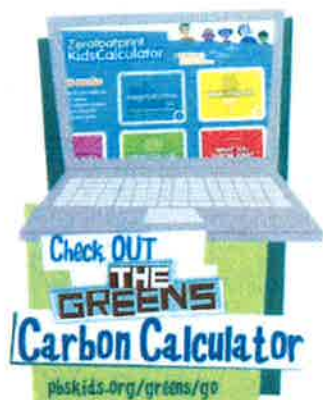


INTRO

Global Warming



A Blanket Around Planet Earth

A layer of gases called the *atmosphere* surrounds Earth. When sunlight reaches our planet, it warms the land and the oceans. Excess heat rises back into the atmosphere. Some of the gases in the atmosphere, known as *greenhouse gases*, trap heat and act like a giant blanket keeping our planet warm. This is similar to the way an actual greenhouse works, and that's why it's called the *greenhouse effect*. Sunlight passes in through the glass of a greenhouse and warms plants, but the heat is then trapped inside and cannot escape back out.

Too Much of a Good Thing

Some greenhouse gas is good. Without a blanket of these gases, you'd be freezing right now—Earth would be about 60°F colder! But too much greenhouse gas means a thicker blanket covering the planet, trapping more heat. The result is what scientists call *global warming*.

The Main Greenhouse Gas

Carbon dioxide is the primary greenhouse gas. It pours out of factory chimneys and the exhaust pipes of cars. The more energy we use in power plants, vehicles, and factories, the more carbon dioxide we create.

Trees to the Rescue

Trees do something heroic for our environment: they store carbon dioxide! But more forests are being cut down to make products and to clear land for roads, houses, factories, and farmland. Fewer trees mean that less carbon dioxide is absorbed and more stays in the atmosphere. This increases the greenhouse effect.



Climate Change

Scientists say that Earth's temperature has increased by about 1°F in the past 100 years. That may not sound like much, but it's already having an effect on the planet. Ice sheets in the polar regions and on the highest mountains are shrinking, oceans are warming up, and sea levels are rising. Scientists don't know for sure how higher temperatures will change Earth, but they predict our ecosystems and wildlife will be affected.

We Can All Make a Difference . . .

All around the world, people are coming up with better and better solutions for preventing global warming—like using wind and solar energy instead of carbon-emitting fuels.

. . . And YOU Already Have!

Did you know that every time you recycle paper and reduce junk mail, you save trees and reduce greenhouse gas emissions? Recycling also requires less energy than manufacturing things from scratch does, so you're reducing carbon that way, too. And when you reuse stuff—like canvas shopping bags—you're not wasting ANY energy! There's a lot we can do every day to take care of our planet.



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ACTIVITY

Global Melt-down

INVESTIGATE!

Explore global warming through this soda-bottle demonstration of the greenhouse effect.

You'll create two miniature worlds inside soda bottles, each with an ice-cube glacier and a plastic-cup island. One bottle will be covered with plastic wrap; the other will remain uncovered. Then you'll add heat and see what happens.

Set up Your Islands and Glaciers

MATERIALS

- Clean sand or rocks
- Water, about 2 cups
- 2 empty one-liter soda bottles, clear plastic, with the tops cut off
- 4 clear, 10-oz plastic cups: flexible, not rigid
- Ice cubes
- Scissors
- Scotch tape
- Plastic wrap
- Rubber band
- Strong spotlight

1. Fill each soda bottle with about 1 inch of clean sand or rocks.

2. Use scissors to cut four wide vertical slits in the bottom half of two of the cups. Melted ice water needs to run out of these cups, so make sure the slits are wide and reach the bottom of the cups.

3. Tape the cups. Take one cup with slits and one uncut cup. Stack them bottom-to-bottom. Tape together, being careful not to cover the slits. Do the same for the other two cups.

4. Set up the cups in the soda bottles. With the slit cup on top, push the cup structures down into the sand/rocks in each of the two plastic containers. These are your islands.

5. Add water to both bottles until the water level is about 1 inch above the sand/rocks. Adjust the amount of water slightly until both bottles have the same water level.

6. Put ice cubes in the top cup in both bottles. Use the same number of ice cubes for each. These are your glaciers.

7. Cover the opening of one soda bottle with a piece of plastic wrap. Seal it tightly with a rubber band or scotch tape.

Add Heat

Shine the spotlight on the two bottles. Check back every 15 minutes. When the ice has fully melted in one of the containers, stop the demonstration.

What Happened?

Set the containers next to each other and compare the water levels. In which bottle did the ice melt faster? Why? What do your bottles tell you about how the greenhouse effect works?

What if your miniature bottle worlds were real? Which one would you rather live in? Why? If global warming speeds up melting at the poles or on the highest mountains, what could happen to glaciers and polar ice caps? What could happen to the sea level?



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INTRO

Shrinking Our Carbon Footprint



What's a Carbon Footprint?

Sometimes it's easy to forget that global problems are caused by many little things—like the millions of people on our planet who contribute every day to carbon dioxide emissions by turning on lights, riding in cars, or using hot water. All these add up to what environmentalists call your *carbon footprint*: how much carbon dioxide you add to the planet.

The Biggest Carbon Culprits

Two sources contribute GIANT carbon footprints:

#1 Power plants: They make electricity from fossil fuels and are responsible for more than a third of all the carbon emissions in the United States.

#2 Transportation: The second largest source of carbon dioxide is from cars, buses, and trucks.

Reducing Carbon

Kids can do a lot to help tackle Carbon Culprit #2—cars and buses. Think of how great it would be if we could stop parents, teachers, and bus drivers from emitting so much carbon dioxide from their vehicles!

Kill the Engine! Stop Idling Around!

Have you ever noticed cars or buses waiting around with their engines running? It's called *idling*, and even though vehicles aren't going anywhere, they're still spewing out carbon. Idling for just five minutes every day adds up to 300 pounds of carbon dioxide in one year.

Myths About Idling

- Some people think it takes more gas to turn off and restart a car engine than it does to just let it idle. False! If you're idling for more than 10 seconds, you're wasting more gas.
- Unless it's below freezing, cars don't need to be idled to warm up in winter.

Source: Car Talk, www.cartalk.com

KIDS DECLARE NO-IDLING ZONES

At schools all over the country, kids are leading the way to stop parents and bus drivers from idling. At Morningside Elementary School in Salt Lake City, Utah, for example, kids timed cars to see how long they idled, and handed out stickers saying, "Stop, Turn Off, and Save." They even wrote a no-idling song. After two weeks of their campaign, they measured the carbon emissions in the school parking lot. The results? The carbon dioxide level was CUT IN HALF!

In this activity, you're going to cut down on carbon with a No-Idling Pledge!

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ACTIVITY

No-Idling Pledge


**Take
ACTION!**

Now that you know about the causes of global warming, let's do something about it! Reduce your family's carbon footprint by getting them to stop idling their cars.

MATERIALS

- Paper and pencil
- Art supplies (optional)

1. Start with your family. Talk to them about how exhaust from cars adds carbon dioxide to the air and contributes to global warming. Tell them that a great way to cut down on carbon emissions and air pollution is to turn off the car when it doesn't need to be running.

2. Ask them to sign a No-Idling Pledge. Use the example below to make a document for your family to sign. Or come up with your own wording. Once they've signed it, you can cut out one of the reminder tags on the next page and have them put it in the car.

3. Take it further. Once your family takes the pledge, remind them to stop idling in other places, too, like the drive-up window at the bank or even in the driveway. Can you think of more places where they could stop idling?

4. What about turning your school or neighborhood into a No-Idling Zone? Brainstorm ways to do this. Maybe you could write a letter to your principal asking him or her to work with bus drivers and get them to sign the pledge, too. Design some No-Idling Zone signs and posters. Can you think of some good no-idling slogans? Ask your principal for permission to put them up at school. What about ways to get people in your neighborhood involved in your no-idling campaign?

Here is a No-Idling Pledge you can use.



**NO
IDLING
PLEDGE**

I pledge to protect the environment by not idling more than 10 seconds.

If I am dropping off or picking up students at

_____ School,

I will turn off my engine while waiting.

I will also spread the word to others about how wasteful idling is, and ask them to take the pledge.

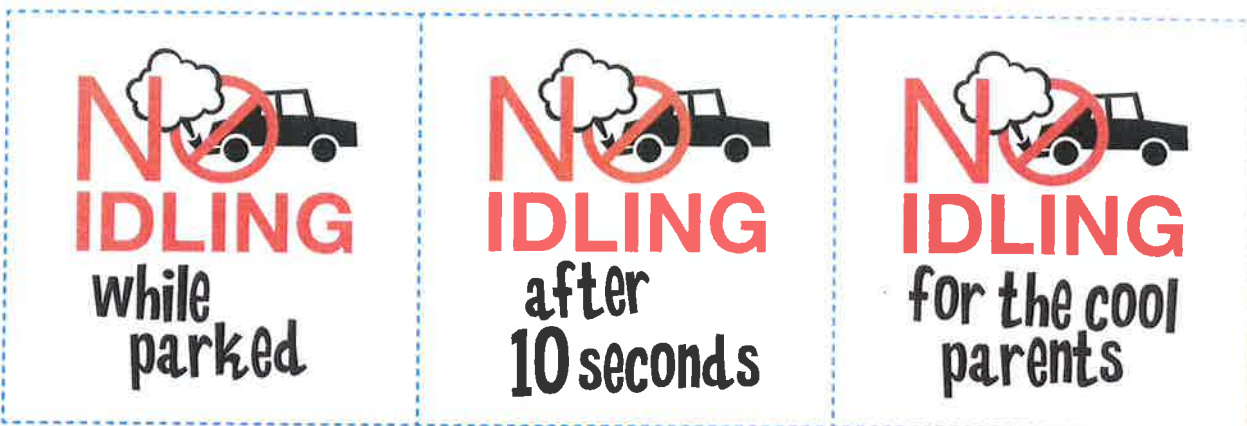
Signature _____

Date _____

**THE
GREENS**

pbskids.org/greens

Here are some reminder tags you can cut out and use inside the car.
For more on no-idling, see page 19.



Credits

This guide was produced by the Educational Outreach Department of WGBH.

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Special thanks for testing these activities to: Lisa Barry and students from Eldredge Elementary School, East Greenwich, Rhode Island; and Carol Copeland and students from the Atrium Afterschool Program in Watertown, Massachusetts.

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