Greenhouse Effect
Activity Key

I. Introduction

The greenhouse effect is an increase in the average temperature of the Earth. It happens because certain gases absorb infrared heat that would normally be radiated into space. Infrared light is what you feel as heat from heat lamps used in restaurants to keep French fries hot. It also causes the heat you feel from ordinary light bulbs. Since carbon dioxide absorbs this heat, the more carbon dioxide there is in the atmosphere, the warmer the air will be. If the air gets too hot, the balance of life will be disrupted. Species of plants and animals will die. The food chain could be upset. This would cause many serious problems worldwide.

Get Info Objectives

1. Identify greenhouse gases.
2. Determine why some proposed replacements for greenhouse gases wouldn't work.
3. Determine the percentage of the various greenhouse gases' effects on global warming.

Gather Data Objectives

1. Determine the change in the concentration of carbon dioxide in the air.
2. Determine the possible causes of the greenhouse effect.
3. Determine the link between industrialization and the greenhouse effect.

Application Objectives

1. Hypothesize reasons for increases in production of certain greenhouse gases and propose solutions to global warming.
2. Infer what international problems need to be addressed to stop the greenhouse effect.
3. Describe the effects of global warming on humans and on plants.

Before doing anything else, add the NOAA Research "Greenhouse Effect" site to Bookmarks or Favorites on your web browser.

II. Get Info

A. Greenhouse Gases

- Click on the "Greenhouse Warming" site.
- Read the information and answer the following questions.

1. What are some greenhouse gases other than CO_2?

Water, methane, CFCs, Nitrous Oxide

Chlorofluorocarbons (CFCs) were used in refrigerators and spray cans. They cause the ozone hole. Perfluorocarbons (PFCs) were thought to be a good alternative to CFCs since PFCs don't destroy ozone.

2. What are two reasons PFCs are a bad alternative to CFCs?

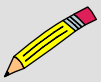
a. They are greenhouse gases.

b. They have very long atmospheric lifetimes – up to 2000 years.

- Click "Back" to return to Greenhouse Effect "Get Info.1" web page.

B. Contributions of Gases

- Click on the "Major Greenhouse Gas" site.



A. What is the least important greenhouse gas? Nitrous oxide

B. What in the most important greenhouse gas? Carbon dioxide

C. Which greenhouse gas destroys another greenhouse gas?
Ozone

- Click "Back" to return to the NOAA Research Greenhouse Effect home page.

III. Gather Data

A. Change in CO_2

- Click on the CO_2 Monthly Mean site.

1. What is happening to the concentration of atmospheric CO_2?
The concentration of CO_2 is increasing

- Click "Back" to return to Greenhouse Effect "Gather Data.1 web page.

B. Timeline

- Click on the Possible Future site.

1. If there are no efforts to stop the greenhouse effect, what is the range of possible temperature increases predicted to be by the time you are 50 years old? 1.7 °C to 3.5 °C

- Click "Back" to return to Greenhouse Effect "Gather Data.1 web page.

C. Revolutionary Problems

- Click on the Industrial Revolution site.

"PPM" means parts per million. For example, if the concentration of sulfur dioxide in the air is 25ppm, for every one million molecules in the air, 25 of them are sulfur dioxide.

1. How much has the CO2 concentration increased since the Industrial Revolution began? _____65_____ ppm

2. What percent increase is this? ___122.4_____ %

- Click "Back" to return to Greenhouse Effect "Gather Data.1" web page.
- Click "Forward" at the bottom of the screen.

D. Activities that Increase Greenhouse Gas Concentration

-Click on the "Human Activities" site.

1. What human activity has the greatest contribution toward the production of greenhouse gases? ____Energy use__

2. What activities do you think are included in the energy use column?
Answers will vary. Answers could include: use of automobiles, power production, air travel, and factory production.

- Click "Back" to return to Greenhouse Effect "Gather Data.2" web page.
- Scroll to the bottom of the page and click "Forward."

E. Industrial Growth and Responsibility

- Click on the "Responsibility" site.

Fossil fuels are responsible for producing CO_2.

1. What country seems to be most responsible for greenhouse gas production? India

- Click "Back" to return to Greenhouse Effect "Gather Data.2" web page.
- Click on the Per Person CO_2 Production site.

The previous graph showed you the percent increase in use of fossil fuels since 1970. This graph shows you the actual production of CO_2 per person.

2. What country is actually most responsible for greenhouse gas production? United States

3. Approximately how many times more CO_2 is produced per person by the country in Question 2 above than is produced per person in India? 10.5 times as much.

- Click "Back" to return to NOAA Research "Greenhouse Effect" home page.

IV. Application

A. Reasons for Increase

- Click on Application
- Click on the Sources of CO_2 site.

1. Why might India's use of fossil fuels have increased so dramatically from 1970 to 1989?

India underwent a major change in its energy use due to increased use of cars, increased use of gasoline-powered farming equipment, new power production facilities, and increased industrial development

- Click "Back" to return to Greenhouse Effect "Application.1" web page.

B. Ways to stop the greenhouse effect

- Click on the Summary site

1. What can we do to slow the global warming increase due to the following gases?

Carbon Dioxide a. Burn fewer fossil fuels.

b. Plant trees and other vegetation.

Methane a. Prevent gas leaks

b. Use methane produced in landfills for fuel

Nitrous Oxide a. Burn less fossil fuel

b. Use different fertilizers that release less nitrous oxides.

CFCs a. Use different chemicals for refrigeration equipment.

Ozone a. Decrease the use of cars and make them more efficient.

b. Decrease the use of electricity or use less polluting methods of producing power.

- Click "Back" to return to Greenhouse Effect "Application.1" web page.
- Click on the "Slow Warming" site.

2. What else can we do to slow global warming?

- Preserve existing forests and encourage reforestation.
- Develop alternative non-polluting energy sources.
- Slow population growth
- Encourage environmental laws and treaties
- Use energy more efficiently and insulate houses.

- Click "Back" to return to Greenhouse Effect "Application.1" web page.
- Click "Forward" at the bottom of the screen.

C. Cartoon

- Click on the "Cartoon" site.

1. What is the point of this cartoon?

Developing countries are increasing the greenhouse gases. They should do everything they can to slow the process of global warming. Driving big cars is wasteful and contributes to global warming.

- Click "Back" to return to Greenhouse Effect "Application.2" web page.

D. Effects of Global Warming

1. Predict the economic effects on people affected by increasing global temperatures.

Answers will vary. Answers could include: increased crop production in some areas, decreased in others; polar ice cap melting; starvation due to breaks in the food web, etc.

2. Predict the effects on plants affected by increasing global temperatures and increased carbon dioxide concentration.

Plants in some areas will thrive while others will not handle the increased temperatures and will die. All plants need carbon dioxide, so they should grow better with an increased supply of carbon dioxide.

V. Enrichment Activities

A. Research

1. Research Venus' greenhouse effect. How is it different from Earth's greenhouse effect?

2. Research ozone's role as a greenhouse gas. Find out which greenhouse gases destroy ozone.

3. Mars' atmosphere has a high concentration of carbon dioxide. Find out why Mars is so cold despite a high percentage of atmospheric CO_2.

4. Develop a plan for all countries to help decrease the greenhouse effect.

B. Related Web Sites

1. Climgraph Educational Graphics on Global Climate Change
   http://www.fsl.noaa.gov/outreach/education/climgraph/

2. Climate Monitoring and Diagnostics Laboratory
   http://www.cmdl.noaa.gov

3. CMDL Observatory Operations sites – Links to stations in Alaska, the South Pole, Samoa, and Mauna Loa in Hawaii
   http://www.cmdl.noaa.gov/obop/