Global Climate Change—Lesson Plan

Student Objectives

- Define *global climate change* and identify its features.
- Explain the "greenhouse effect" and the role of carbon dioxide and other greenhouse gases in changing the Earth's ecosystems.
- Understand the cap-and-trade policy option for reducing total carbon emissions and describe its major elements.
- Evaluate supporting and opposing arguments for implementing a cap-and-trade system in order to reduce overall carbon emissions.
- Decide, individually and as a group, whether the government should adopt a cap-and-trade system to limit greenhouse gas emissions; support decisions based on evidence and sound reasoning.
- Reflect on the value of deliberation when deciding issues in a democracy.

Question for Deliberation

Should our democracy adopt a cap-and-trade system to limit greenhouse gas emissions?

Materials

- Lesson Procedures
- Handout 1—Deliberation Guide
- Handout 2—Deliberation Worksheet
- Handout 3—Student Reflection on Deliberation
- Reading
- Selected Resources
- Deliberation Question with Arguments
  (optional—use if students have difficulty extracting the arguments or time is limited)

Global Climate Change—Reading

Polar bears can swim up to 100 miles before drowning. They swim to hunt seals—their favorite food—and seals can be found on sea ice. If the ice disappears and polar bears are far from land, they die. Unfortunately, the polar ice cap is melting as temperatures in the Arctic continue to rise. As a result, more polar bears are drowning when they try to catch seals in the ocean but cannot find ice on which to rest. More bears are also staying on land, where they must scavenge for food and travel inland when they cannot find food on the beaches. Sadly, one bear recently wandered into an Alaskan village looking for food and was killed because it threatened people's safety (Halpin, 2008). Unless changes in the global climate are checked, experts predict that two-thirds of the polar bear population will disappear by 2050 (Revkin, 2007).

Polar bears are not the only species that will be affected by global climate change. A 2003 U.S. Department of Defense report acknowledged that climate change is occurring and recognized the potential for relatively abrupt change. Such change, the Department said, could result in "skirmishes, battles, and even war" due to food shortages, the loss of freshwater, interruptions in energy supplies, and the migrations of millions of desperate people (Schwartz and Randall, 2003). UN Secretary General Ban Ki-Moon has said that global climate change poses a threat to humanity and the planet that is as grave as war (Osborne, 2007). Most national leaders now agree that something must be done soon to avert a catastrophe. Countries are particularly interested in reducing the harmful effects of greenhouse gases, particularly carbon dioxide (CO_2). Cap-and-trade policies offer one way to do so.

What Are Greenhouse Gases and the Greenhouse Effect?

For more than 100 years, scientists have known about the "greenhouse effect." Radiation from the sun passes through the atmosphere and strikes the Earth's surface. Instead of bouncing back into space, the radiation is trapped by the atmosphere and becomes heat. This process keeps the Earth from becoming cold and hostile to life. Over the past few centuries, human activities like farming, heating, and industry have increased the amount of CO_2 and other gas emissions that trap the sun's radiation. Together, these emissions are called "greenhouse gases."

Of course, the Earth can become warmer naturally, but scientists estimate that most emissions that are warming the atmosphere come from burning fossil fuels like coal, oil, and gasoline. The United States, with less than 5% of the world's population, is responsible for 22% of greenhouse gases that humans produce; China, with almost 20% of the world's population, is the next largest producer with 18% ("U.S. Emissions in a Global Perspective," 2007). The burning of forests—to clear land for farming, roads, and housing and commercial developments—accounts for up to 25% of CO_2 emissions worldwide (Mitchell et al., 2007).

The UN's Intergovernmental Panel on Climate Change (IPCC) found that during the past 200 years (the era of the Industrial Revolution), levels of CO_2 in the atmosphere rose by about 30%. The IPCC's 2007 report noted that most of the increase in global average temperatures in the past 50 years is "very likely due" to human activities. The IPCC forecasts that growing concentrations of greenhouse gases in the atmosphere will dramatically increase the Earth's temperature, resulting in more droughts, declines in crop yields, and even famine in poorer countries. Insects will thrive and insect-borne diseases like malaria will expand. Increasingly violent storms, gathering additional energy from a warmer ocean, will threaten life. In addition to losing polar bears and

the Arctic ecosystem, scientists estimate that numerous animal, bird, and fish species will become extinct, as other ecosystems change or disappear.

Limiting Carbon: The Kyoto Protocol and Cap-and-Trade Systems

Today, countries are using different strategies to limit CO_2 emissions. A total of 174 countries have signed the Kyoto Protocol, a 1997 agreement that aims to reduce greenhouse gas emissions. Of these, 36 countries are required to reduce their emissions, while 137 developing countries—including China, the second-largest producer of carbon emissions—are required only to monitor and report their emissions. The United States, the world's largest producer of carbon emissions, originally signed the Kyoto Protocol but never ratified it. Nevertheless, the United States and other non-participants in the Kyoto Protocol are still studying ways to reduce emissions.

In addition to using the Kyoto Protocol and other treaties to reduce CO_2 emissions, many governments are creating economic incentives. The European Union has developed a specific policy called the Emissions Trading System (ETS). Begun in 2005, ETS is one kind of cap-and-trade system. Under cap-and-trade, a country or group of countries sets a limit (or cap) on the amount of a pollutant that can be released into the atmosphere. Companies or specific sectors of the economy—such as energy or manufacturing—are permitted a number of credits that represent just how much pollutant they can emit.

In European Union countries, companies or sectors that exceed their CO_2 credit limits have two choices: either they can pay a heavy fine for the extra pollution, or they can buy pollution credits from other, less polluting companies and industries that do not require them. Essentially, ETS creates a market in which companies can trade pollutants. This market does several things: (1) it permits companies that produce large quantities of CO_2 to remain in business but also

encourages large emitters to reduce their carbon "footprint"; (2) it rewards companies that emit less CO_2; (3) it allows governments to limit the overall amount of CO_2 emitted into the atmosphere; and (4) it uses economic strategies to achieve specific policy goals.

Other countries now use or are considering cap-and-trade systems for regulating CO_2 emissions. The Russian Federation uses a program similar to ETS, called "joint implementation," that allows countries with economies-in-transition to create tradeable carbon credits. The United States, which already has a cap-and-trade system for regulating sulfur dioxide (SO_2) gas emissions, is now debating whether to adopt a similar system for CO_2 emissions.

Cap-and-Trade Skeptics and Believers

Supporters of cap-and-trade say that this policy helps put global climate change in terms that citizens and consumers can understand. Because climate change is an enormous problem, people often have difficulty seeing how they can make a difference. People respond better to problems that affect them directly and can be addressed by personal decisions. Cap-and-trade puts a price on carbon emissions. Because citizens and consumers understand prices, they can choose to support technologies and products that produce less carbon. Such consumer pressures will help business owners see the benefit of reducing emissions.

Supporters also point to the success of similar efforts. Researchers with the Global Environment Program note that the U.S. Clean Air Act in 1990 established a cap-and-trade system for sulfur dioxide (SO_2) emissions, the primary cause of acid rain. "This system has proven to be such an environmental and economic success—reducing SO_2 emissions at a fraction of the expected costs—that the European Union borrowed directly from it to design its cap-and-trade system for CO_2 emissions" (Mathers and Manion, 2005).

Opponents of cap-and-trade believe that such a plan cannot work because it is a national response to a worldwide problem. Even if some countries "cap" carbon emissions, other countries will continue to produce them. Thus, countries with caps lose business to countries without caps, and the problem with carbon emissions continues. Many people also oppose cap-and-trade because they believe it will cost jobs and other economic benefits. They argue that cap-and-trade forces businesses either to produce less carbon or trade for carbon credits. In both cases, the result is fewer jobs (Jordan, 2009).

Supporters agree that some carbon economy jobs will be affected by cap-and-trade. On the other hand, they note what happened when the automobile was introduced in the 20th century: while old jobs connected to horses disappeared, new jobs and industries were created. Similarly, they argue, new jobs and industries will be created to meet the needs of a post-carbon economy.

Some opposition to cap-and-trade comes from environmentalists who say that some important stakeholders are often left out of the process. They claim that industrial leaders are included in decisions about the CO_2 emission "caps," but environmental groups are excluded from the discussions. A study by Climate Action Network Central and Eastern Europe (CAN-CEE) concluded that "Environmental NGOs have often been excluded from the consultation processes and even when given a chance to provide comments, those were not taken into consideration or mentioned" ("Independent NGO Analysis of NAPs of New Member States," 2004). These environmental opponents also worry that concessions made by government in order to gain the support of businesses make the system too weak. In the Czech Republic, for example, the annual CO_2 cap was set at almost 21% ***above*** historical emission levels. Ironically, a system that is intended to benefit everyone is decided in secret only by a very select and powerful few.

Many economists and environmentalists oppose giving government-provided emission credits without a cost to major CO_2 producers. Instead, they prefer carbon auctions, where major CO_2 producers must buy their credits from the government. The government can then use these funds to support other CO_2 reduction strategies such as "clean energy" sources (wind, solar, geothermal, tidal). Some environmentalists even prefer a "carbon tax" on all carbon usage to encourage everyone to reduce CO_2 quickly to avoid environmental catastrophe.

Many business interests oppose taxes as a matter of principle. They believe their primary responsibility is to make money for their owners or investors, and government regulations are often seen as attempts to reduce their profits. Thus, some companies prefer cap-and-trade systems to more direct government mandates because cap-and-trade gives them the flexibility to decide how they will meet their emissions targets.

Cap-and-trade supporters also argue that companies can both reduce their carbon emissions and prosper economically without extra costs to their stakeholders. Until recently, industries needed to pay the costs of monitoring and reporting data to the government. Reporting took time, cost money, and depended on the honesty of the businesses that provided it. Today, governments, non-governmental organizations, and even ordinary people can use satellite data and other resources available via the Internet to monitor CO_2 emissions. Therefore, businesses may no longer have to bear the cost of data collection and reporting or worry about transparency.

Cap-and-trade is but one example of what former Czech president Vaclav Havel has called "the challenge to behave responsibly." After all, he notes, "Technological measures and regulations are important, but equally important is support for education, ecological training and ethics—a consciousness of the commonality of all living beings and an emphasis on shared responsibility" (Havel, 2007).

Global Climate Change—Selected Resources

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"Global Warming: Undo It" (New York: Environmental Defense Action Fund, 2005), http://www.undoit.org/home.cfm.

"Global Warming Updates: Science, Politics, Economics" (Washington, DC: Cooler Heads Coalition, 2004), http://www.globalwarming.org/article.php?uid=562.

"Global Warming: What Should We Do About It?," *Bill of Rights in Action* (Los Angeles, CA: Constitutional Rights Foundation, Fall 2002), Vol. 18: 4, http://www.crf-usa.org/bria/bria18_4b.htm.

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Osborne, Hillary, "Climate Change Is Our Top Priority, Says UN Chief," *Guardian* (November 6, 2007).

"Research Library: Climate Change" (Washington, DC: Worldwatch Institute, 2005), http://www.worldwatch.org/topics/energy/climate/.

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Schwartz, Peter, and Doug Randall, *An Abrupt Climate Change Scenario and Its Implications for United States National Security*, a report prepared for the U.S. Department of Defense (Emeryville, CA: Global Business Network, October 2003), http://www.gbn.com/ArticleDisplayServlet.srv?aid=26231.

United Nations Framework Convention on Climate Change, http://unfccc.int/2860.php.

"U.S. Emissions in a Global Perspective," *Emissions of Greenhouse Gases Report*, Report #:DOE/EIA-0573 (Washington, DC: Energy Information Administration, Official Energy Statistics from the U.S. Government, November 28, 2007), http://www.eia.doe.gov/oiaf/1605/ggrpt/.

Weier, John, "Global Warming," *Earth Observatory* (Goddard, MD: National Aeronautics and Space Administration [U.S.], Goddard Space Flight Center, April 8, 2002), http://earthobservatory.nasa.gov/Library/GlobalWarming/warming2.html.

Global Climate Change—Deliberation Question with Arguments

Deliberation Question

Should our democracy adopt a cap-and-trade system to limit greenhouse gas emissions?

YES – Arguments to Support the Deliberation Question

1. Global climate change has already begun, as evidenced by the rise in the Earth's temperature. Even the U.S. Department of Defense recognizes this change and is considering the consequences. If people wait too long, the climate might reach a threshold of irreversible and catastrophic change. Cap-and-trade is a reasonable plan for getting started before it's too late.
2. Cap-and-trade policies put a price on carbon emissions. Citizens and consumers understand prices and so can respond to them in ways that benefit the global environment. More specifically, they can use their wallets to support the technologies and products that produce less carbon.
3. Cap-and-trade is a method that has proven effective. A similar cap-and-trade approach in the United States was successful in reducing emissions of sulfur dioxide, the primary cause of acid rain. The sulfur dioxide cap-and-trade system reduced emissions at a fraction of the expected costs. As a result, the European Union borrowed directly from this model to design its CO_2 cap-and-trade system.
4. Cap-and-trade policies benefit the environment without hurting businesses. More direct government regulations, like carbon taxes, do not allow businesses the flexibility they need to reduce carbon emissions without reducing their profits. Cap-and-trade policies, on the other hand, let businesses decide how they can best reach emission reduction targets. While some old economy carbon-based jobs will be affected by cap-and-trade, new jobs and industries will be created to meet the needs of a post-carbon economy.
5. A cap-and-trade system is feasible now that governments and businesses have easy, cheap, and more transparent ways to monitor CO_2 emissions. Today, governments, non-governmental organizations, and even ordinary people can use satellite data and other resources via the Internet to monitor CO_2 emissions. Therefore, businesses may no longer have to bear the cost of data collection and reporting or worry about transparency.

Global Climate Change—Deliberation Question with Arguments

Deliberation Question

Should our democracy adopt a cap-and-trade system to limit greenhouse gas emissions?

NO – Arguments to Oppose the Deliberation Question

1. Cap-and-trade is bad for the national economy. Countries that "cap" carbon emissions will force their businesses either to produce less carbon or trade for carbon credits. In either case, the result is fewer jobs. Countries with caps will lose those jobs to countries without caps, and the problem with carbon emissions continues. Cap-and-trade cannot work because it is a national response to a worldwide problem.
2. Reducing greenhouse gases is too urgent a problem for market-based solutions like a cap-and-trade system. To avert environmental catastrophe, carbon producers must be required to emit substantially less pollution immediately. A carbon tax would therefore be preferable to cap-and-trade policies.
3. The process for setting caps is flawed. Often, the government involves industries and other major CO_2 producers in determining the emission "caps" but does not involve environmental groups. Therefore, the cap numbers are too low to significantly reduce greenhouse gas emissions. Ironically, a system that is intended to benefit everyone is decided only by a very select and powerful few, behind closed doors. A flawed process leads to a cap-and-trade policy that is neither fair nor effective.
4. Weak carbon limits are worse than no limits at all. In order to convince businesses to agree to carbon limits, governments make cap-and-trade systems too weak. Major CO_2 producers should have to pay for their emissions, not trade credits with less polluting companies and industries. Global climate change requires strong regulations. If major carbon producers have to pay a substantial penalty for their high emissions, they will have an incentive to reduce their carbon "footprint."
5. Cap-and-trade is a weak political compromise. Being good stewards of the Earth requires education, conservation practices, and ethics, not a quick policy solution. Unless a cap-and-trade system is coupled with a more comprehensive approach to challenging global warming, significant change in our behavior and carbon usage is not likely to occur.

Lesson Procedures

Step One: Introduction

Introduce the lesson and the Student Objectives on the **Lesson Plan**. Distribute and discuss **Handout 1—Deliberation Guide**. Review the Rules of Deliberation and post them in a prominent position in the classroom. Emphasize that the class will deliberate and then debrief the experience.

Step Two: Reading

Distribute a copy of the **Reading** to each student. Have students read the article carefully and underline facts and ideas they think are important and/or interesting **(ideally for homework)**.

Step Three: Grouping and Reading Discussion

Divide the class into groups of four or five students. Group members should share important facts and interesting ideas with each other to develop a common understanding of the article. They can record these facts and ideas on **Handout 2—Deliberation Activities** (Review the Reading).

Step Four: Introducing the Deliberation Question

Each **Reading** addresses a Deliberation Question. Read aloud and/or post the Deliberation Question and ask students to write the Deliberation Question in the space provided on **Handout 2**. Remind students of the Rules for Deliberation on **Handout 1**.

Step Five: Learning the Reasons

Divide each group into two teams, Team A and Team B. Explain that each team is responsible for selecting the most compelling reasons for its position, which you will assign. Both teams should reread the **Reading**. Team A will find the most compelling reasons to **support** the Deliberation Question. Team B will find the most compelling reasons to **oppose** the Deliberation Question. To ensure maximum participation, ask everyone on the team to prepare to present at least one reason.

Note: Team A and Team B do not communicate while learning the reasons. If students need help identifying the arguments or time is limited, use the **Deliberation Question with Arguments** handouts. Ask students to identify the most compelling arguments and add any additional ones they may remember from the reading.

Step Six: Presenting the Most Compelling Reasons

Tell students that each team will present the most compelling reasons to **support** or **oppose** the Deliberation Question. In preparation for the next step, Reversing Positions, have each team listen carefully for the most compelling reasons.

- Team A will explain their reasons for **supporting** the Deliberation Question. If Team B does not understand something, they should ask questions but NOT argue.
- Team B will explain their reasons for **opposing** the Deliberation Question. If Team A does not understand something, they should ask questions, but NOT argue.

Note: The teams may not believe in or agree with their reasons but should be as convincing as possible when presenting them to others.

Step Seven: Reversing Positions

Explain that, to demonstrate that each side understands the opposing arguments, each team will select the other team's most compelling reasons.

- Team B will explain to Team A what Team A's **most compelling** reasons were for **supporting** the Deliberation Question.
- Team A will explain to Team B what Team B's **most compelling** reasons were for **opposing** the Deliberation Question.

Step Eight: Deliberating the Question

Explain that students will now drop their roles and deliberate the question as a group. Remind the class of the question. In deliberating, students can (1) use what they have learned about the issue and (2) offer their personal experiences as they formulate opinions regarding the issue.

After deliberating, have students find areas of agreement in their group. Then ask students, as individuals, to express to the group their personal position on the issue and write it down (see My Personal Position on **Handout 2**).

Note*:* Individual students do **NOT** have to agree with the group.

Step Nine: Debriefing the Deliberation

Reconvene the entire class. Distribute **Handout 3—Student Reflection on Deliberation** as a guide. Ask students to discuss the following questions:

- What were the most compelling reasons for each side?
- What were the areas of agreement?
- What questions do you still have? Where can you get more information?
- What are some reasons why deliberating this issue is important in a democracy?
- What might you or your class do to address this problem? Options include teaching others about what they have learned; writing to elected officials, NGOs, or businesses; and conducting additional research.

Consider having students prepare personal reflections on the Deliberation Question through written, visual, or audio essays. Personal opinions can be posted on the web.

Step Ten: Student Poll/Student Reflection

Ask students: "Do you agree, disagree, or are you still undecided about the Deliberation Question?" Record the responses and have a student post the results on www.deliberating.org under the partnerships and/or the polls. Have students complete **Handout 3**.

Handout 1—Deliberation Guide

What Is Deliberation?

Deliberation (meaningful discussion) is the focused exchange of ideas and the analysis of arguments with the aim of making a decision.

Why Are We Deliberating?

Citizens must be able and willing to express and exchange ideas among themselves, with community leaders, and with their representatives in government. Citizens and public officials in a democracy need skills and opportunities to engage in civil public discussion of controversial issues in order to make informed policy decisions. Deliberation requires keeping an open mind, as this skill enables citizens to reconsider a decision based on new information or changing circumstances.

What Are the Rules for Deliberation?

- Read the material carefully.
- Focus on the deliberation question.
- Listen carefully to what others are saying.
- Check for understanding.
- Analyze what others say.
- Speak and encourage others to speak.
- Refer to the reading to support your ideas.
- Use relevant background knowledge, including life experiences, in a logical way.
- Use your heart and mind to express ideas and opinions.
- Remain engaged and respectful when controversy arises.
- Focus on ideas, not personalities.

Handout 2—Deliberation Activities

Review the Reading

Determine the most important facts and/or interesting ideas and write them below.

1) _____

2) _____

3) _____

Deliberation Question

Learning the Reasons

Reasons to Support the Deliberation Question (Team A)	Reasons to Oppose the Deliberation Question (Team B)

My Personal Position

On a separate sheet of paper, write down reasons to support your opinion. You may suggest another course of action than the policy proposed in the question or add your own ideas to address the underlying problem.

Name: _____

Date: _____

Teacher: _____

Handout 3—Student Reflection on Deliberation

Large Group Discussion: What We Learned

What were the most compelling reasons for each side?

Side A: Side B:

What were the areas of agreement?

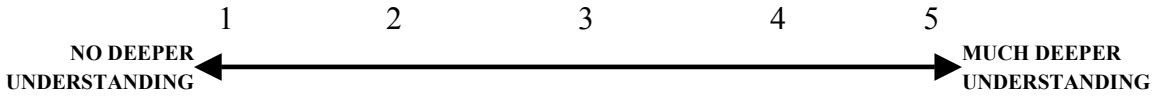
What questions do you still have? Where can you get more information?

What are some reasons why deliberating this issue is important in a democracy?

What might you and/or your class do to address this problem?

Individual Reflection: What I Learned

Which number best describes your understanding of the focus issue? [circle one]



What new insights did you gain?

What did you do well in the deliberation? What do you need to work on to improve your personal deliberation skills?

What did someone else in your group do or say that was particularly helpful? Is there anything the group should work on to improve the group deliberation?