

Background Information

What is a carbon footprint?

As humans eat, commute, and shelter themselves, they burn fossil fuels and produce carbon dioxide (CO₂). Carbon dioxide is a powerful greenhouse gas that causes climate change. When we burn fossil fuels, we mostly get heat, water, and CO₂. Humans produce around 82% of the carbon dioxide that enters the atmosphere. The remainder of the carbon dioxide in the atmosphere enters naturally as part of the Earth's carbon cycle. Current human lifestyles are returning carbon to the atmosphere faster than nature can remove it. A carbon footprint is calculated based on the amount of carbon dioxide a human, product, event, or organization releases into the air.

How can humans reduce their carbon footprint?

Humans can make choices about how they live to help reduce the quantity of fossil fuels burned and greenhouse gases produced. Some of the choices they can make are listed below:

- Alter diet - drink tap instead of bottled water and eat locally produced foods
- Decrease energy use - turn off items that are not in use and install energy efficient appliances and lighting
- Drive less - skip sitting in the drive-thru, bike, walk, and carpool
- Reduce wastes - recycle and compost

Why should humans make an effort to reduce their carbon footprint?

Most scientists think that the growing quantity of greenhouse gases in the atmosphere is causing the average temperature near the Earth's surface to increase. If humans limit their use of fossil fuels to decrease the amount of carbon dioxide emitted, they can help prevent the climate changes caused by the rising temperature (e.g., higher temperatures, more droughts, wilder weather, changing rain/snow patterns, melting glaciers, rising sea levels, warmer oceans, increased ocean acidity).

Key Vocabulary

Carbon dioxide- a powerful greenhouse gas that causes climate change; it is the primary greenhouse gas emitted by humans into the atmosphere

Carbon footprint- the amount of carbon dioxide emitted into the air by a human, product, event, or organization as a result of burning fossil fuels

Climate change- a broad set of changes that go along with global warming (e.g., higher temperatures, more droughts, wilder weather, changing rain/snow patterns, melting glaciers, rising sea levels, warmer oceans, increased ocean acidity)

Energy Star- a labeling program started by the U.S. Environmental Protection Agency to help people save money and reduce the emission of greenhouse gases

Fossil fuels- non-renewable energy sources (coal, oil, gas) that formed more than 300 million years ago out of dead plants and animals

Global warming- an increase in the average temperature near the Earth's surface

Greenhouse effect- the heating effect on the Earth's surface caused by gases in the atmosphere trapping solar radiation

Greenhouse gas- a gas that contributes to the greenhouse effect

Materials Needed for Activity

- 1 copy of the Global Warming Word Web handout per student
- 1 copy of the Reducing Our School's Carbon Footprint handout per student
- 1 copy of the Fossil Fuels photo collection per small group
- Access to an online carbon footprint calculator (e.g., [Cool Climate Network: Small Business Carbon Footprint Calculator](#), [EPA: Household Carbon Footprint Calculator](#))

Teacher Preparation

- Make copies of the Global Warming Word Web and Our School's Carbon Footprint handouts and the Fossil Fuels photos.
- Gather information below to help Grade 6 students calculate the school's carbon footprint. If you cannot find the exact numbers, estimate.
 - Size of the school building (number of square feet)
 - Number of vehicles that travel to and from the school each day
 - Number of people who take public transportation to the school each day
 - How much electricity is used each year (in kWh)
 - Quantities of natural gas or oil used in the school
 - Preview the online carbon footprint calculator tools. The [Cool Climate Network: Small Business Carbon Footprint Calculator](#) has the option to calculate the carbon footprint of a school.

1. **Warm-up Activity:** Distribute the Global Warming Word Web to students. Have individual students record what they already know about global warming on their webs. Allow students to share in small groups and add new ideas to their webs. Check to make sure students understand that global warming refers to an increase in the average temperature near the Earth's surface.
2. Distribute and discuss photos that portray examples of humans burning fossil fuels (e.g., power plant with smoke stacks, a gas-burning fireplace, a plane flying, a car driving).
Grade 6 Students: Explore the different ways carbon dioxide enters the atmosphere.
3. Provide the statements below and have your students sort the cards to classify them as true or false. After student groups have sorted the cards, discuss the statements as a class.
 - Carbon dioxide is a powerful greenhouse gas that contributes to global warming (True)
 - Plants are responsible for most of the carbon dioxide that enters the Earth's atmosphere (False)
 - The majority of energy used by humans comes from burning fossil fuels (True)
 - Human reliance on fossil fuels is causing carbon dioxide to enter the atmosphere faster than nature can remove it (True)
 - A carbon footprint is the measurement of the amount of carbon dioxide a human, product, event or organization releases into the atmosphere (True)
 - It is important for humans to reflect on their lifestyles and try to make changes to help reduce the amount of carbon dioxide being released into the atmosphere (True)
 - Humans will have access to fossil fuels forever (False)
4. Tell students, "Now, we are going to tour the school to evaluate the efforts being made to reduce our building's carbon footprint." Distribute and review the "Reducing Our School's Carbon Footprint" evaluation checklist. Lead students on an exploration of the school. After the exploration, have students rank the school's effort.
Grade 6 Students: Gather the information necessary and use an online tool to calculate the school's carbon footprint.
5. Invite students to reflect on the data they collected and identify ways they could improve the effort being made to decrease the school's carbon footprint. Direct students to select and describe the top three steps they think should be taken to further improve the school's carbon footprint. Allow students to share and defend their choices.

Extension Activity

Now that the students have learned about methods that can be used to reduce a carbon footprint, they can evaluate/calculate their personal carbon footprint and create a plan to reduce their personal impact on the atmosphere.

Sources

<http://coolclimate.berkeley.edu/business-calculator>

<http://www.epa.gov/climatechange/ghgemissions/ind-calculator.html>

<http://www.epa.gov/climatestudents/faq.html#one>

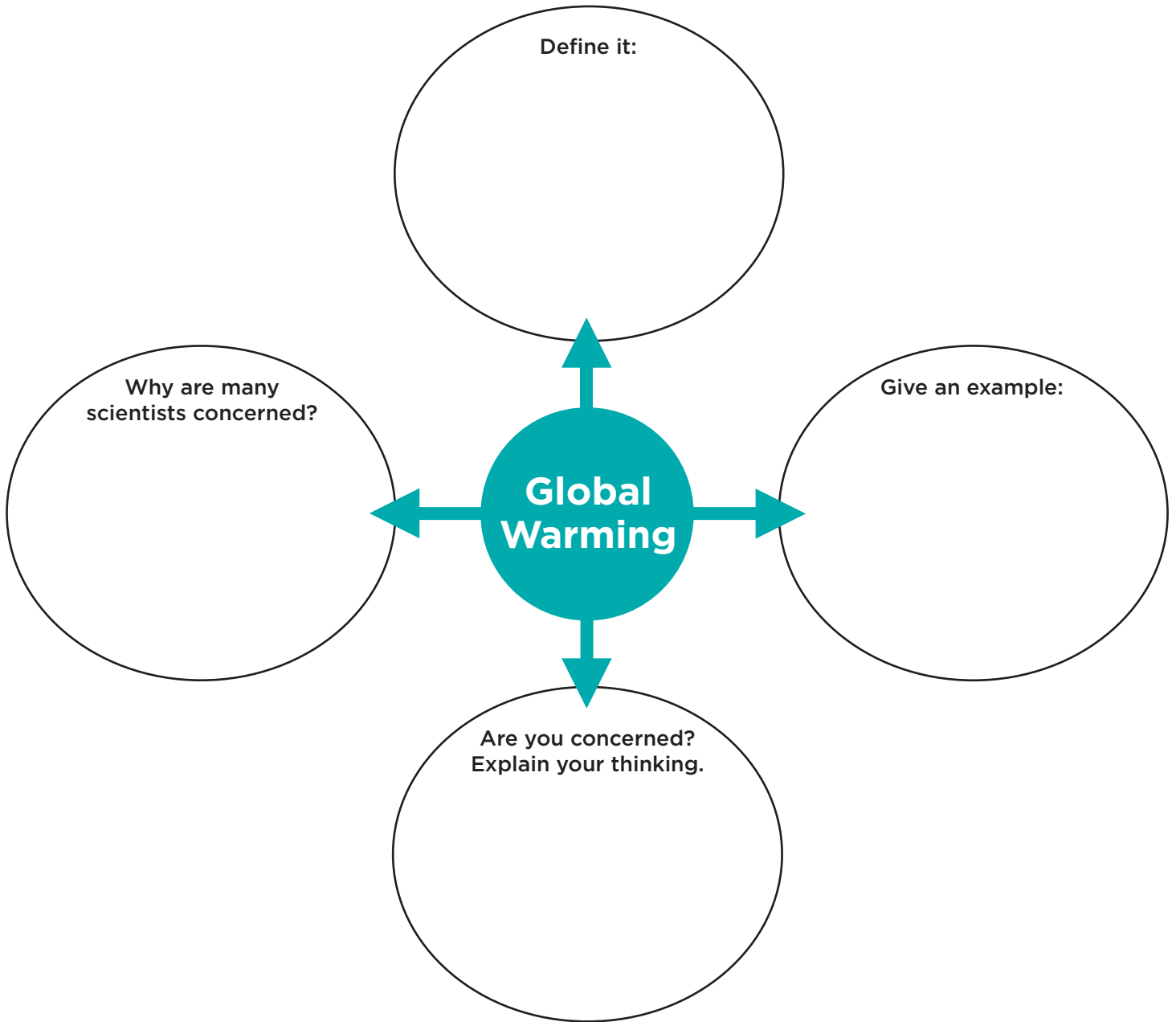
Fossil Fuels Photo Collection



Name:

Date:

Global Warming Word Web





Name:

Date:

Reducing Our School's Carbon Footprint

WHAT IS OUR SCHOOL CURRENTLY DOING?

Directions: Conduct an evaluation to identify the steps your school has taken to reduce its carbon footprint. Place a check next to each step that you observe.

Steps taken to heat and cool the building efficiently:

- Installed a programmable thermostat
- Adjusted the temperature lower for heating and higher for cooling
- Reduced the drafts from windows and doors
- Properly insulated the roof and walls
- Used ceiling fans and floor fans for cooling
- Covered windows to create shade

Steps taken to install energy efficient lighting:

- Installed fluorescent lighting in place of halogen or incandescent

Steps taken to clean the air:

- Placed live plants in the building

Steps taken to use Energy Star products:

- Installed Energy Star products in the cafeteria's kitchen
- Installed Energy Star products in the teacher's lounge
- Installed Energy Star products in the health room
- Discouraged staff from installing appliances in individual classrooms and offices

Steps taken to reduce hot water use:

- Reduced hot water temp to a maximum of 120°F
- Insulated the hot water tanks

Steps taken to recycle:

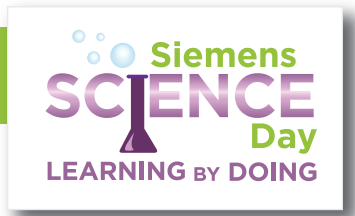
- Placed bins in the heavily traveled hallways
- Placed recycle bins in the cafeteria
- Provided recycle bins for every classroom
- Established and communicated school-wide expectations for recycling
- Involved the custodial staff in the process of the school-wide effort to recycle

Steps taken to compost:

- Created and maintained a communal compost bin
- Installed compost bins in classrooms

Add up the total number of steps that have been taken and rank your school's effort below.





WHAT ELSE CAN OUR SCHOOL DO?

Review the information that you gathered during your evaluation of the school. Develop a plan to help your school reduce its carbon footprint.

Your plan should include:

- At least three steps to reduce the amount of energy used in your building. For ideas about reducing energy use, check out:
 - *The Energy Kids: Using & Saving Energy*
 - *A Student' Guide to Global Climate Change*
- A list of materials and resources needed to get your plan started
- Names of individuals and groups responsible for overseeing implementation and monitoring of each step

Step	Materials and Resources	Person(s)/Group(s) Responsible

Write a statement below about why your plan is the best choice. You will need to convince your peers that your plan would be the most effective way to reduce your school's carbon footprint.