

Greenhouse Gases

Duration:

½ class

Objectives:

Students will:

- Think-pair-share about greenhouse gases
- Read an article on greenhouse gases
- Complete a diagram to illustrate how greenhouse gases affect climate

Vocabulary:

Atmosphere

The layer of gases surrounding the earth

Climate

The long-term weather conditions that a particular area experiences

Greenhouse Gases

Gases in the atmosphere that allow sunlight to pass through but trap in infrared heat energy, thus contributing to global warming

British Columbia PLO's:

Science 6, 7, 8

Background:

This is a good activity to use at the beginning of a climate change unit. It will help the students understand how greenhouse gases (GHGs) in the atmosphere are related to climate change.

Understanding how GHGs impact the atmosphere and the global climate aid us comprehend the mechanisms behind abrupt climate change.

The atmosphere is a protective layer that keeps the earth's surface safe from harmful radiation found in outer space. Greenhouse gases allow sunlight (energy) to penetrate the earth's atmosphere. When sunlight strikes the earth's surface, some of it is reflected back towards space as infrared radiation (heat), which causes our atmosphere to heat up, helping to make our planet warm enough to live on. This heating phenomenon is generally referred to as the greenhouse gas effect.

Over the last several thousand years carbon dioxide levels have fluctuated due to a variety of natural causes. These include: volcanic eruptions that release large quantities of gas from the earth; solar flare-ups, which transmit more solar energy than would otherwise be received by

the earth; and certain orbital variations, which bring the earth closer to the sun during orbital cycles.

Over the last several hundred years scientists have observed carbon dioxide levels along with other greenhouse gas levels spike, reaching new highs never before observed. The causes have been debated in the scientific community but as of 2007 the United Nation's Intergovernmental Panel on Climate Change stated that the warming of the planet is very likely due to GHGs being released from human sources. The burning of fossil fuels in automobiles, factories, electricity plants and other industrial processes causes most of the GHGs released. Understanding how greenhouse gases impact the environment is important when studying climate change and how it is affecting the planet.

Materials:

- Notebooks
- Class set of *Ocean News* article *Greenhouse Gases*
- Greenhouse gas overhead (see the resource section for some suggested images from the Internet)

Procedure:

1. Write the phrase greenhouse gases (GHG) up on the board. Have the students think about what they know about GHGs and then write their ideas down in their notebooks.
2. Get the class to read the *Oceans News* article *Greenhouse Gases* (individually or as a class). Discuss any questions and add new words to the unit vocabulary list.
3. After reading the article have the students draw a diagram that shows how they understand greenhouse gases function in the atmosphere and contribute to climate patterns. Give them roughly 5 min to diagram their ideas. Have them complete their diagrams using only one colour.
4. When their diagrams are complete get them to share their ideas and pictures with their neighbours. In a different colour, have them add to their diagram any insights or changes they have learned through discussions with their neighbours.
5. On the board or on a blank overhead draw a basic diagram with the earth's surface, the atmosphere, and the sun's heat energy reaching the earth. Have the students share and add to this diagram some of the things they have noted from their own work. As a class, draw (or have a student draw) a visual representation of how greenhouse gases in the atmosphere work.
6. When the class diagram is complete have them add any additions to their own diagrams that should be made so their illustrations cover all the important pieces of information (they should use a different colour). Go over keywords that should be included. See the sample diagrams for details.
7. You can collect these diagrams from the students for grading. You can also have the students re-do the diagrams for homework using the multi-coloured versions they created in class and have them hand in both the new and old versions the next day.

Discussion:

- Do all the greenhouse gases act in the same way in trapping heat in the atmosphere? Which ones are different from each other?
- How would a reduction in greenhouse gases affect the climate?
- What are some of the ways in which you could reduce your greenhouse gas emissions everyday?

Extension and Resources:

- Wikipedia has a good section on greenhouse gases
en.wikipedia.org/wiki/Greenhouse_gases
- The Koshland Science Museum has a good graphic illustrating greenhouse gas contributions to the warming atmosphere
www.koshland-science-museum.org/exhibitgcc/causes02.jsp
- This site has a simple greenhouse gas effect image <http://www.isover.hr/Item.aspx?Id=31>