

Sustainability Classroom Guide

Introduction to Environmental Sustainability

What is Sustainability?

Sustainability is a big word... and it's an even bigger idea!

Sustainability means using the resources we need for today without using up those resources for people in the future.

While Sustainability covers a lot of areas (like business and social ideas), most of the time people are talking about the environment and nature. This is called Environmental Sustainability.

Do you think there will be enough trees to give everyone the fresh air, paper, and building materials they need in 100 years? What about 1,000 years?

That depends on us. If we are responsible with nature, the Earth will be able to give future generations the things they need. If we are not responsible, we could impact our planet forever.



Environmental Sustainability Tree

Sustainability means living with our future in mind — so we don't use up today the things we need to live tomorrow. Because Environmental Sustainability is such a big idea, it takes people working together across many different areas to make sure we don't damage the Earth's resources: including air, water, trees, food, and energy.

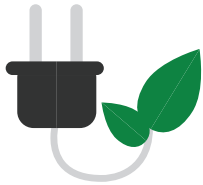
Think of Environmental Sustainability as a tree with Recycling, Energy Conservation, Managing Water, Food Production, and Air Quality as its branches.





Recycling

Recycling helps us manage waste, reduce how much we take from nature, and reuse what we already have. Recycling can help save energy, money, trees, wildlife, and more!



Energy Conservation

Energy Conservation is about using less energy, how we produce energy, and how that energy affects the environment when we use it. Converting the Earth's resources into energy can cause pollution, which is why we should use only what we need.



Managing Water

Managing Water helps save our limited freshwater supply to make sure we have enough for the future. Water is not only important for humans and animals to drink, it also helps grow the food that feeds us.



Food Production

Food Production involves how food is grown, harvested, and produced. While science has developed ways to produce a lot of food quickly, some of these methods can actually hurt fields, insects, and livestock for the future.



Air Quality

Air Quality affects our health, the weather, and even the temperature of the Earth. When we pollute the air, it can harm trees, produce, animals, and our own health.



In this lesson, we're going to focus on the **Recycling** branch of the Environmental Sustainability tree.



Recycling



Outline

Recycling Basics
Paper

Plastic
Glass and More

Light Bulbs

Let's Learn About Recycling Basics

What is recycling?

Recycling means turning used materials into reusable materials, instead of wasting them. In many cases, the things we throw away can be used to make new items we can use again.

Did You Know?

Americans throw away more than 500 billion pounds of trash each year. That's more than 3 pounds per person, per day!



Important Words

Recycling:

Turning waste into reusable material.

Landfill:

A place where trash is buried and covered with soil.

Decompose:

To break down into simpler parts.



Why is recycling important?

More than half of our trash ends up in a **landfill**, and some items can take many years to **decompose**.

Because we throw away so much trash every year, we are running out of space to put it. This can lead to pollution and can harm the plants and animals that depend on the Earth to survive.

Recycling allows us to give new life to many of the things we already have, instead of using more raw materials from nature. Not only does this help us save the Earth's resources, it can also help us save energy and money too.

What are some things that can be recycled?

- Paper
- Plastic
- Glass
- Batteries
- Aluminum Cans
- Some Household Hazardous Waste
- Food Waste
- Light Bulbs
- Electronic Waste (e-Waste)
- Tires
- Used Motor Oil

What happens to recyclables?

First, recyclables are collected from homes and businesses and taken to the recycling center. The recycling center separates everything by type: paper, plastic, glass, and more.

Next, each item goes through a different process to get it ready to be used to make new products. For example, cardboard is mashed in hot water and then pressed into new paper sheets. Plastic is shredded into small pieces, washed, and then crushed into tiny pellets.

Did You Know?

The recycling symbol uses a picture to show how recycling works. Each arrow represents a different step in the process: REDUCE means using products that create less waste, REUSE means to use something again, and RECYCLE means to return items so the material can become something new. Recycling helps save the Earth's resources.



Discussion Time!



Many of the things you can find at home can be made from recycled materials. Some examples are pictured below. Can you name others? Don't forget to look for the recycled symbol!



Water Bottles



Magazines



Egg Cartons



Glass Containers



Laundry Detergent Bottles



Pizza Boxes



Paper Towels



Newspapers



Soda Cans



Trash Bags

You may be able to recycle too!



Step 1: Find Out How to Recycle Where You Live

Different towns have different ways that they gather materials for recycling. Some places want you to put material in a special recycling bin out in front of your home to be collected by a recycling truck. Other places want you to bring items to a recycling collection center. Some places will even give you some money back when you return used bottles and cans to the store!



Step 2: Collect Materials

At home, collect used paper, clean cardboard, plastic bottles, aluminum cans, glass containers, and other items that can be recycled. Make sure to keep them separate from the rest of your trash.

Did You Know?

Almost half of all recycled material in the United States is paper and paperboard. Let's work together to recycle more plastic, metal, glass, and specialty items too!



Discussion Time!

Share how people in your neighborhood collect recyclables.



Once you know the basics, recycling is easy!

Let's Learn About Paper

How is paper made?

**1**

Paper is made from the wood in trees. First, the trees are cut down and their bark is removed.

**2**

Next, the wood passes through spinning blades that cut it into small wood chips. The chips are then cooked in a mixture of water and chemicals to make a **pulp**.

**3**

The pulp is cleaned and either bleached white or dyed a specific color. The pulp is then pumped through a screen to drain away the water.

**5**

Finally, the paper is wound into large rolls, which can later be cut into different sizes and shapes needed for various uses. The entire process uses a lot of energy, wood, and water!

**4**

The result is squeezed between large rollers to create a smooth, thick piece of paper and heated to dry.

Important Words

Pulp:

A soft, wet substance made by crushing something or by using chemicals.

Did You Know?

Some companies have developed a way to make paper from sugarcane waste fiber. Because sugarcane grows much faster than trees, it can give us the paper we need without destroying our forests.



How much paper do we use?

More than 136 billion pounds of paper and paperboard are made each year in the United States. 86 billion pounds are recycled.

What happens to paper after you recycle it?



1

The recycling process for paper is similar to the way that paper is made, except fewer trees need to be cut down! First, recycled paper is sorted into different types.



2

Next, it is shredded into tiny pieces and turned into a pulp. This pulp is pressed through a screen and spun in a cone-shaped machine to help clear away ink, dirt, and other **contaminants**.



3

The paper is heated, dried, and rolled. It is now ready to be made into new paper products.



Many of the items you use at home can be made from recycled paper. Don't forget to look for the recycled symbol!



Cardboard



Magazines



Egg Cartons



Cat Litter



Toilet Paper



Pizza Boxes



Paper Towels



Newspapers



Tissue



Napkins

Important Words

Contaminant:

Something that makes a substance (like paper, water, air, or food) dirty or unusable.

Did You Know?

Trees can take 20, 30, or even 100 years to reach their full size. That means it takes a lot longer for a tree to grow than it does for us to cut it down and turn it into paper.



Let's Learn About Plastic

How is plastic made?

**1**

Plastic comes from natural resources such as coal, natural gas, salt, and oil. The raw materials need a lot of processing to become plastic. First, they are heated to extremely high temperatures to break them down.

**2**

Next, the heated materials are mixed with other ingredients to create a plastic **resin**.

**3**

Finally, the plastic resin is heated again and shaped into the plastic items we use every day.

Important Words

Resin:

A sticky substance, similar to tree sap, that cannot dissolve in water.

Did You Know?

Recycling 10 plastic bottles saves enough energy to power a laptop for an entire day!



How much plastic do we use?

More than 64 billion pounds of plastic are made each year in the United States, but only about 6 billion pounds are recycled.

There are two main types of plastics

Thermoplastics

Soften when heated, harden when cooled



Thermosets

Never soften after they have been molded into their final shape



Because thermoplastics are the most commonly recycled, we will focus on them for this section.

What happens to thermoplastics after you recycle them?



1

Because there are so many different raw materials used to make plastic, recycling plastic is a big job! First, recycling centers sort through all the different types of plastic and identify what and how they can be reused.



2

Next, the plastic is crushed into small pieces and cleaned.



3

Cleaned plastic is melted and then processed into flakes. It is now ready to be made into new plastic products.

Discussion Time!



What do thermoset plastic items like pot handles and electric plugs have in common?

Answer: They are both used for high heat, because thermosets don't melt easily.

Did You Know?

Using reusable water bottles can help reduce the need for thermoplastic water bottles. These reusable containers can be filled, washed, and refilled.



What happens if plastic is carelessly thrown out?

Plastic takes hundreds of years to decompose as trash in a landfill, but it can also harm land and ocean life if it's littered. Small animals can get stuck in hard plastic trash. Other animals, such as birds, may try to eat a plastic food wrapper or a plastic drinking straw.



Plastic bags that get thrown into the ocean can get wrapped around coral, suffocating it. What seems harmless to us can actually be very dangerous to nature.

Did You Know?

Plastic items can take tens, hundreds, even thousands of years to decompose. That means that a plastic grocery bag littered on the ground or into the ocean can keep harming nature for a very long time.



Recycling plastic helps make sure that the Earth is better for everyone, even plants and animals.

Let's Learn About Glass and More

Glass and other items each have their own special recycling process. Recycling these items can go a long way towards helping sustain the Earth and its resources.

Glass

Place glass in a recycle bin (ask an adult to help if the glass is broken). Recycled glass is sorted, cleaned, crushed, melted, and formed into new shapes to be used again.



Batteries

Take batteries to a designated battery collection center (ask an adult to help if the batteries are leaking or have white powder on them — it could be acid and should not be touched). Because there are many kinds of batteries, the recycling process is different for each type. Alkaline batteries (the kind most commonly used at home) are separated into three parts. Each of these parts can be reused in new products. Large batteries, like car batteries, use special processes to separate the acid from the plastic and lead.



How much glass do we use?

More than 22 billion pounds of glass are made each year in the United States, but only about 6 billion pounds are recycled.



Did You Know?

Up to 3 billion batteries are thrown away each year in the United States. That's a lot of wasted resources!



Discussion Time!



Name some of the things in your home that use batteries.

Aluminum Cans

Place aluminum cans in a recycle bin. Collected aluminum cans are sorted, cleaned, and melted to become hot liquid aluminum. The aluminum is formed into large blocks. These blocks are sent to mills to become new products, like soda cans or television parts.



Food Waste

Take **organic** food waste to a compost center, or ask an adult to help you create your own **compost** pile at home. As food items decompose, they break down into a dark and soil-like substance. This **fertilizer** can be mixed with regular soil and will act like vitamins to help grow healthy plants.



Electronic Waste (e-Waste)

Take broken electronics (like cell phones, tablets, and video game systems) to an e-waste recycling center or electronics store that accepts recycling items. Because electronics have so many parts and pieces, collected e-waste items are taken apart so that each material can be recycled separately.



Did You Know?



Food scraps and yard trimmings take up a lot of landfill space. They also release methane, a gas that can harm the environment. Instead of throwing these items away, start a compost pile instead!



For every million cell phones we recycle, we can reuse 35 thousand pounds of copper, 772 pounds of silver, and 75 pounds of gold!



Important Words

Organic:

Related to living matter, like plants or animals.

Compost:

A rich soil-like substance made from food and plant waste.

Fertilizer:

A substance added to land or soil to help plants grow.

Household Hazardous Waste

Don't pour leftover chemicals like paint, cleaners, medicines, or hairspray down the drain. These chemicals can end up in the ground, in rivers, or in oceans and are harmful to nature. Take these items to a designated collection center. If left around, these chemicals might be bad for the people and pets in your house. Collection centers will recycle what can be reused and safely dispose of what can't be recycled.



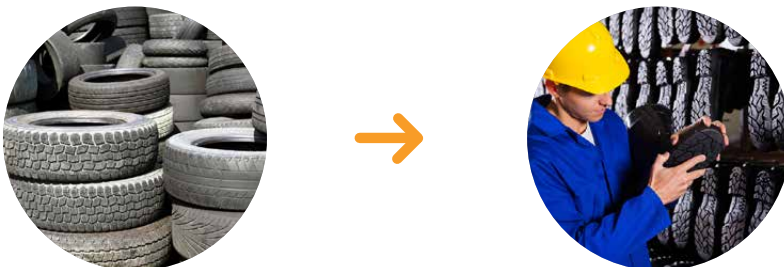
Did You Know?

Recycled tires are often used as building material for playgrounds. Take a look the next time you play at school or at your local park. How much recycled rubber can you find on your playground?



Tires

Take used tires to a collection center or tire store that accepts recycling items. Tires are cleaned to remove dirt, metal, and other things they may have picked up from the road. The rubber is ground into pieces, heated, and then formed into new items.



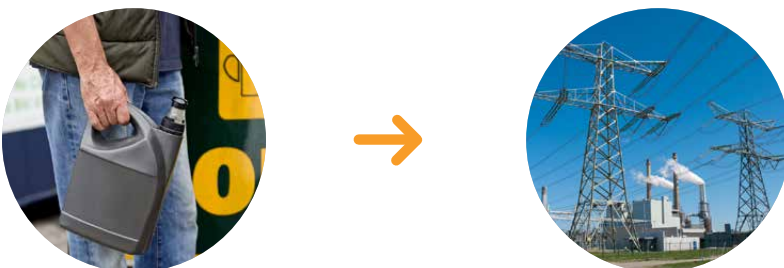
Important Words

Refine:

A process that cleans out what doesn't belong and returns a substance to a pure state.

Used Motor Oil

Take used oil to an auto shop or gas station that accepts recycling. Some towns allow you to put used oil into a special container and leave it on the curb to be collected. Recycled motor oil can be used as heat for furnaces or be used in power plants to make electricity. It can also be **refined** and used to create more engine oil. Recycling motor oil, instead of dumping it, helps sustain our environment by keeping rivers and oceans clean.



Let's Learn About Light Bulbs

There are three main types of light bulbs



Incandescent — creates light when a wire inside the bulb is heated



Fluorescent — creates light when electricity reacts with gas inside the bulb



LED (Light Emitting Diodes) — a solid, low power bulb that creates light when electricity passes through it

Most households in the United States today use either CFLs (Compact Fluorescent Light Bulbs) or LED bulbs.

Why are LED light bulbs a good idea?

Today's LED light bulbs can give off the same brightness as other light bulbs while using a lot less energy. When recycled properly, LEDs are taken apart so the materials can be used again. This helps reduce the amount of **greenhouse gas** released into the environment.

LED bulbs last a lot longer than other types of bulbs, so they can help your family save money too.



LED light bulbs can power the lights you need and help the environment at the same time!

Did You Know?



There's a special program that helps people find the right light bulbs for their families. LED and CFL bulbs with the ENERGY STAR label have been tested to make sure that they work properly and will help save energy.



Important Words

Greenhouse Gas:

A gas that traps heat in the Earth's atmosphere, harming the natural balance of the planet's environment.

Why is it dangerous to throw light bulbs in the trash?

In most states, throwing fluorescent light bulbs in the trash is against the law! This is because many light bulbs have chemicals inside them that can be dangerous if released into the air and breathed by humans, pets, or other animals.



Did You Know?

If every home in the United States replaced just one light bulb with an LED bulb that has earned the ENERGY STAR, we could keep almost 7 billion pounds of greenhouse gas from being released into the air. That's the same amount of greenhouse gas produced by over 640 thousand cars!



What happens to LED light bulbs after you recycle them?



1

Almost every part of an LED light bulb can be recycled. Take used bulbs to a collection center that accepts LEDs for recycling. First, recycled LED bulbs are crushed.



2

Next, a screen helps separate the glass from the other parts, such as aluminum and other metals.



3

Similar to how e-waste is recycled, each part of an LED bulb goes through a separate process to prepare it for reuse.



Are you ready to be a Sustainability Super Hero?

Recycling Classroom Activities



Create a Recycling Poster

Use something old to make something new! Gather some recycled poster board, pens and pencils, and other art supplies. Make a poster that explains why recycling is important.

Make Your Own Recycling Box

Bring a cardboard box from home. Decorate it with the recycling symbol and other recycling reminders. Take the box home to help you remember to recycle every day!



Create a Comic Book Superhero

Imagine a recycling superhero. What would he or she look like? Any special powers? Gather some recycled paper and art supplies and design a comic book starring your superhero.

You Be the Teacher

How would you teach recycling to someone younger than you?
As a group, design a lesson to help teach recycling to little kids. Then, use your lesson to help younger students learn why recycling is so important.



Visit the Recycling Center

Start your own class recycling drive! Gather glass or plastic bottles for a week. At the end of the week, take a class trip to the local recycling center. See what they do to recycle the items that you collected and see how they prevent them from going to a landfill.

Recycling Saves

Recycling helps us manage waste, reduce how much we take from nature, and reuse what we already have. In many cases, the things we throw away can be changed from our trash into something we will use again. Not only does this help us save the Earth's resources, it can also help us save energy and money too!



Money

Waste disposal costs our country, our states, and our communities a lot of money. Recycling saves money by making the most of what we've already produced.



Space

Our planet is running out of landfill space, and some items can take as long as 1,000 years to decompose. Recycling helps keep materials that can be reused out of landfills.



Trees

It takes much longer for trees to grow than it does for us to cut them down. Recycling helps us make the paper we need without over-using our forests.



Wildlife

Items that seem harmless to us can actually be very dangerous to nature. Recycling helps keep things like plastic bags and drinking straws away from animals.



Energy

When we reuse recycled materials instead of harvesting new resources, we can save up to 95% of the energy required to make new items. We can also save energy by making small changes at home — such as switching to LED light bulbs.



BONUS IDEA

There are lots of ways to conserve the Earth's resources — even the electricity we use to power our lights at night. Choosing an ENERGY STAR certified bulb can save you money and helps make a difference for our planet.

Home energy conservation tips

- ✓ Turn lights off when not needed
- ✓ Replace a light bulb with an LED
- ✓ Use ENERGY STAR light strings for the holidays

Learn more and take the pledge at www.ricoh-usa.com/energystarpledge



Resources

<https://www.epa.gov/recycle/recycling-basics>

<https://www.epa.gov/recycle/reducing-and-reusing-basics>

<https://www.epa.gov/recycle/how-do-i-recycle-common-recyclables>

<https://www.epa.gov/recycle/reducing-wasted-food-home>

<https://www.epa.gov/hw/household-hazardous-waste-hhw>

<https://www.epa.gov/recycle/electronics-donation-and-recycling>

<https://www.epa.gov/recycle/composting-home#benefits>

<https://www.epa.gov/smm/advancing-sustainable-materials-management-facts-and-figures>

https://www.epa.gov/sites/production/files/2015-09/documents/2013_advncng_smm_fs.pdf

<https://www3.epa.gov/epawaste/conserve/tools/warm/pdfs/Plastics.pdf>

<https://www.epa.gov/cfl/recycling-and-disposal-cfls>

<https://www.epa.gov/sustainability/learn-about-sustainability#what>

https://www.energystar.gov/ia/partners/promotions/change_light/downloads/Fact_Sheet_Mercury.pdf

https://www.energystar.gov/products/lighting_fans/light_fixtures/why_choose_energy_star_qualified_led_lighting

https://www.energystar.gov/products/lighting_fans/light_bulbs

https://www.energystar.gov/products/lighting_fans/light_bulbs/learn_about_cfls

https://www.energystar.gov/products/lighting_fans/light_bulbs/learn_about_led_bulbs

<https://www.batterysolutions.com/recycling-information/how-are-batteries-recycled/>

<http://www.greenit.net/downloads/GreenIT-EnvIssues-Batteries.pdf>

http://bgm.stanford.edu/pssi_faq_benefits

<https://www.wm.com/location/california/ventura-county/west-hills/recycle/facts.jsp>

<https://www.thebalance.com/how-long-does-it-take-garbage-to-decompose-2878033>