

Climate Change Summit

Time: Three 45-minute class periods over one-two weeks

National Benchmarks: Benchmarks 5A: Diversity of Life; 5D Interdependence of Life; 5E: Flow of Matter and Energy; 9B:Symbolic Relationships; 9D:Uncertainty; 12B:Computation and Estimation; 12D:Communication Skills; 12E:Critical-Response Skills.

National Science Content Standards: *Science as Inquiry: A; Life Science: C:* Biological Evolution; The Interdependence of Organisms; Matter, Energy, and Organization in Living Systems; *Science and Technology: E:* Abilities of Technological Design; Understandings about Science and Technology; *Science in Personal and Social Perspectives: F:* Population Growth; Natural Resources: Environmental Quality; Natural and Human-induced Hazards; Science and Technology in Local, National, and Global Challenges

New York State Standards: 1, 2, 4, 5, 6, 7

Objective: Students will weigh the pros and cons of energy choices needed to stabilize the global emissions of carbon and be able to decide which strategies to use.

Lesson Outline:

1. Students learn about climate change and basic energy sources
2. In groups, students research one-two strategies for mitigating climate change
3. With the entire class, students debate possible solutions
4. Students decide on the eight best strategies as a class

Materials:

Climate change and energy powerpoints
Wedge game worksheet
Climate Summit worksheet
Princeton University's stabilization triangles-these can be made with paper or wood

Engage: In pairs, students write down all of the things they have heard about climate change, separating them into the following categories: causes, consequences, and solutions. Students should identify which of these items they would specifically like to know more about, and which things they are uncertain about or believe may not be true. Review these lists as a group in order to gain insight into current student understanding.

Explore: Divide students into groups, preferably with each group researching 1-2 strategies from the Climate Mitigation Initiative out of Princeton University. This can be done outside of class if necessary, but check in with students before the Climate Summit to make sure they are focusing correctly. It is important that all students create a list of challenge questions for the other groups. The Climate Summit worksheet is meant as a guideline to help you organize students into research groups.

Note: The Climate Mitigation Initiative was funded in part by the Ford Motor Company and British Petroleum. Discussing funding issues in science is an important topic to consider with students. Some independent analysts have suggested that the CMI's focus on carbon capture and sequestration technologies is due to its industry focus. This could be another research topic for students to investigate. Another interesting note is that when this "game" was first developed, there was only a need for seven wedges; now, we need eight for stabilization.

This means that we are putting more and more carbon dioxide into the air, at a faster rate, than the creators of this game anticipated.

At the end of the specified research time, you will begin the Climate Summit. Each group will present their strategies, allowing time for questions and answers at the end. Allow 5-7 minutes for each group to present, and then 3-5 minutes for questions.

Finally, students will now have a chance to discuss what eight strategies they would choose as a whole group, regardless of the strategies they researched independently. Using their worksheet, they have already come up with 8 strategies that make their stabilization triangle. They can use a strategy more than once, but they can only use a maximum of 5 electricity options, 4 transportation options and 5 heat options. This worksheet will help facilitate the discussion with the rest of the class. Keep note of which strategies are more and less popular and discuss these strategies specifically. It is important to mention that the wedges are based purely on scientific calculations, not moral or emotional aspects of each wedge.

Explain: If we are to reduce carbon emissions globally, we must begin by keeping our emissions “flat” (as opposed to increasing emissions as population and energy use grows). Once the technologies are established that avoid increases in our emissions, then we can begin to emit less greenhouse gases than our historical emissions (even as the population rises).

Not one technology can allow us to stabilize our emissions; rather we will need a combination of achievable strategies that halt our increasing emissions. Students will work in groups to devise a set of 8 strategies that will allow the global population, despite growth, to flat line its emissions. Each strategy represents one wedge, and one wedge is a strategy to reduce carbon emissions by 25 gigatons of carbon at one billion tons of carbon a year (over 25 years). Furthermore, each wedge represents a technology currently available or expected to be available in the very near future.

Extend: Students can use the “Supermarket Hunt” to more deeply assess one aspect of climate change, that is, the carbon that is released due to transportation of our food supply.

Evaluate: Collect student reports from the Climate Summit.

Comments:

References:

Pacala, S. and R. Socolow. 2004. Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies. *Science* 305: 968-972.

Socolow, R.H. and S.W. Pacala. 2006. A Plan to Keep Carbon in Check. *Scientific American*. September.