Climate Change Classroom Activity: Teacher's Guide

Grade Level: 2-8
Curriculum Connections: Fine Arts, Language Arts, Science
Class Time: 60 to 90 minutes

Objectives:

1. Students will be able to define climate change.
2. Students will learn about the causes and effects of climate change on humans, other wildlife and the environment.
3. Students will learn about different ways they can save energy in their homes by designing their bedroom to use energy efficient appliances and renewable energy.

Materials:

1. Home Energy Savings Worksheets 1 and 2 (download in one file from website)
2. Colored pencils, markers, crayons for design of room.

Initial Classroom Discussion (to provide background information):

Vocabulary (in bold): global warming, climate change, greenhouse effect, greenhouse gases, non-renewable resources, renewable resources, native plants

1. Ask students if they have ever heard of **global warming** or **climate change**
    a. If they have ask if anyone knows what these words mean
    b. Global warming means the average temperature of the Earth is increasing
    c. Climate change means that the average weather over time on Earth is changing from its normal patterns, like certain areas are getting more rain than usual or the temperatures becoming hotter in an area

2. Ask students whether they think the Earth's climate is changing
    a. The Earth's climate is always changing, but in the past few decades the Earth's climate has been getting warmer more quickly than in history
    b. Effects are already being seen including the melting of glaciers, the ocean levels rising and plants in certain areas blooming earlier than usual

3. Ask students if they know what causes climate change. Causes include:
    a. The Earth's distance from the sun
    b. Volcano eruptions
    c. A change in the suns energy
    d. Human activity and the **greenhouse effect**

4. Ask students whether they have heard of the greenhouse effect (if no one gave this as an answer)
    a. Tell them to think about how a greenhouse works- is it warm or cold?

b. The sun's rays enter the greenhouse and then are reflected back. Some rays are trapped by the glass so that they stay in the greenhouse and warm it up.
c. This is how the greenhouse effect works in the Earth's atmosphere- the sun's rays are reflected by all of the surfaces on Earth back into the atmosphere where greenhouse gases trap some of the rays and this warms the Earth's atmosphere
d. **Greenhouse gases** include carbon dioxide (this is the most abundant), methane, water vapor, ozone, and nitrous oxide
e. Too much of these greenhouse gases causes the planet's atmosphere to warm up
f. This is a great short video of the greenhouse effect and climate change to help students visualize the process: https://ny.pbslearningmedia.org/resource/phy03.sci.phys.matter.greenhouse2/global-warming-the-physics-of-the-greenhouse-effect/#.Wq_7JR3wYdU

5. What are some effects of climate change?
   a. Loss of sea ice and glaciers, which means loss of habitat for many arctic animals like polar bears
   b. Sea level rise- this causes flooding in many coastal areas
   c. Intense weather including heat waves, droughts, wildfires and storms like hurricanes
   d. All of these changes affect wildlife and their ability to live in their habitat; it could cause them to migrate elsewhere and some may not be able to survive
   e. They also affect humans- we have to deal with the consequences of extreme and destructive weather like heat waves, drought, wildfires, hurricanes and flooding

6. Ask students if they know what a non-renewable and a renewable resource are
   a. **Non-renewable resources**- these are fossil fuels are oil, natural gas, coal- these produce greenhouse gases and they cannot be reused- once they are used they are gone
   b. **Renewable resources**- solar, wind, tidal and wave energy- these do not produce greenhouse gases and can be used indefinitely

7. Ask students if they know what human activities release greenhouse gases
   a. Electricity use- using a computer, TV, lights, video games, charging cell phones----- the list is endless
   b. Industry- factories burn fossil fuels to create energy and release greenhouse gases when they make certain products from raw materials
   c. Heating homes and buildings- fossil fuels are mostly used to heat our homes and buildings with oil and natural gas, releasing greenhouse gases
   d. Waste disposal- throwing garbage away into a landfill releases methane
   e. Agriculture- methane emissions from livestock
   f. Transportation- cars, buses, motorcycles use gas and this releases carbon dioxide and ozone
   g. Land use- cutting down of forests or clearing natural land can release carbon dioxide because plants store a lot of carbon dioxide from the atmosphere

8. What can we do to reduce greenhouse gases?
   a. Reduce electricity use- turn off the tv, video games and lights when not using them. If possible unplug appliances since many still use electricity even if they are not turned on.
   b. Use energy efficient lights- LEDs (Light Emitting Diodes) or CFLs (Compact Fluorescent Lightbulbs) take a lot less energy to produce light than incandescent bulbs
   c. Use renewable energy- this will not release greenhouse gases to produce electricity
   d. Don't waste heat or air conditioning- make sure doors and windows are closed and not leaking to avoid unwanted air escaping or coming in
   e. Recycle- in most cases it takes less energy to recycle than it does to produce new products from raw materials
   f. Set your thermostat- keep the temperature in rooms set to around 68 degrees in the winter and 72 in the summer to reduce heating and cooling

g. Save water- heating water uses energy too!
h. Reduce gasoline use- walk, ride a bike or carpool
i. Increase plants and trees- plant a garden with **native plants** and trees- native plants are plants that lived historically in an area (in our case Long Island) and can live well in our climate. These plants have very long roots and these roots can absorb a lot of carbon dioxide. Trees can also absorb a lot of carbon dioxide and other air pollutants, which makes our air cleaner.
j. Use Energy Star appliances- this rating means that these electronics and home appliances use less energy than standard products

Student Activity:

1. Using the information on how to reduce greenhouse gas emissions that was just discussed, have students design a room in their home that can use less energy. Have students use their bedroom as an example.
2. Give students a copy of the "Home Energy Savings Worksheet 1" and "Home Energy Savings Worksheet 2"
3. On worksheet 1 they can use the rectangle to draw items they have in their bedroom (they can also expand to the outside of the room if they would like to plant trees or native plants!). Tell them it doesn't have to look exactly like their room, but make sure they put in the items that use electricity or energy. This step can be less or more detailed depending on the age group.
4. Once they are done with this step they should look at worksheet 2. This has various actions or items students can use in their room to reduce their energy use. Younger students can cut and paste these pictures into their drawings, while more advanced students may want to draw different items themselves.
5. Allow students to get creative and draw additional items that aren't on the worksheet.
6. Students should take home their new energy efficient rooms to share what they learned with their families and inspire them to make changes to their household that will allow their entire homes to become more energy efficient and release less greenhouse gases.
7. It may also inspire your students to take actions in their classroom and school to save energy and help protect the environment.

Please contact 311 or email sustain@northhempsteadny.gov if you have any questions or comments about this lesson plan!