cost of recycling the old computers to the purchaser or manufacturer that would be ideal.

## STATE LAWMAKER

Your name is Margaret Capitol and you are a state assembly woman for Wisconsin. Your job involves proposing and voting on new policies and laws for the state. You have gotten one or two contacts about recycling issues in the state, but none specific to computer recycling. You don't know much about the issue, but have pledged to try to balance the needs of all of the interest groups involved with the issue of computer recycling.



## LANDFILL OWNER



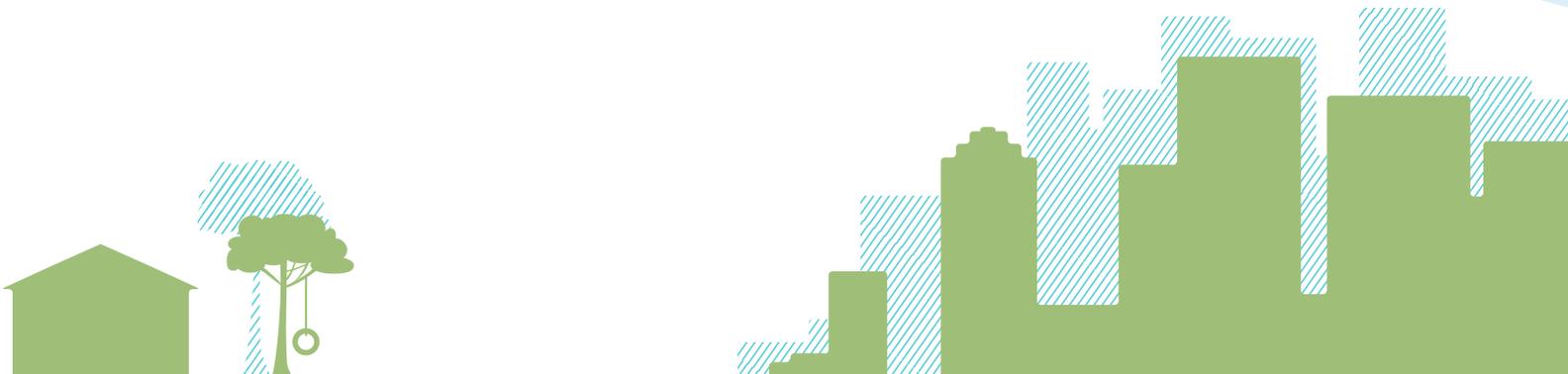
Your name is Pat Landphil and you've owned a sanitary landfill in Sheboygan County since it was built in 2004. You know that electronics items and residential computers are routinely disposed of at your facility. Your primary concern is your company's bottom line. You are making a good profit on the computers disposed of at your landfill. You are opposed to policies that would take away business and profits from your landfill.

## STATE WASTE MANAGEMENT SPECIALIST

Your name is Les Wasten and you work for the Wisconsin Department of Natural Resources as a Recycling Specialist. You helped to draft the state's recycling laws that went in to effect in 1995 (for aluminum, plastics, paper, etc). You also work with local communities to enforce the state's recycling laws and coordinate recycling grants. You are 100 percent in support of a statewide ban on computers in landfills and hope that a policy will be developed to mandate recycling computers.

## ENVIRONMENTAL ACTIVIST

Your name is Betty Proteckalot and you are the president of the Wisconsin chapter of Recycle Now! Recycle Now! is a non-profit, nationwide group of people interested in promoting environmentally sustainable waste disposal, and the three R's of reduce, reuse and recycle. You want a statewide ban on the disposal of computers in Wisconsin's landfills. You have a difficult time understanding why others wouldn't want to find an environmentally friendly way to recycle computers.





## E-WASTE NOT, E-WANT NOT

# E-WASTE IN THE UNITED STATES

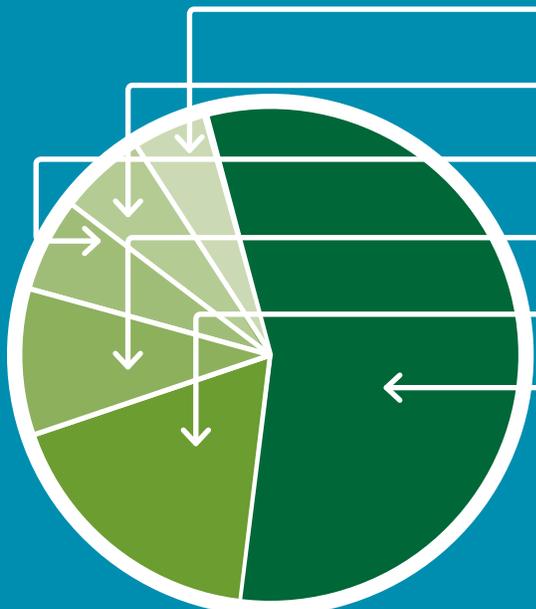
Take Home Worksheet, pg. 1

In the year 2000, over 2 million tons of electronic waste was generated in the US. These items included DVD's, cell phones, computers, and video game cartridges. If only a few castoff computers or gadgets had to be disposed of, it wouldn't be much of a problem. But by 2010, an estimated 250 million computers will become obsolete and 300 million TVs will be chucked out, creating a growing environmental and health problem.

### COMPOSITION OF E-WASTE IN THE USA

Source: Municipal Solid Waste in the United States: 2000 Facts and Figures. US EPA Office of Solid Waste and Emergency Response. June 2002. pages 150-160.

These figures are shown in percentage and in weight.



**4.40%** PC's > 93,474 tons

**5.90%** Monitors > 125,340 tons

**6.10%** Household Electronics > 129,588 tons

**10.10%** Commercial Electronics > 214,564 tons

**17.90%** Electronics Packaging > 380,268 tons

**55.60%** TV's > 1,181,166 tons

**Total** > 2,124,400 tons, for the year 2000

Name \_\_\_\_\_



**E-WASTE NOT, E-WANT NOW**  
**E-WASTE IN THE UNITED STATES**  
Take Home Worksheet, pg. 2

**1**

Looking at the graph "Composition of E-waste in the USA," what were the top two categories for electronic waste in the United States for 2000?

**2**

How do you think these percentages will change in the next 15 years as more electronics are sold?

**3**

The total electronic waste weight for the United States was 2,124,400 tons in the year 2000. How many pounds is that?

**4**

The population of the United States was 281,421,906 in 2000. How many pounds of electronic waste is that per person?

**5**

If the amount of e-waste is projected to grow 60% in the US from 2000 to 2010, how many tons and pounds would that be for 2010? (use weight figure in question #3 to calculate 2010 estimate)

**6**

What other options, besides landfilling, are there for the disposal of electronic items?

**7**

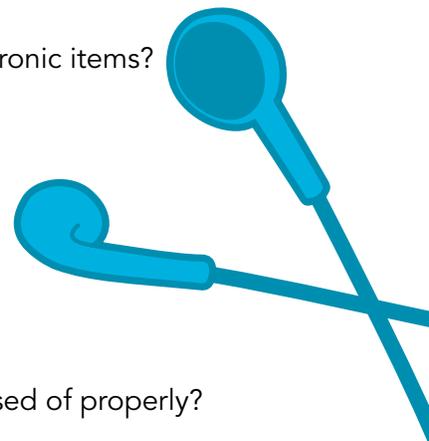
Name two hazardous substances that may be found inside a TV.

**8**

What effect on the environment could these substances have if not disposed of properly?

**9**

Name the electronic items on the pie chart that your family has disposed of in the last year. What are the options for your family's electronic waste disposal in your community?



# Where does it all end up?

**Learning Objectives:** Students will heighten their awareness of the number of electronic items in their homes and explore where these products go when they are done being used.

**Subjects:** Science, Social Studies, Mathematics, Environmental Education, Family and Consumer Education

**Wisconsin Model Academic Standards:** SC A.4.5, B.4.3, C.4.5, C.4.6, C.8.2, C.8.6, SS H.4.2, D.4.7, D.8.11, M A.4.2, E.4.2, E.4.3, EE A.4.1, A.4.2, A.8.2, A.8.5, B.8.20, C.4.2, C.8.2, D.4.2, D.4.3, D.4.4, D.4.5, FCE introductory A.2.

**Grades:** 4-6



**Materials:** "Where Does It All End Up?" take home worksheet

**Procedure:** Have students predict what electronic items they'll find the most of in their homes. Then have students fill out the worksheet at home to discover how many consumer electronic products their family uses. Once students have completed their worksheets, have them bring the worksheet back to class for a group discussion.

## Pre-Activity Questions:

1. What types of electronic products do you use at your house? Make a class list. What electronic items do you think you'll have the most of at home?
2. What do you use these products for? (i.e., watching TV, calling a friend, playing video games)
3. Pick a couple of products listed and talk about what life might have been like before these products were invented. What did people use as an alternative to the product? (i.e., video games and board games)
4. Ask the students where these products go when we are done using them. What are some alternatives to throwing them away (reuse, recycle)? Talk about the different components of some of the products and what might be recyclable in them (plastic, aluminum, glass, steel, other metals).

## Post-Activity Questions:

5. What electronic items did everyone have in their homes?
6. How close were you with your predictions for what electronic items you have the most of at home?
7. Tally up your class's electronic items totals and put them on the chalkboard.
8. For each item, have students calculate the average number of products per person in the class (for example 2.4 TVs per student).
9. Using the per person average you found from your class, try to calculate how many TVs there might be in the municipality (city/town/village) you live in. Take your municipality's population and multiply it by the average number of TVs per person you found. Do the same for cell phones and computers.
10. Find out what recycling options are available in your community for used electronics items. Identify short-term and long-term solutions to the electronic waste problem and discuss the consequences (both positive and negative) of the proposed solutions.

## Did you know?

- Nearly 250 million computers will become obsolete between the years 2005 and 2010.
- Many people discard computers every 3 to 5 years.
- In 2001, only 11 percent of personal computers retired in the US were recycled.
- Mobile phones in the US were discarded at a rate of 130 million per year in 2005, resulting in 65,000 tons of waste.
- TVs and computers can contain an average of 4 pounds of lead (depending on their size, make, and vintage) as well as other potential toxins like chromium, cadmium, mercury, beryllium, nickel, zinc, and brominated flame retardants. These materials need to be handled carefully.

Source: US EPA, 2005





# \*Plastics Everywhere!



**Learning Objectives:** Students will increase their awareness of the use of plastics in their lives and learn more about which plastics are recyclable.

**Subjects:** Science, Social Studies, Environmental Education, Family and Consumer Education

**Wisconsin Model Academic Standards:** SC B.4.1, SC C.4.5, SS D.4.7, SS D.8.11, EE A.4.1, EE A.4.2, EE A.4.3, EE A.8.2, EE A.8.4, EE D.8.5, EE E.4.2, EE D.4.3, FCE introductory A.2, FCE intermediate A.3.

**Grades:** 4-8

\* Section is adapted from waste and recycling curriculum by the California Integrated Waste Management Board.

Whether you are aware of it or not, plastics play a big part in your life. Plastic is used in everything from car parts to doll parts and from soft drink bottles to the refrigerators they are stored in. From the car you ride in to school to the television you watch when you get home, plastics are everywhere.

Plastics are made up of building blocks called **hydrocarbons**, which are derived from petroleum or natural gas, also called **fossil fuels**. They are considered **non-renewable resources** because the conditions under which they were formed no longer exist. Also, the mining, transportation and refining of petroleum creates a lot of pollution. By reusing plastics again and recycling, we can slow down the production of new plastic products from raw materials.

There are seven types of plastic, all with different scientific properties. Because of the differences in their properties, they cannot be melted together to form new plastic. It is difficult (with current technologies) to collect and properly sort the different types of plastics from one another, which makes recycling opportunities for plastics more limited than some other materials. Today, plastics with codes #1 and #2 are commonly accepted in community recycling programs. In the future, technology and innovation will hopefully lead to greater collection, recycling and the remanufacturing of plastics into other usable products.

## GOING BEYOND

1. Find out which plastics are recycled in your area. Plastic containers marked with plastic number codes #1 and #2 are commonly recycled.
2. Discuss the negative aspects of using a non-renewable resource and ways to slow our consumption of these resources.
3. Assign the activity "Plastics In Your Home" as homework. Share reuse possibilities with the class.



polypropylene

polyethylene terephthalate



polyvinyl chloride

**Note:** About a week before you begin this lesson, ask students to bring to class a variety of plastic containers that are empty and clean (#1-#7). Cut pieces approximately 2 inches square from each plastic sample. Be sure to label one master key set for yourself with a permanent marker.

### Materials:

**Optional introductory activity:** a plastic sandwich bag (soft film, not thick Ziploc), a pencil, water

**Core activity:** "Test Your Plastic Polymers" and "Plastics Codes: Determine Their Identity" handouts; cut up plastic containers #1-#7, several plastic dishes/pans or buckets for the float test

### Optional Introductory Activity Procedure:

Fill a plastic sandwich bag with water. Then ask for a student volunteer who is brave enough to stand under the bag while you push a sharp pencil through it.

Hold the bag over the volunteer's head. Slowly rotate the sharp pencil in through one side of the bag and out the other side. No water should leak out. (Do not push the pencil through completely.)

Ask the students to hypothesize why the bag did not leak when the pencil was pushed through.

Explain where plastics come from and that in the production of plastics, petroleum hydrocarbons are chemically altered from a monomer (one) into polymer (many) molecular chains. As the pencil is pushed through the bag, it slips between these chains. Unbroken, the chains slide around the shape of the pencil, sealing in the water. A dull pencil, however, breaks the chains and causes the bag to leak. When the pencil is removed, the polymers may move somewhat towards their original shape, but not enough to close the large pencil hole.

Have the volunteer carefully dispose of the water.

### Core Activity Procedure:

Assign students to scientific teams of three to four people. Distribute plastic pans or buckets filled with water to each team for the float test.

Provide a set of unlabeled plastic samples from as many types of plastic that you could find and the worksheet "Test Your Plastic Polymers" for each group.

Ask students to record each sample's plastic properties on the chart.

Distribute a copy of "Plastics Codes: Determine Their Identity" to each group.

Have students complete their charts by deciding which type of plastic each sample represents.

### Post-Activity Reflection/Response:

1. Encourage students to share their results. Discuss the different properties of the different types of plastics (i.e., stiff, light, flexible).
2. Why are there many different kinds of plastics in use? *Different resins are suited to different uses, depending on their strength, flexibility, and resistance to specific chemicals or heat (some bottles are filled with hot liquids).*
3. Why do some plastics have to be separated before they can be recycled? *Each plastic has a different set of properties and is used for specific purposes. Various plastics have different melting points, so if they are mixed together, the process becomes contaminated and no longer results in a reusable new plastic.*
4. Explain to students that the recycling process for plastic containers includes: (1) sorting the containers by their resin types; (2) cutting the plastic into tiny pieces, called pellets; (3) melting the pellets; and (4) reshaping into new plastic objects. Students should be advised to never melt plastic themselves because the fumes are very dangerous to your health and to the air quality.



# PLASTICS EVERYWHERE! PLASTIC CODES: DETERMINE THEIR IDENTITY

Student Handout



Code	Type	Name	Description	Some examples
PETE		polyethylene terephthalate	usually clear or green, sinks in water, rigid, glossy	soda bottles, peanut butter jars, vegetable oil bottles 
HDPE		high density polyethylene	semi-rigid, usually sinks in water, cloudy colored plastics	milk and water jugs, bleach bottles 
PVC		polyvinyl chloride	semi-rigid, glossy, usually sinks in water	detergent/cleanser bottles, pipes 
LDPE		low density polyethylene	very flexible, not crinkly, usually floats in water	6-pack rings, bread bags, sandwich bags 
PP		polypropylene	semi-rigid, low gloss, usually sinks in water	margarine tubs, straws, yogurt containers, reusable food storage containers 
PS		polystyrene	dull appearance, floats in water	styrofoam, packing peanuts, egg-cartons, foam cups 
Others		multi-layer plastics	often brittle, glossy and clear, usually sinks in water	reusable water bottles, baby bottles 



## PLASTICS EVERYWHERE!

# PLASTICS IN YOUR HOME

Take Home Worksheet, pg. 1

You'll be using this worksheet to poll family members about their plastics recycling knowledge and also for an inventory of what type of plastics your household uses. Wisconsin state law requires that all plastic types #1–#7 are recycled, but currently #3–#7 are exempt because there aren't any good cost-effective options available for them to be reused.

Use the "Plastic Codes: Determine Their Identity" handout as a guide as you check your home for different types of plastics. Be sure to check your pantry, refrigerator, laundry room, bathroom and under your kitchen sink. Write your findings in the table on the next page. Attach an extra sheet if necessary. After you have completed your investigation of plastics at home, answer the questions below.



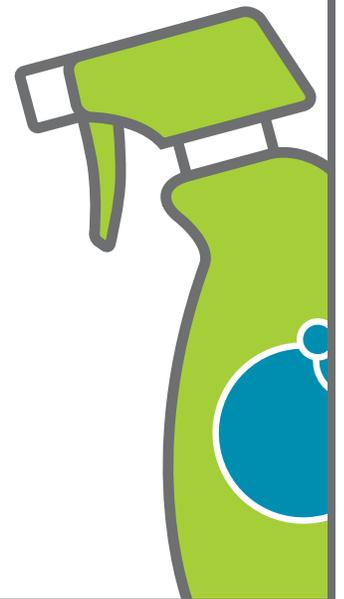
1. What was the most common type of plastic you found in your home?

2. Does your household recycle this plastic type or is it discarded in the trash?

3. Ask your family which plastics they recycle and which are discarded, and write down their responses.

4. What is the percentage of #1 and #2 plastics you found compared to the other plastics? (example: 11 out of 20 would be, 11 divided by 20, which is .55 or 55 percent)

5. What are some ways you can increase that percentage in your home?





# Out of Sight, Out of Mind: It All Adds Up

**Note:** Read the definitions for solid waste, trash and garbage in the Glossary of Terms. For these activities, initially consider recyclables as part of the trash. Once items are identified and recycled, they will no longer be trash.

**Learning Objectives:** To help students visualize how much solid waste is generated for each person in Wisconsin and understand how the number of people living in our state and country affects this amount.

**Subjects:** Mathematics, Social Studies, Science, Environmental Education

**Wisconsin Model Academic Standards:**  
SC C.4.2, SC C.8.1, M A.4.3, M D.4.2, M D.4.5, M D.8.4, SS D.4., D.8.11, EE A.4.1, EE A.4.2, EE B.8.20

**Grades:** 4-8



**Materials:** 14 pound bag of miscellaneous trash and recyclables (wash containers and avoid items with sharp edges), gloves, tarp to place trash on (optional)

## Procedure:

**First:** Describe trash and list some examples.

**Ask the students:** What qualities does an item have that makes you decide it is trash? What different kinds of trash are there?

**Next:** Dump the 14 pound bag of trash (and recyclables) on the tarp on the floor.

**Discuss with the students:** Does this seem like a lot of trash? This much trash is thrown out each day for every person in Wisconsin. How do you feel about the fact that you are responsible for 14 pounds of trash that is thrown out each day?

**Continue the discussion:** If you make 14 pounds of trash each day, how many pounds do you make every week, month and year? Convert the annual number from pounds into tons. How many tons of trash do you make each year?

To help you visualize how much a ton weighs, ask if a student would like to volunteer how much they weigh. How many of that student would it take to make one ton? How many "students-worth" of trash do you make each year? How many people are in your family? If 14 pounds of trash are generated each day for every person, how many pounds or tons of trash does your family make every week, month and year? How do your buying habits affect the amount of trash you produce?



NOW THAT YOU'VE DISCOVERED THE AMOUNT  
OF TRASH YOUR OWN CLASS GENERATES,  
JUST IMAGINE HOW MUCH TRASH IS GENERATED  
BY ALL THE CLASSROOMS IN WISCONSIN!

## Out of Sight, Out of Mind:

Class  
Trash

**Materials:** Trash generated by your class on a typical day (note: initially include recyclable items like paper, plastic, aluminum and glass in the trash weight and then subtract recyclables from the total weight afterward), tarp or sheet of plastic to put trash on (optional), rubber gloves, clear garbage bags, bathroom or grocery scale

**Procedure:** Collect and save the trash your class generates (in the classroom, art room, shop, lunch room, etc.) on a typical day. Wash jars and cans, place food trash in a sealed container, separate trash types into clear plastic garbage bags. You can save trash for more than one day if you wish. This will enable you to calculate the average amount generated by your class each day. Have students (either as a class or in groups) fill out the "Class Trash" worksheet as observations are made with the class's trash.

**Note:** Students will need to be familiar with the concepts of weight and volume in order to do the following activity and understand the implications. Consider using this activity as part of a mathematics lesson that addresses these concepts.

**Learning Objectives:** Students will calculate the amount and types of trash thrown out by their class at school and investigate where it is taken.

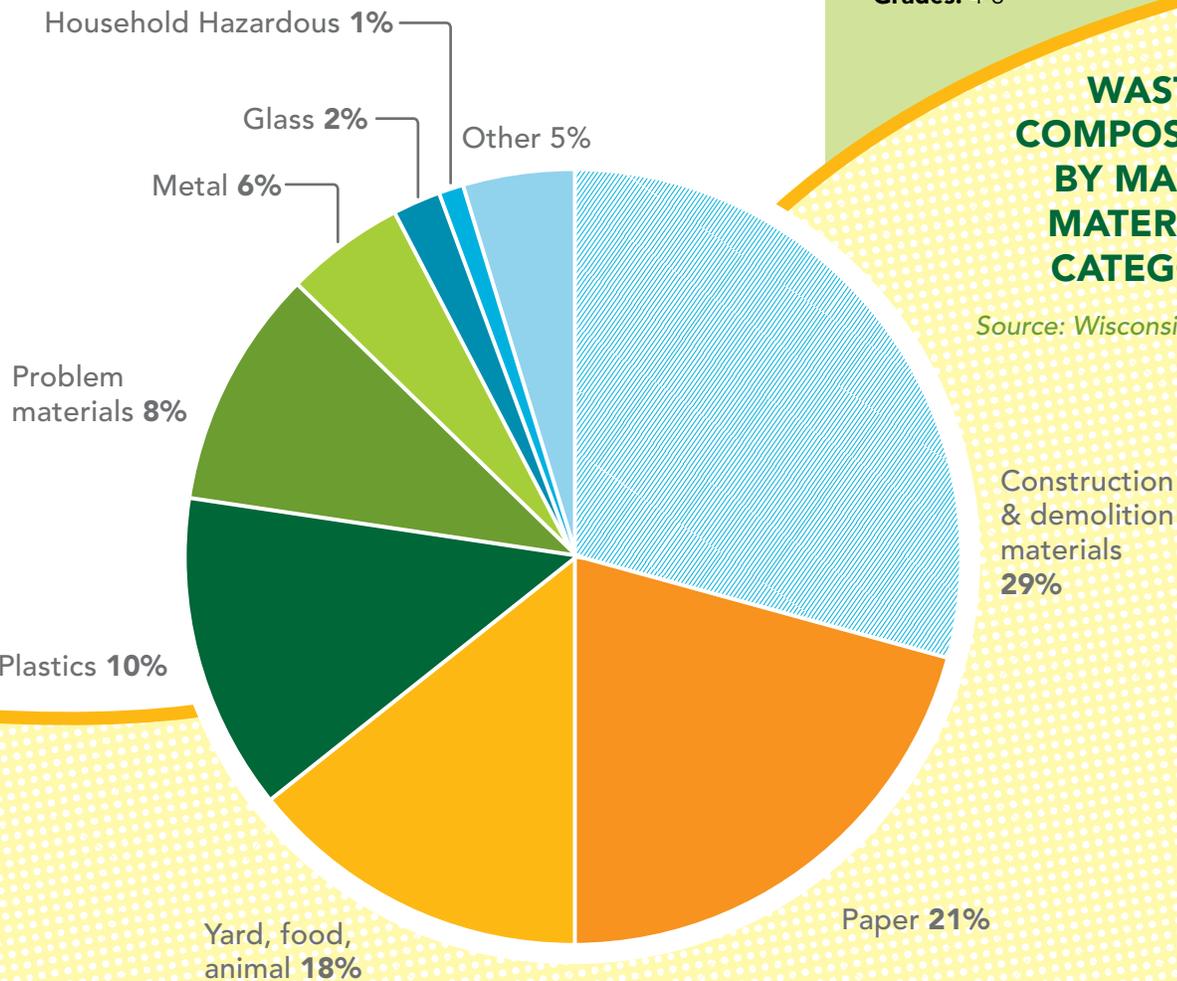
**Subjects:** Mathematics, Social Studies, Science, Environmental Education, Family and Consumer Education.

**Wisconsin Model Academic Standards:** SC C.4.4, SC C.4.5, SC C.4.6, M D.4.2, M D.4.3, M D.4.3, M D.8.4, SS D.4.7, SS D.8.11, EE A.4.1-4, EE A.84, EE B.8.20, FCE introductory D.2 and D.3.

**Grades:** 4-8

### WASTE COMPOSITION BY MAJOR MATERIALS CATEGORY

Source: Wisconsin DNR, 2007



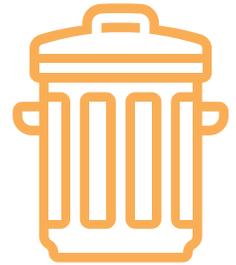


# OUT OF SIGHT, OUT OF MIND CLASS TRASH

Class Worksheet, pg. 1

Name \_\_\_\_\_

1. List the items you throw in the classroom and lunchroom wastebaskets on a typical day.



2. Predict what four types of materials make up the greatest portion of the waste by:

Weight: 1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_ 4. \_\_\_\_\_

Volume: 1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_ 4. \_\_\_\_\_

Number of items: 1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_ 4. \_\_\_\_\_

3. After you have spread out the class's trash on a tarp on the ground, count the number of different items for each trash type (i.e., food waste, glass, plastic bags), and fill out the chart to the right. Place the trash, by type, in separate bags.

Trash Type	Number of items found in trash type
Food waste	
Paper	
Pencils/pens	
Aluminum	
Plastic	
Glass	
Paper bags	
Plastic bags	
Other (specify)	
Other	
Other	
Other	

4. What types of trash create most of the total class trash by number? What types/items could have been recycled instead of thrown into the garbage can?

5. Draw a bar graph to illustrate the amounts of the different trash types found. Be sure to highlight which types on the graph are recyclable.





6. Select the four types of trash you estimate make up most of the total trash by weight. Use one of the following methods to determine the exact or approximate weight of each type:
  - a. If you have a grocery scale in your classroom, weigh the items.
  - b. If you have a bathroom scale you can weigh yourself holding the bag and then just yourself and subtract the two numbers to determine the weight of the trash.
  - c. If you don't have a scale, find objects in the classroom that are of a known weight. Compare the weights of your object and the class's trash (use a balance if you have one).

#	Trash type	Weight estimate
#1		
#2		
#3		
#4		

**Estimated weight of all of your class's trash:**

7. Calculate the volume of the trash and recyclables in each bag by measuring the width, length and depth of the items in it. How might volume differ if the glass, cans or boxes are crushed? Does weight change if volume changes?

8. How do your calculations compare with the predictions you made in question #1?
9. How much trash (minus recyclables) does your class throw out in a day, week, month and school year by weight, volume? How much recyclables does your class throw out in a day, week, month and school year by weight, volume?
10. How much space will one school year's-worth of your class's trash and recyclables fill if they are not compressed? Calculate the volume of your classroom. If you didn't remove any of your class's trash and recyclables from the classroom, how much of the room would be filled by the end of the year? How much room would be left for you?
11. Do you think your class makes a lot of trash? If not so much, explain reasons for your response.

### GOING BEYOND

1. Investigate where your school's trash and recyclables are taken.
2. Pledge to reduce 5 percent of the average daily weight of your class's trash by finding ways to reduce waste. (i.e., composting lunch food waste, using discarded paper for scrap paper, using reusable containers in lunches, etc.)

# \* Make a Mini-Landfill



**Learning Objectives:** To have students examine the materials that comprise the products they use, describe whether these materials are renewable or non-renewable resources, observe what happens to materials when placed in an old fashion dump and a newer sanitary landfill, and decide whether they should be disposed of in a different way.

**Subjects:** Science, Social Studies, Environmental Education, Family and Consumer Education, and Health.

**Wisconsin Model Academic Standards:** SC C.4.2, SC C.4.5, SC C.4.7, SC C.8.6, SC C.8.10, SS D. 8.11, EE A 4.1-4, EE A.8.4, EE B.4.3, EE C.8.2, FCE introductory A.2, FCE intermediate A.3, H A.4.2, H A 8.2.

**Grades:** 4-8

\* Section is adapted from A-Way With Waste curriculum guide, a program of the Washington State Department of Ecology.

## Materials:

- Eight large clear glass jars
- Four tight-fitting lids for jars
- Dry soil
- Miscellaneous solid waste
- Crayons/markers
- Masking tape

\* Procedure and diagram of activity is on the next page.

## Pre-and Post-Activity Questions:

1. Define and give examples of: organic materials, renewable resources and non-renewable resources.
2. What do you think will happen to items made of renewable or non-renewable resources when they are put in a modern landfill?
3. List four items you use everyday that you could recycle.

## GOING BEYOND

1. Keep a record of your family's purchases from two trips to the grocery store.
  - Record what your family does with the waste from its store purchases.
  - Is there anything your family could do with the waste from its store purchases besides landfilling?
2. Predict how many plastic shopping bags your family brings home in one month (include grocery and retail bags). Count how many plastic bags accumulated. Was the number more or less than you expected? What are a majority of these bags made of? What resources are used in the production of the bags? What retail locations in your area offer plastic bag recycling? Find a way to let others know about these recycling locations (i.e., posters, information on school mailers, school website).
3. Visit a local landfill. A list of Wisconsin's sanitary landfills is available at [http://dnr.wi.gov/org/aw/wm/faclists/WisLic\\_SWLandfills.pdf](http://dnr.wi.gov/org/aw/wm/faclists/WisLic_SWLandfills.pdf)



## Procedure:

1. Ask students to choose one item you threw away today. What is your item made of? Into which of the following four categories of solid waste does your item fit?

- a. organic (e.g., potato peels)
- b. renewable resource/recyclable (e.g., newspaper)
- c. non-renewable resource/recyclable (e.g., aluminum cans)
- d. non-renewable resource/hard to recycle (e.g., toothbrush)

2. What happens to the item you threw away?

Discuss: Where is away? What is a dump? What is a landfill? What is the difference between a dump and a landfill? List ways you can avoid disposing of your item in a landfill.

3. With crayons and masking tape, label two sets of glass jars with the four category headings above. Label one set of jars "Set 1," and the other "Set 2."

4. Fill each jar in "Set 1" and "Set 2" about half full with soil.

5. Sort each solid waste item into its proper category (a-d). Put a small sample of each into the "Set 1" and "Set 2" jars with the corresponding labels and cover with soil.

Do the following:

- "Set 1," leave the lids off and keep soil damp with water.
- "Set 2," put the lids on tight; do not add water.
- Place both sets of jars on a shelf away from people and out of direct sun.

6. Predict what you think will happen to the solid waste in each jar. Record your predictions.

7. Observe and record what changes, if any, occur during a 4–6 week period.

Discuss: What happened to the items made of organic and renewable resources in each set? What happened to the items made of non-renewable resources in each set? How did what happened compare with your predictions? What comparisons can you make between the two sets?

8. "Set 1" represents the old fashioned dump; "Set 2" represents the newer sanitary landfill. What comparisons can you make between your mini-dumps and mini-landfills and a real dump and a real landfill?



# Classroom Composting



**Learning Objectives:** To have students learn about recycling in nature and actually recycle organic matter by composting.

**Subjects:** Science, Environmental Education, Family and Consumer Education

**Wisconsin Model Academic Standards:** SC A.4.5, SC A.8.6, SC C.4.2, SC C.4.4, SC C.4.6, SS D.4.7, SS D.8.11, EE A.4.1-4, EE A.8.3, EE A.8.4; EE C.8.2, EE E.4.2, FCE introductory D.2, D.3.

**Grades:** 4-8

## Materials:

- fish aquarium
- organic waste materials (be sure to add a variety of materials, not all one kind, i.e., use sawdust, wood ash and leaves in addition to food scraps; avoid meat scraps, fats and oils, which inhibit decomposition and in outdoor compost piles can attract dogs, rats, raccoons and other animals)
- lawn fertilizer that contains nitrogen (but not herbicides or insecticides) or manure and green grass clippings that also contain large amounts of nitrogen. Be careful, don't use too much nitrogen—a carbon: nitrogen ratio of 25-30:1 is ideal. (Grass clippings already have a carbon: nitrogen ratio of 19:1, while leaves have a 60:1 ratio.)
- soil
- 1-2 dozen red earthworms (obtain from yard, garden, bait shop or school grounds)
- thermometer
- trowel or large kitchen spoon (for turning, or aerating the pile)

## THE PERFECT COMPOST RECIPE

**soil:** contains microorganisms that help decomposition.

**organic wastes:** such as leaves, food scraps, grass clippings. Wastes should be varied, including materials with both carbon and nitrogen. By alternating layers of high-carbon and high-nitrogen materials, you can create good environmental conditions for decomposition to occur.

**nitrogen:** many of the organisms responsible for decomposition need nitrogen, thus nitrogen is necessary for rapid and thorough decomposition. Nitrogen is found naturally in organic wastes (higher in "green" materials like grass clippings than in "brown" materials like dry leaves), and in many commercial fertilizers.

**worms:** they eat the waste, helping to break it down; make droppings, which enrich the soil; tunnel through and aerate the waste, facilitating decomposition; and eventually die and become part of the compost.

**water:** necessary for normal functioning of life. Too much water in a compost pile may make it soggy and slow decomposition by reducing needed oxygen.

**air:** the biological activity of fungi, bacteria, small insects and other organisms results in decomposition. Most biological processes require adequate amounts of oxygen.

**time:** decomposition takes time. To speed up decomposition, aerate (by turning it over) your pile every few days; otherwise, just leave it and wait.

**heat:** is produced by chemical reactions resulting from increased biological activity that occurs during decomposition. Heat helps sanitize compost by killing certain organisms (e.g., weed seeds, pathogens, harmful insect larvae).

**mass:** in order to generate enough heat for optimal decomposition, the pile must contain at least one cubic meter of organic material. Thus, the temperatures generated in an aquarium compost pile may be different from those generated in one that is larger.

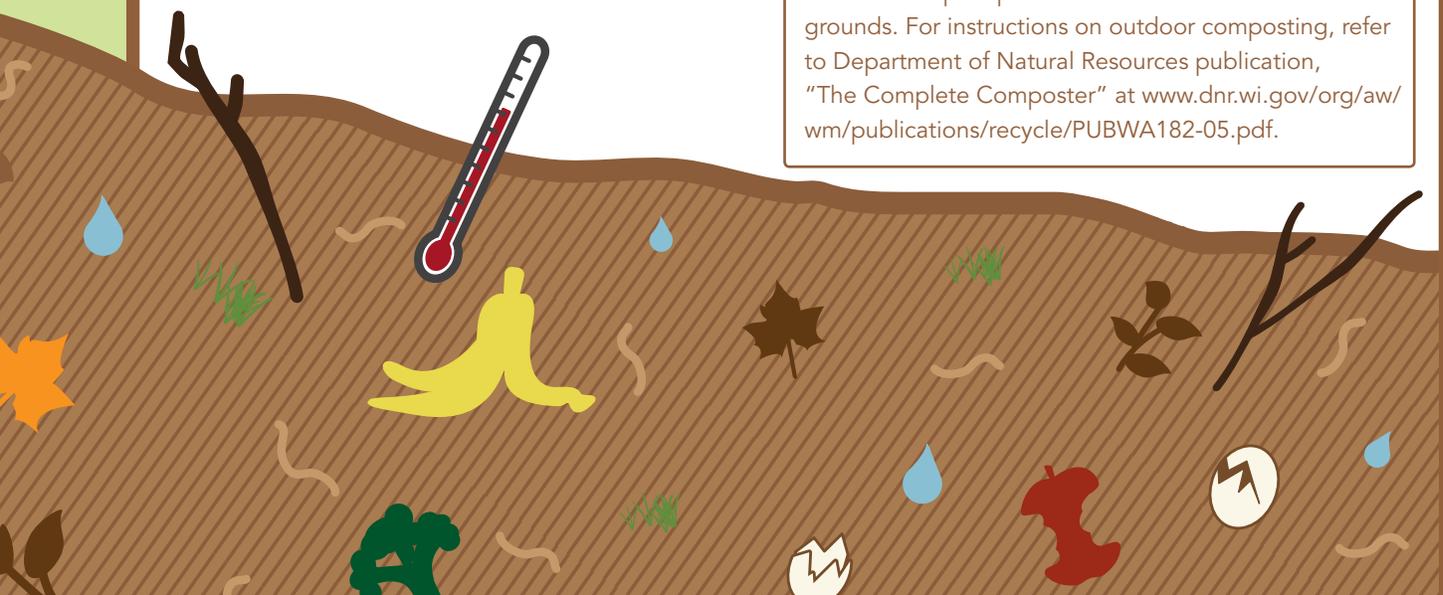


## Procedure:

1. Discuss: What “ingredients” do you think are needed to construct a compost pile? Why? List ingredients.
2. Design a plan for making a mini-compost pile in the classroom. Decide which ingredients the students will provide and which will be supplied by the teacher. Set a date for constructing your pile.
3. Suggestions for creating a mini-compost pile:
  - a. Chop the organic wastes into small pieces. You can leave some large pieces of the same materials to compare rates of decomposition between large and small items. Why might there be a difference?
  - b. Alternate layers of the materials as follows (amounts are approximate): inch of soil, two inches of organic waste, sprinkle of fertilizer, sprinkle of water, repeat.
  - c. Cover with an inch of soil. Water the pile enough to make it moist but not soggy. It should feel like a damp sponge (it feels moist, but you can't squeeze water out of it).
  - d. Add the earthworms and observe their behavior.
  - e. Place your compost pile where it will be at room temperature (not in direct sun).
4. Place the thermometer in the middle of the pile. Wait an hour or so, then record the temperature.
5. Record the temperature from the same location and depth, and at the same time each day. Why is it a good idea to be consistent with location, depth and time of recording? Does the temperature change? Why or why not? Make a graph to show your temperature results.
6. Gently mix the compost once a week to aerate it. A good time to turn the compost is after the temperature peaks and begins to drop. Why? Be sure to record the temperature before you turn the compost that day.
7. Be patient. Occasionally check the moisture and add water if needed.
8. Make a chart to help you keep a daily record of temperature and other observations during the next month or two.

\* Procedure instructions continued on next page.

**Note: Air circulation** is important to decomposition, thus the best compost bin is one with wire or screen sides. **Mass** is also important, since approximately one cubic yard of compost is needed to generate good decomposition temperatures (104°-170° F). Thus, an aquarium, with its small size and glass sides, is not the best compost container. Consider constructing an outdoor compost pile with wire sides on the school grounds. For instructions on outdoor composting, refer to Department of Natural Resources publication, “The Complete Composter” at [www.dnr.wi.gov/org/aw/wm/publications/recycle/PUBWA182-05.pdf](http://www.dnr.wi.gov/org/aw/wm/publications/recycle/PUBWA182-05.pdf).





9. Observe: Which materials break down the fastest? Slowest? Why? Are there any odors? Why do you think decomposition has an odor? Does the texture of the compost change? In what ways? Once the materials in your compost pile have decomposed into humus, conduct the same feel, smell and look test that you did in Part 1, #2.
10. Now decide what your class should do with this rich soil. When you clean out the aquarium, should you dump the humus in the trash; take it outside and dig it into the soil; or use it for growing plants in the classroom?
11. Discuss: How does composting reduce the amount of waste you would have thrown out? What do you think happens to organic wastes that end up in the landfill? Is the

landfill a gigantic natural compost pile, or are there problems with placing large amounts of organic material in landfills? (no air, limited moisture, etc.)

12. Now that you have constructed and maintained a mini-compost pile in the classroom, how would you go about constructing and maintaining one at home?

### Pre- and Post-Activity Questions:

1. What are the necessary "ingredients" for a good compost pile?
2. How is composting related to the concept of recycling?
3. How can composting reduce waste?

## GOING BEYOND

1. Create a compost pile as in Part 2, but also add manufactured items like a soda can, paper clip, bottle cap, aluminum foil, iron nail, pencil, crayon, paper, plastic bag, rubber band, etc. Predict rates of decomposition or lack of decomposition and observe actual changes, if any.
2. Take a field trip to a local woods or park. Examine a rotting log or leaf litter. Place a sample of rotting humus in a white enamel pan and sort through it carefully, looking closely for "decomposers." What decomposers (insects, mites, fungi, etc.) can you find? What do you think they are doing? Read about their life histories.
3. Make a worm composter. (for more information on worm composting, see DNR publication "The Complete Composter" at [www.dnr.wi.gov/org/aw/wm/publications/recycle/PUBWA182-05.pdf](http://www.dnr.wi.gov/org/aw/wm/publications/recycle/PUBWA182-05.pdf) and DNR website Environmental Education for Kids (EEK!) Composting [www.dnr.wi.gov/eeek/recycle/composte\\_waste.htm](http://www.dnr.wi.gov/eeek/recycle/composte_waste.htm) and Composting with Worms [dnr.wi.gov/eeek/earth/recycle/compost2.htm](http://dnr.wi.gov/eeek/earth/recycle/compost2.htm).)
4. Visit someone who maintains a compost pile. Why do they compost? What do they do with the compost? Have they had any problems? Would they recommend composting?
5. Investigate what happens to the leaves your community discards each autumn. What do you think should be done with them?
6. If your community has a municipal composting center, take a field trip to it. Be sure to prepare questions to ask the guide.
7. Have students design experimental compost piles. For example, make a pile that is low in nitrogen; lacks moisture; has little air circulation; or is made of a single ingredient (e.g., just grass clippings). Also create a good compost pile for comparison. Compare rates and temperatures of decomposition between piles.
8. Fill flower pots with different soil types, including one type that has your humus mixed in. Plant seeds or grow seedlings in the pots. Make 4-5 pots with each soil type so that you're comparing more than one plant grown in each type (i.e., so that you have a large enough sample size to make a valid judgment). Do the plants in different soil types grow at different rates, with different vigor, color, etc? What are possible explanations for any differences?



# Packaging: Is It a Waste?

Most recycling and waste reduction programs focus on packaging since it is a very large and visible portion of the waste stream. Consumers have the opportunity to significantly reduce the amount of packaging they buy and throw away if they make purchasing decisions with waste reduction in mind. Every day consumers make decisions about what to buy, and how to buy it, based on a number of factors—value, quality and convenience. An increasing number of consumers are also trying to evaluate the environmental consequences of purchasing certain products and the packages in which they are contained. They want to know which package is best for the environment. Unfortunately, there is no environmentally perfect package that fits all situations of use. Consumers need to understand the functions of packaging and have some guidelines for evaluating packaging before they can make sound decisions. With this background, they'll be able to select products with the least amount of packaging for their needs, and in most cases, save money too!

*There are four parts to this section. Each part will have it's own list of Learning Objectives, Subjects, WMASs and grades covered.*

**Part One: Rate That Package!**

**Part Two: Grocery Store Scavenger Hunt**

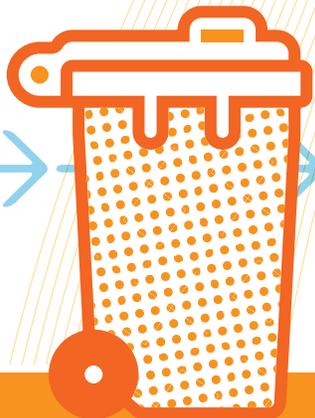
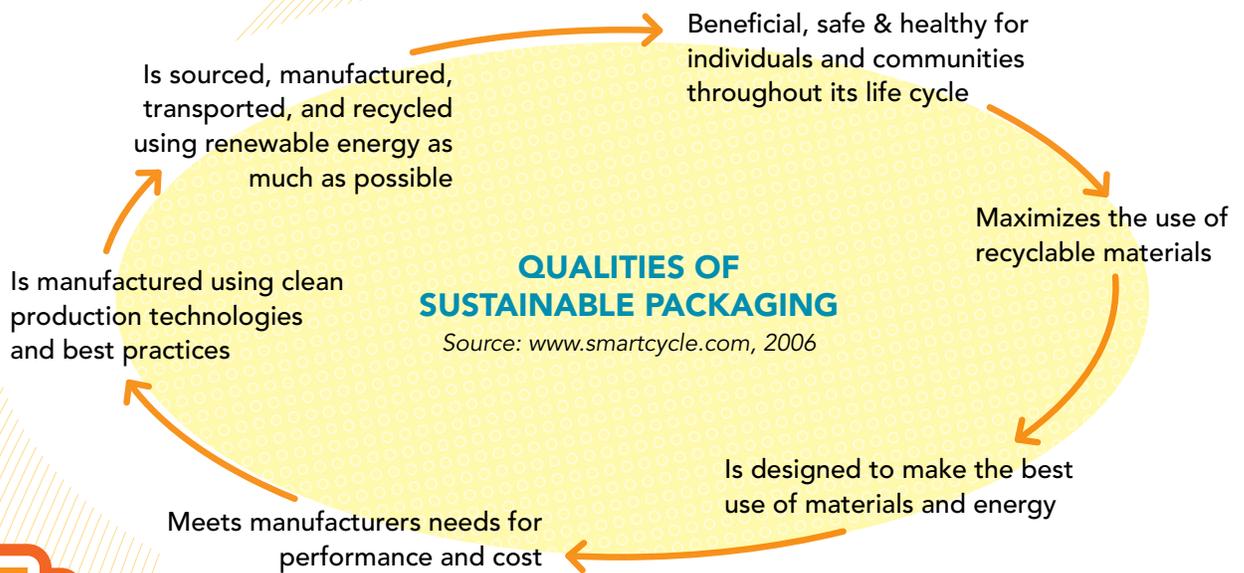
**Part Three: Pick Your Potato**

**Part Four: What's At My House?**

Oil saved by recycling 1 ton of plastic packaging: **16.3 barrels**

Landfill space saved by recycling 1 ton of plastic packaging: **30 Cubic Yards**

Number of plastic bottles Americans throw away every hour: **2.5 million**



## IN FACT

In 2003, the Environmental Protection Agency estimated that the United States produced 11.9 million tons of plastic packaging. Over 90 percent of this was sent to a landfill after just one use.

## Packaging: Is It a Waste?

# Rate that package!



**Learning Objectives:** This activity will help students think about the functions of packaging and will encourage them to give equal consideration to quality, value, convenience, and environmental impact when making purchasing decisions.

**Subjects:** Science, Social Studies, Environmental Education, Family and Consumer Education.

**Wisconsin Model Academic Standards:** SC C.4.5, SC C.8.4, SC C.8.2, SS D.4.7, SS D.8.11, EE A.4.1-4, EE A.8.4, FCE introductory A.2, D.2.

**Grades:** 4-8

**Materials:** "Rate That Package!" worksheet and a variety of packaged food and personal care products purchased from your local grocery store. Product variety should include items with packaging made from recycled materials (e.g., recycled paperboard in cereal boxes), packaging that is recyclable (plastics marked with #1 or #2), non-recyclable packaging (foam, plastics marked with #7), and convenience items that may have multiple layers of packaging (individually wrapped candy bars, travel items).

**Procedure:** Divide the students into groups of 4-6. Have each group of students sit at a table with a variety of the packaged products. Give each student a "Rate That Package" worksheet and have them fill it out as they examine several products from their table.

After they have finished with the worksheet, have them complete the following questions to discuss with the rest of their workgroup/class:

1. Which product at your table scored the highest?
2. Which products scored the lowest?
3. Pick a product that scored lower than others and make suggestions on how the packaging could be changed to score higher.

## GOING BEYOND

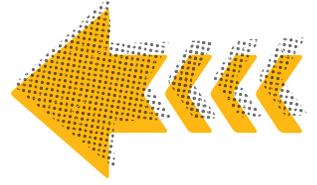
With waste reduction in mind, have students make a shopping list for one of the events below. Have students share their ideas on their list with the class.

- Birthday party of 10 guests
- Family reunion of 100 guests
- Dinner and sleepover at friends house
- Class party for about 30 students

Name \_\_\_\_\_

# PACKAGING: IS IT A WASTE? RATE THAT PACKAGE!

Student Handout



Closely examine the packaging samples provided by your teacher. For each packaging sample answer the yes or no questions below to rate it.

	#1		#2		#3		#4	
<b>Product:</b>								
<b>Brand Name:</b>								
<b>Types of Packaging:</b>								
	Yes	No	Yes	No	Yes	No	Yes	No

## Does the packaging...

provide useful information?								
protect product during transport & storage?								
protect product from spoilage?								
protect against tampering?								
provide convenience in opening and using?								
provide the right amount of product for me?								

## Is the packaging...

refillable or returnable?								
reusable?								
recyclable in your community?								
made from recycled material?								
using the minimum amount of materials to meet packaging needs?								
Assign one point for each 'yes' answer and add up for the total score. <b>Total Score:</b>								

# Grocery store scavenger hunt



**Learning Objectives:** Students will consider problems associated with energy and resources expended in food packaging and the complexity of promoting and storing food in our society.

**Subjects:** Science, Social Studies, Environmental Education, Family and Consumer Education.

**Wisconsin Model Academic Standards:** SC C.4.5, SC C.8.4, SC C.8.2, SS D.4.7, SS D.8.11, EE A.4.1-4, EE A.8.4, FCE introductory A.2, D.2.

**Grades:** 6-8

**Materials:** "Grocery Store Scavenger Hunt" worksheet, packaged grocery product (optional)

**Procedure:** Use the Pre-activity Questions/Discussion items in class before assigning the "Grocery Store Scavenger Hunt" worksheet. Have students go to the grocery store with the family member in their household that does the shopping. Fill out the worksheet and then complete post-activity questions/discussions in class.

### Pre-Activity Questions and Discussion:

1. Name as many types of materials you can think of that grocery store foods are packaged with (paperboard, foam, plastics, etc).
2. What are some reasons products are packaged? (product safety, product appeal)
3. Pick a product example. What do you think the product's manufacturer looks for when they choose the packaging type? What do you think consumers look for with packaging this product?

### Post-Activity Discussion:

4. What were some of the products that you found to be over-packaged or had more layers of packaging than necessary?
5. Which did you find more of during your scavenger hunt—recyclable or non-recyclable packaging?
6. Why do you think some manufacturers choose to have their products in multiple layers of packaging?
7. Which products seemed to be more expensive per pound—the ones with lots of packaging or little to none?



Name \_\_\_\_\_



# PACKAGING: IS IT A WASTE? GROCERY STORE SCAVENGER HUNT



Take Home Worksheet no. 1

Plan a visit to a grocery store to see if you can hunt down all of the packaged items described below. Remember: recycling symbols are normally found on the bottom of a packaged item. Recyclable items include aluminum, paperboard (cereal boxes), cardboard, glass (salad dressing bottles), plastic #1 (peanut butter, water bottles), plastic #2 (detergent bottles, other non-food containers) and steel (vegetable and fruit cans). *You may have to use an additional sheet of paper to complete your scavenger hunt worksheet.*

1. Find an item packaged in a clear #2 plastic and list the product name.
2. Find an item that is wrapped in plastic and cardboard, and list the product name.
3. Find an item that has three layers of packaging and list the product name and describe the packaging.
4. Find an item in the grocery store with no packaging at all and list the item's name.
5. Find a product that is made out of the item (entirely or partially) in question #4, but is packaged. Name the product and describe the packaging (example: apples, applesauce). Which product costs less per pound?
6. Find a grocery item with packaging made from 100 percent recycled material. List the product's name and describe the packaging.
7. Find a product that is packaged in a reusable container. List the product, describe what the container is made of, and list some ideas for reusing the container.
8. Look for a grocery item that is in a refillable container. List the product and describe the packaging.
9. Find an example of a product that is packaged two different ways—one way packaged in a non-recyclable container, and the other in a recyclable container. (example: applesauce in glass jar versus applesauce in six individual, non-recyclable plastic #5 cups)
10. Look for a grocery item that can be bought in bulk, instead of smaller serving sizes that have more packaging. List the product.
11. Take one of the products you found above that had non-recyclable or excessive packaging and redesign the packaging. List how you'd design the package and draw a sketch of how it would look.

## GOING BEYOND

Purchase the product you described in question #11 above and bring it to class for a presentation. Show the class the product, share what the packaging consists of and what resources were used to make that packaging. Present the alternative packaging you designed for the product.

## Packaging: Is It a Waste?

# Pick your potato



**Learning Objectives:** Students will examine the relationships between the cost of products and the amount of processing and packaging.

**Subjects:** Science, Social Studies, Environmental Education, and Family and Consumer Education

**Wisconsin Model Academic Standards:** SC C.4.5, SC C.8.4, SC C.8.2, SS D.4.7, SS D.8.11, EE A.4.1-4, EE A.8.4, FCE introductory A.2, D.2.

**Grades:** 6-8

**Materials:** "Pick Your Potato" worksheet

**Procedure:** Use the Pre-Activity Questions to guide a classroom discussion before filling out the "Pick Your Potato" worksheet. Discuss your conclusions, and answer the Post-Activity Questions afterwards.

### Pre- Activity Questions:

1. What functions do the various forms of packaging serve?
2. Which of your favorite foods could you buy with no packaging? Which ones would you have to do without?
3. Why should we be concerned with buying products that have less packaging and less processing?

### Post-Activity Questions:

4. What will you look for when you buy products in the future? What criteria will you use for making your decisions about what to buy and what not to buy?
5. How can the packaging of foods be reduced while still addressing health and safety concerns?

## GOING BEYOND

1. Working with a partner, select a fresh food item to investigate, such as a tomato or corn. If possible, go as a class to the grocery store (or go independently after school). Calculate and/or record the price per pound of the fresh product as well as 5-10 items that are processed from that product. Make a chart like the one on the "Pick Your Potato" worksheet, for the product you are investigating. Which form of food item is the most expensive per pound? Why? What relationships are there between cost and the amount of processing and packaging? Which form of the food item would you purchase if you were interested in: Reducing solid waste at home? Saving money? Convenience?
2. Contact a food processing company. Find out what percentages of their costs are due to the purchasing, processing, packaging, and shipping of the product. Ask them how they dispose of their production wastes.
3. Conduct a survey of several fast food restaurants and record the types of packaging (e.g., polystyrene, paper, aluminum foil) they use for similar items (e.g., soda, plain hamburger, fish sandwich, french fries, coffee). Is the packaging necessary? What criteria are you using to make your judgment? If you were concerned about the impacts of solid waste on the environment, which restaurants would you go to most? Could you influence the restaurant to change its packaging policies? How?
4. Make informative posters that recommend careful selection of food products. Include such ideas, for example, as: choose products in recyclable, returnable, or refillable containers; avoid excessive packaging, buy products in bulk or in larger sizes, buy unwrapped fruits and vegetables, avoid snack items in single-serving packages, carry products home in cloth bags, support companies that provide minimal and recyclable packaging. Look for local areas (with permission) to post these signs such as grocery stores, laundromats, and community bulletin boards.



# PACKAGING: IS IT A WASTE? PICK YOUR POTATO

Take Home Worksheet no. 2



Examine the chart on this worksheet and then answer these questions:

1. Which form of the potato is the most highly processed and packaged?
2. Which form is the most expensive per pound?
3. Which form of potato would you purchase if you were interested in:
  - a. Reducing solid waste at home?
  - b. Saving money?
  - c. Convenience?
4. Which form of potato produced the most waste (packaging and peelings) at home?
5. Which form of potato do you think might produce the most waste at the processing plant?
6. What do food processors do with their vegetable wastes? (spread in fields, compost, sell for animal feed, etc.) Are these really wastes? How can you reduce the amount of waste and not throw away potato peelings?

Product	Package Size	Price	Price per pound
Individual Fresh Potatoes	N/A	.79	.79/lb
Bag of Fresh Potatoes	5 lbs	2.29	.46/lb
Sliced Canned Potatoes	14.5 oz	.99	1.09/lb
Instant Mashed Potatoes	13.75 oz	2.19	2.54/lb
Microwavable Easy Fries	4.25 oz	1.00	3.76/lb
Boxed Scalloped Potatoes	7.5 oz	2.19	4.62/lb
Box of Potato Chips	12 oz	3.19	4.25/lb
Multi-pack Potato Chips	24 oz	8.49	5.66/lb
Fast Food Large Fries	6 oz	1.49	3.97/lb



*Price information from Pick and Save in Oconomowoc, WI, and McDonalds in Waukesha, WI, July 2006*

# What's at my house?



**Learning Objectives:** Students will investigate products in their own homes to learn more about packaging types and making choices as consumers that promote recycling and environmental sustainability.

**Subjects:** Science, Social Studies, Environmental Education, Family and Consumer Education.

**Wisconsin Model Academic Standards:**

SC C.4.5, SC C.8.4, SC C.8.2, SS D.4.7, SS D.8.11, EE A.4.1-4, EE A.8.4, FCE introductory A.2, D.2.

**Grades:** 4-8



**Materials:** "What's At My House?" worksheet

**Procedure:** Use the Pre-Activity Questions/Discussion items in class before assigning the "What's At My House?" worksheet. Have students go through the activity with the family member(s) in their household that does the grocery, personal care and home products shopping. Fill out the worksheet and then complete Post-Activity Questions/Discussions in class.

### Pre-Activity Questions:

1. What are some of your favorite grocery store products? Name some and put them on the board. Describe and list how those products are packaged (i.e., paperboard box, plastic wrapper, etc.) Some items will not have packaging, such as produce items.
2. What is recyclable in your community? (glass, plastic, cardboard, paper, paperboard, aluminum, steel)
3. Talk about what it means for a product to be **durable**. Why is it important to choose products that are durable?
4. What does it mean when a product is designed to be **disposable**? Name some products that are designed to be one-time use only and then disposed of. How does this type of product affect how much waste is sent to our landfills?
5. What types of packaging are **recyclable**?
6. What does it mean when a product is **reusable**?
7. Why do we choose the products we do? Talk about what influences our purchases such as price, advertising, convenience and durability.

### Post Activity Questions:

8. What packaging types did you find the most of in your home?
9. Note any trends within your observations on your worksheet.
10. As consumers, how can we reduce the amount of packaging needing to be recycled and disposed of? List some ideas how to do this.
11. How can you look for ways to reduce the amount of packaging waste in your family?

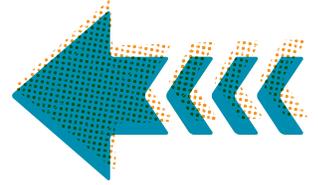
### GOING BEYOND

1. Pick one product from your worksheet that is not recyclable and find an alternative for your family. Alternatives might include picking another brand that has less packaging, more recyclable packaging, or stopping using that product.
2. Pick an item from your worksheet that is not very durable and find alternatives to that the product.

Name \_\_\_\_\_

# PACKAGING: IS IT A WASTE? WHAT'S AT MY HOUSE?

Take Home Worksheet no. 3



Use items in your home to fill out the chart below. Ask the help of the person(s) in your household that does the grocery shopping. (Reasons for purchasing an item might include: on sale, best value, convenience, preferred brand, best quality, etc.)

Pick a minimum of four products, from each of the following three categories, to fill out this chart.

1. Grocery/food products
2. Personal care items, like toothpaste and shampoo
3. Home products, such as cleaning, storage or household supplies

Product	Durable Y/N	Disposable Y/N	Recyclable Y/N	Reusable Y/N	Reason for Purchasing
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					



## PACKAGING, IS IT A WASTE? WHAT CAN I DO?

Student Handout

### Grocery shopping with the four R's in mind

Walking into a grocery store can be an overwhelming experience—there are so many choices: What brand? What size? What flavor? What packaging? By keeping the four R's in mind—Reduce, Reuse, Recycle and Re-buy (or Buy Recycled)—you can reduce waste, and save money, all by the simple process of shopping.

How do you apply the four R's when shopping?



1.

It's easiest to shop with the first R—**Reduce**—in mind. Look for ways to get more product and less packaging for your money. Take dry breakfast cereals for instance, most are available in large, family-sized boxes, which reduces packaging over time. The idea of buying in larger sizes holds true for many products, from detergents to tomato sauces and pastes. Second, don't buy packaged products that don't need it—fruits and vegetables are prime examples. Apples, carrots and other produce can be bought loose (or, if necessary, be put in a plastic bag brought from home). Third, reuse your paper, plastic, or cloth bags. And fourth, carry a shopping list to reduce the amount of impulse shopping you do, thereby reducing unnecessary waste.

2.

The second R—**Reuse**—is also important. Buy groceries like juice, lunch supplies and condiments with reusable containers in mind. Juices can be purchased in concentrate form to be mixed in your own reusable containers. You can reduce a tremendous amount of lunch waste by avoiding single serving containers.

3.

Don't forget to also buy with **Recycling**—the third R—in mind. If you can't reuse an item, or plan to dispose of it, make sure the item is recyclable. Typically, this means it is cardboard, glass, aluminum, tin, or specific kinds of plastic. For example, #1 and #2 plastics are readily recyclable. (If you are not sure whether the plastic container is a #1 or #2 plastic, and therefore can be recycled, ask store management. If they don't know, ask them to find out!). Recycling is important, but it is often more effective to prevent waste before it is generated in the first place. That's why the first R—Reduce—is the top priority.

4.

Finally, **Re-buy** (or Buy Recycled)—buy products made with recycled material. Purchasing these products helps turn waste reduction strategies into economic development opportunities. The packaging on many products lists whether recycled material is used. Buying these products helps “close the loop,” and because these products use fewer resources, you will be helping the environment. Buying with the four R's in mind helps reduce unnecessary waste, and can help build up the piggy bank.



## GENERAL

*Greener Machine*. March 2002. Wisconsin Natural Resources Magazine. Publ. CE-053. Education and Information, Wisconsin DNR, PO Box 7921, Madison, WI 53707.

*Waste Reduction and Recycling: A Guide for the Workplace*. 2001. Publ. CE-278. Education and Information, Wisconsin DNR, PO Box 7921, Madison, WI 53707. <http://dnr.wi.gov/org/aw/wm/publications/recycle/Workplace.pdf>

*Wisconsin Waste Reduction and Recycling Program*. 2006. Publ. WA-422. Waste Management, Wisconsin DNR, PO Box 7921, Madison, WI 53707. <http://dnr.wi.gov/org/aw/wm/publications/anewpub/WA422.pdf>

*Recycling Facts and Figures*. 2003. Publ. CE-163. Education and Information, Wisconsin DNR, PO Box 7921, Madison, WI 53707. <http://dnr.wi.gov/org/aw/wm/publications/recycle/publce163-2003.pdf>

## COMPOSTING

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*Yard Care: Do Your Share*. 2001. Publ.WA-073. Waste Management, Wisconsin DNR, PO Box 7921, Madison, WI 53707. <http://dnr.wi.gov/org/aw/wm/publications/recycle/PubYard-Care-01.pdf>

## CURRICULUM MATERIALS

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<http://www.dnr.wi.gov/EEK/>

*K-3 Supplement to the Recycling Study Guide*.  
2007. Publ EI-2004 2007. Education and Information,  
Wisconsin DNR, PO Box 7921, Madison, WI 53707.

Waste and Recycling Educational Materials  
(all ages), U.S. Environmental Protection Agency,  
Ariel Rios Building, 1200 Pennsylvania Avenue  
N.W., Washington, DC 20460. [http://www.epa.gov/  
epaoswer/education/index.htm](http://www.epa.gov/epaoswer/education/index.htm), and *Recycle City*,  
<http://www.epa.gov/recyclecity/>

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Wisconsin DNR, PO Box 7921, Madison, WI 53707.  
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*Away with Waste* (out-of-print) Washington State  
Department of Ecology. [http://www.ecy.wa.gov/  
programs/swfa/index.html](http://www.ecy.wa.gov/programs/swfa/index.html)

California Integrated Waste Management  
Board Curriculum, <http://www.ciwmb.ca.gov/>

## RECYCLING ORGANIZATIONS

Associated Recyclers of Wisconsin,  
<http://www.arow-online.org/>

Wisconsin BESMART,  
<http://www.besmart.org/>

Recycling Educator,  
Bureau of Education and Information  
Wisconsin Department of Natural Resources,  
PO Box 7921, Madison, WI 53707  
(608) 267-2463.

Recycling Team Leader–Wisconsin Department of  
Natural Resources, Bureau of Waste and Materials  
Recovery, PO Box 7921, Madison, WI 53707,  
(608) 267-7550

University of Wisconsin–Extension,  
Solid and Hazardous Waste Education Center  
(SHWEC), Lowell Hall, 610 Langdon St.,  
Rm. 529, Madison, WI 53703.  
<http://www3.uwm.edu/Dept/shwec/>

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### 2007 Project Coordinator

Shelley Warwick

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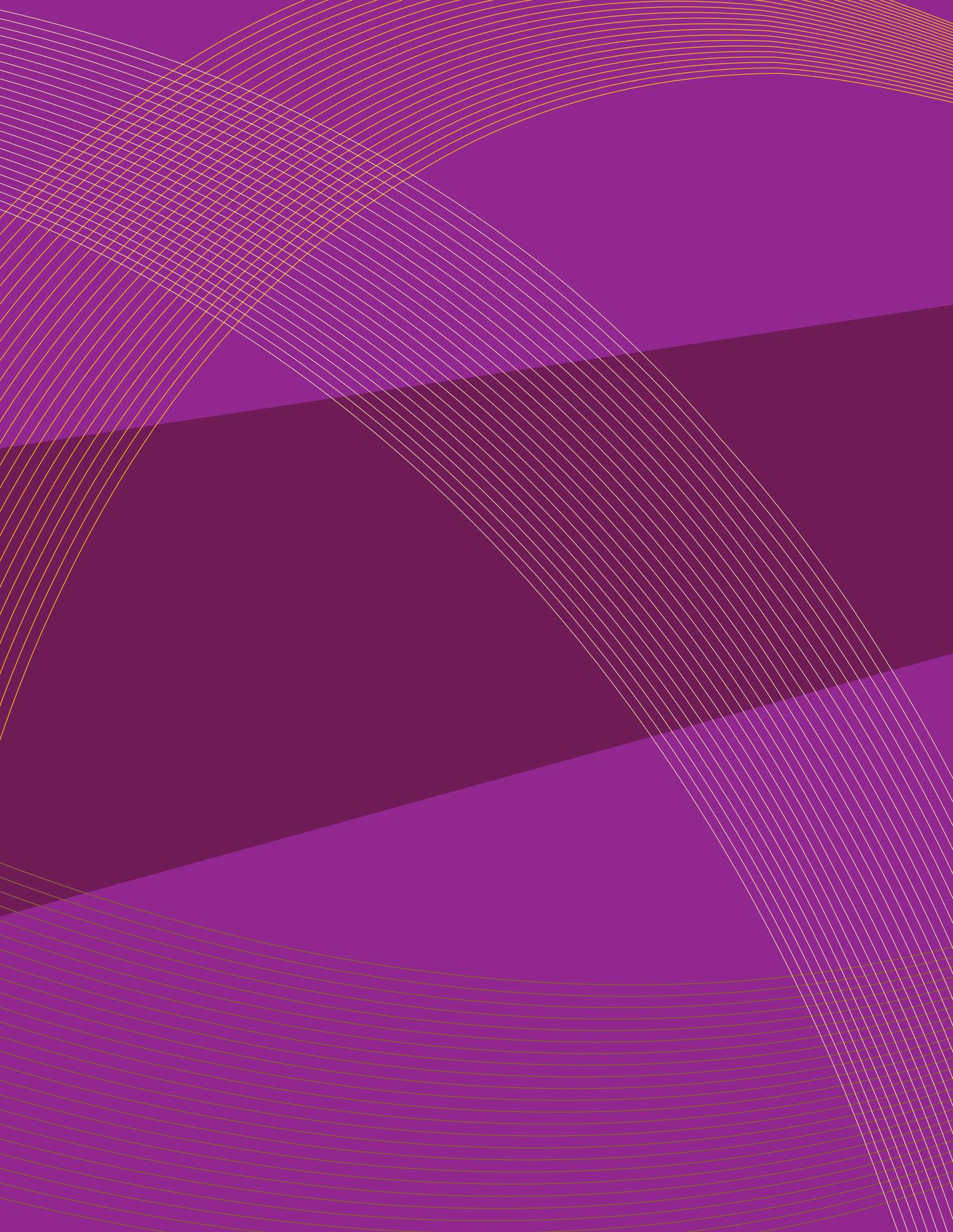
Cricket Design Works

Your comments and suggestions about this study  
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