

Climate Change: The Debate

Key Concepts:

- Carbon dioxide
- Fossil fuels
- Greenhouse effect
- Greenhouse gases
- Methane
- Nitrous oxides
- Radiative forcing

WHAT YOU WILL LEARN

1. You will learn about greenhouse gases and the greenhouse effect.
2. You will analyze different readings about how using fossil fuels may or may not be causing the Earth's climate to change.
3. You will write a brief that supports or refutes the position that the use of fossil fuels is causing the Earth's climate to change.

Background

The Earth’s atmosphere is a mixture of gases, mostly consisting of oxygen (21%) and nitrogen (78%); however, these gases contribute little to the **greenhouse effect**. The greenhouse effect is primarily a function of the atmospheric concentration of water vapor and **carbon dioxide** (CO₂) and other trace gases such as **methane** (CH₄) and **nitrous oxides** (N₂O). These **greenhouse gases** occur naturally and play a major role in determining the Earth’s temperature by trapping and reflecting heat energy, a process known as **radiative forcing**. Human activities, such as burning **fossil fuels**, have been proposed as causes of the recent increase in the concentration of these greenhouse gases (Table 1).

Table 1. Global Greenhouse Gas Concentrations (ppm)

Time Period	Carbon Dioxide	Methane	Nitrous Oxides
Pre-industrial concentrations	280	0.7	0.3
Current concentrations	377	1.8	0.3

At the 1997 United Nations (UN) Convention on Climate Change in the Japanese city of Kyoto, the UN member nations agreed to reduce greenhouse gas emissions in order to protect the environment. This agreement is known as the **Kyoto Protocol**.

A key aspect of the Kyoto Protocol called for

industrialized nations, such as the United States, to substantially reduce their carbon dioxide emissions (Figure 1). Much of these emissions come from the burning of fossil fuels. Many scientists think that the increase in atmospheric carbon dioxide is caused by this burning of fossil fuels; and this in turn is causing the temperature of Earth’s

Country	Reduction Target (Percent)	Country	Reduction Target (Percent)
Australia	+8.0	Liechtenstein	-8.0
Austria (R)	-13.0	Lithuania (R)	-8.0
Belgium (R)	-7.5	Luxembourg (R)	-28.0
Bulgaria (R)	-8.0	Monaco	-8.0
Canada (R)	-6.0	Netherlands (R)	-6.0
Croatia	-5.0	New Zealand (R)	0.0
Czech Republic (R)	-8.0	Norway (R)	+1.0
Denmark (R)	-21.0	Poland (R)	-6.0
Estonia (R)	-8.0	Portugal (R)	+27.0
European Community (R) ^a	-8.0	Romania (R)	-8.0
Finland (R)	0.0	Russia	0.0
France (R)	0.0	Slovakia (R)	-8.0
Germany (R)	-21.0	Slovenia (R)	-8.0
Greece (R)	+25.0	Spain (R)	+15.0
Hungary (R)	-6.0	Sweden (R)	+4.0
Iceland (R)	+10.0	Switzerland (R)	-8.0
Ireland (R)	+13.0	Ukraine	0.0
Italy (R)	-6.5	United Kingdom (R)	-12.5
Japan (R)	-6.0	United States	-7.0
Latvia (R)	-8.0		

Figure 1. Kyoto Protocol Carbon Dioxide Reduction Targets. Source: EPA

atmosphere to increase on a global scale. Also, Global warming is believed to be causing the Earth's climate to change. Although many scientists agree that the burning of fossil fuels and other human activity is affecting our climate, some scientists and politicians disagree with this position.

The following exercise consists of a “structured controversy,” a discussion that presents two sides of a controversial issue, in this case, the points which support climate change and the points which refute it. In this structured controversy you will be reading and discussing several documents that present data and information that either support or refute climate change. You will be assigned one of these two positions and asked to create a brief (a statement) in support of that position. You do not actually have to agree with the position; you simply have to write a brief in support of the position based on the data and information provided in the documents as if you agree with this point of view.

Building Your Position

Based on what you currently know about climate change, do you agree or disagree with the position statement that:

Human activity, especially the burning of fossil fuels, is causing the Earth's climate to change.

Explain why you agree or disagree:

Writing the Brief

You will be assigned to a group of 4 and then you will work on writing the climate change brief with a partner from this group. Each pair will be assigned a position and perspective on climate change and then provided materials to write a brief that supports the assigned position. You and your partner will be assigned one of the following position statements:

Human activity, especially the burning of fossil fuels, is causing the Earth's climate to change.

Human activity, especially the burning of fossil fuels, is not causing the Earth's climate to change.

After you and your partner have written your climate change brief in support of your assigned position, present your position and argument to the other pair in your group. They will write and present a brief in support of the other position. After both positions and perspectives have been presented, all 4 will discuss the strong and weak points of each position and record them in the tables below.

Position: *Human activity, especially the burning of fossil fuels, is causing the Earth's climate to change.*

Strengths	Weaknesses

Position: *Human activity, especially the burning of fossil fuels, is not causing the Earth's climate to change.*

Strengths	Weaknesses

After discussing and recording the strengths and weaknesses of each climate change position, the group needs to reach consensus and write a joint climate change position statement. Based on the data and information provided in the documents, you need to be ready to defend your assigned position.

Resource Documents

The following documents provide data and information about climate change. You can use these documents to better understand your assigned position. This understanding will help you write your climate change brief in support of your assigned position, and also give you a good perspective on your assigned position's weak points.

- Consumer Alert (2000). *Global Warming in Brief--Q & A*
- Environmental Protection Agency (2000). *Global Warming and Our Changing Climate*, EPA 430-F-00-011
- Environmental Protection Agency (2002). *In Brief: The U.S. Greenhouse Gas Inventory*, EPA 430-F-02-008
- Environmental Protection Agency (1998). *Straight Talk on Global Warming*
- Environmental Protection Agency (Undated). *What is Global Warming?*
- Environmental Protection Agency (Undated). *Why Care about Global Warming?*
- Environmental Protection Agency (1999). *Fact Sheet on the Kyoto Protocol*
- Environmental Protection Agency (2002). *Fact Sheet on Waste and Climate*
- Friends of Science (2005). *Providing Insight into Climate Science*.
- NASA Earth Observatory (2006). *Paleoclimatology: Explaining the Evidence*