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# Issues in Energy Production

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# Introduction

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This unit book was carefully designed to provide students with the opportunity to think deeply and intelligently about the necessity of energy production and how its methods impact the environment. This unit-book does not preach environmental doctrine. The first chapter sets the tone by providing conflicting opinions on the extent of recent global warming and whether humans are responsible for it. Presented with the worst-case description of the harm that could be caused by global warming, in Chapter 2, students are encouraged to discuss whether America as a whole and they as individuals are obliged to do something to prevent it. In Chapter 3, students learn about the BP disaster and have a chance to discuss the advantages and dangers of relying on oil as a source of energy. After learning about attempts to replace the conventional gas-guzzling vehicle in Chapter 4, students discuss what kind of a car they, as environmentalists, should buy. In Chapter 5, students learn of the potential dangers of mountaintop mining and the practice of hydraulic fracturing (“fracking”) used to release natural gas. They are asked to take on the roles of local farmers or natural-gas company CEOs and argue for and against fracking on a farmer’s property in Pennsylvania. In Chapter 6, students decide whether they would allow a nuclear plant or disposal facility to be located within ten miles of their homes. Other chapters raise similar and often personal questions about using solar, wind-turbine, geothermal, biomass, and ocean-generated energy. Chapters 9 and 10 require students to examine their own carbon footprint and decide what they and the U.S. as a whole should do about their problems with greenhouse gases. Chapter 11 provides students with review questions and an essay question that teachers may use for a unit test on global warming.

To insure learning, each chapter provides students with multiple-choice questions on its important facts and concepts. To encourage higher-order thinking, students are assigned a short essay in which they express their opinions on the issues raised by the chapter. Teachers are presented with teacher pages that provide an overview of each chapter and their objectives and suggest teaching strategies.

# CHAPTER 1

## GLOBAL WARMING: CAUSED BY HUMAN ACTIVITY?

### Overview

This chapter presents two sides of the issue of whether global warming exists and whether it is caused by human activity. The chapter begins with a description of three environmental disasters of the summer of 2010 (two heat waves and a flood) that many presume were caused by global warming. A chart shows the 0.8-degree Celsius increase in global warming since 1911. Most of the chapter consists of documents from various sources stating that global warming does or does not exist, and that it is or is not caused by human activity. Multiple-choice questions test students' understanding and their ability to analyze the articles. An essay question asks students to take a stand on the issues raised.

### Objectives

Students will:

- read and analyze evidence that global warming does or does not exist and that it is or is not caused by human activities
- discuss what they think the evidence presented in this chapter shows about global warming
- explain their own beliefs regarding global warming.

### Strategies

Determine whether students have done their homework by reviewing their answers to the multiple-choice questions and discuss why each answer is correct. Emphasize that 0.8-degree Celsius increase in global temperature is equivalent to about 1.2-degrees Fahrenheit. Ask why less than 1.5-degrees warming could cause great changes in climate. Point out that climate change has been consistent in the past 25 years but its effects have not been uniform throughout the globe. End class by having students volunteer to read their essays and explain what they originally believed about global warming and human activity and whether and how what they learned in this chapter has affected their thinking.

# Assignment

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Assign Chapter 2, and pass out the student reading and activities pages. Ask students to complete their assignment on their own paper if they run out of room on the handouts.



# CHAPTER 1

## GLOBAL WARMING: CAUSED BY HUMAN ACTIVITY?

### One Hot Summer

*August 9, 2010: Temperatures in the central U.S. were forecast to climb back to the 100-degree Fahrenheit (37.7 Celsius) mark that week, and in many areas it would feel much hotter than that... Excessive-heat warnings have been issued for nine states along the Mississippi River and a heat advisory covered parts of seven more states. It's the latest heat wave of a Northern Hemisphere summer that has shattered records around the world.*

*August 12, 2010: Russian President Dmitri Medvedev said that 25 percent of Russia's grain crops have been destroyed by weeks of drought and wildfires, leaving many Russian farmers close to bankruptcy.*

*August 14, 2010: Pakistan's Prime Minister Yousuf Raza Gilani said that 20 million people have been affected by the worst floods in his country's history.*

There is some agreement that global warming *might have caused* unprecedented heat waves and the 2010 catastrophic fires in Russia, torrential rains in Pakistan, searing droughts in other parts of the world, and record-setting temperatures in the United States during the same year. These events have intensified the debate over climate change: whether it in fact exists, whether (if it exists) it is caused by human activities, and what if anything should be done about it. The following excerpts and one chart provide some evidence that could support either side in this debate. You will be asked to read these documents and decide what conclusions can and should be drawn from them.

### March 2008: Dubious Professionals Deny Greenhouse Gases Are Causing or Will Cause Climate Change

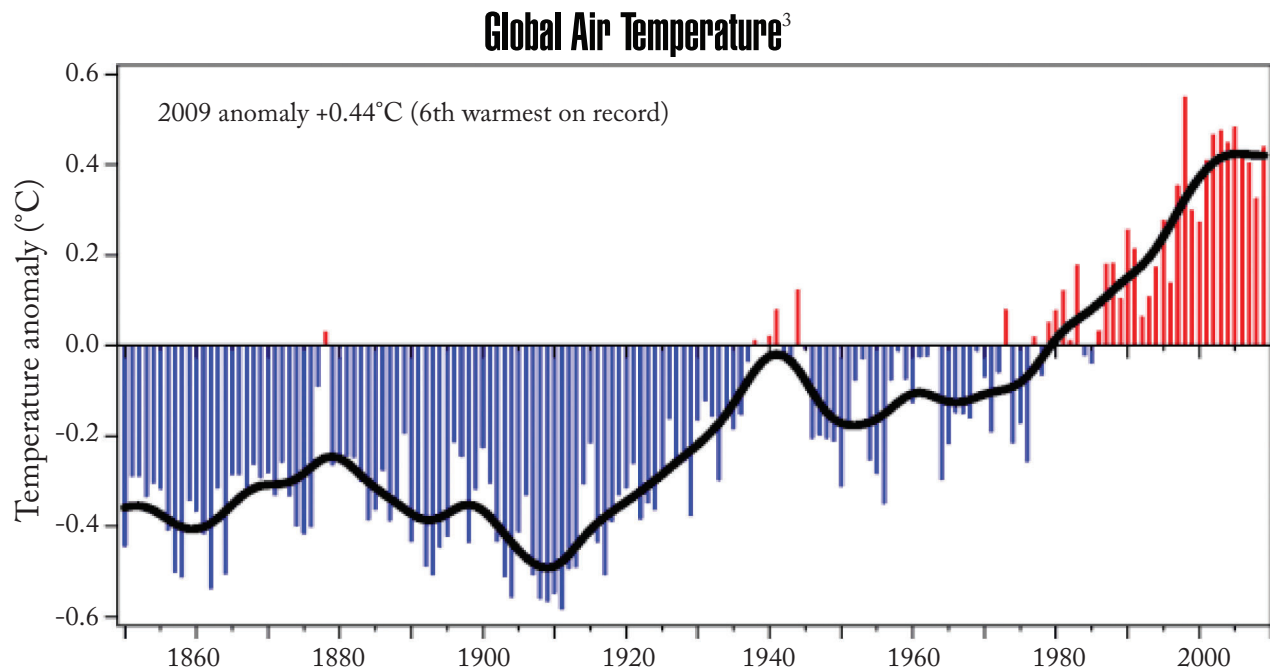
We, the scientists and researchers in climate and related fields, economists, policymakers, and business leaders, [a total of 206] assembled at Times Square, New York City, participating in the 2008 International Conference on Climate Change... *Hereby declare:* That there is no convincing evidence that CO<sub>2</sub> emissions from modern industrial activity has in the

past, is now, or will in the future cause catastrophic climate change... That attempts by governments to inflict taxes and costly regulations on industry and individual citizens with the aim of reducing emissions of CO<sub>2</sub> will pointlessly curtail the prosperity of the West and progress of developing nations without affecting climate... That human-caused climate change is not a global crisis... *Now, therefore, we recommend*—That world leaders reject the views expressed by the United Nations Intergovernmental Panel on Climate Change... That all taxes, regulations, and other interventions intended to reduce emissions of CO<sub>2</sub> be abandoned forthwith.<sup>1</sup>

## February 2007: Report of Intergovernmental Panel on Climate Change

In its first major report [since 2001], the world's most authoritative group of climate scientists issued its strongest statement yet on the relationship between global warming and human activity. The Intergovernmental Panel on Climate Change said the likelihood was 90 percent to 99 percent that emissions of heat-trapping greenhouse gases like carbon dioxide, spewed from tailpipes and smokestacks, were the dominant cause of the observed warming of the last 50 years.<sup>2</sup>

## Change in Global Air Temperature



1. Cornwall Alliance for the Stewardship of Creation Newsletter, October 4, 2010

2. <http://www.nytimes.com/2007/02/06/science/earth/06clim.html>

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## April 2008: Dissent From a British Official

The following dissent was written by Nigel Lawson, a member of British Prime Minister Margaret Thatcher's Conservative Party's government:

The readiness to embrace this fashionable belief has led the present Labor Government, enthusiastically supported by Democrats, to commit itself to a policy of drastically cutting back carbon dioxide emissions—at huge cost to the British economy and to the living standards not merely of this generation, but of our children's generation, too.

Now, I readily admit that I am not a scientist; but then neither are the vast majority of those who espouse the currently fashionable madness. Moreover, most of those scientists who speak with such certainty about global warming and climate change are not climate scientists, or Earth scientists of any kind, and thus have no special knowledge to contribute.

Those who have to take the key decisions aren't scientists either. They are politicians.

...Given that nowadays pretty well every adverse development in the natural world is automatically attributed to global warming, perhaps the most surprising fact about it is that it is not, in fact, happening at all. The truth is that there has so far been no recorded global warming at all this century.

The world's temperature rose about half a degree Celsius during the last quarter of the 20th century but for the first seven years of the 21st century reveal there has been a standstill.

Genuine climate scientists admit that Earth's climate is determined by hugely complex systems, and reliable prediction is impossible.

That does not mean, of course, that we know nothing. We know that the planet is made habitable only thanks to the warmth we receive from the rays of the sun. Most of this heat bounces back into space; but some of it is trapped by the so-called greenhouse gases which exist in the Earth's atmosphere. If it were not for that, our planet would be far too cold for man to survive.

The most important greenhouse gas is water vapor, including water suspended in clouds. Rather a long way behind, the second most important is carbon dioxide.

The vast bulk of the carbon dioxide in the Earth's atmosphere is natural—that is, nothing to do with man. But there is no doubt that ever since the Industrial Revolution in the latter part of the 19th century, man has added greatly to atmospheric concentrations of carbon dioxide by burning carbon—first in the form of coal, and subsequently in the form of oil and gas, too.

So it is reasonable to suppose that, other things being equal, this will have warmed the planet, and that further man-made carbon dioxide emissions will warm it still further.

But in the first place, other things are very far from equal. And in the second place, even if they were, there is no agreement among reputable climate scientists over how much this

contributed to the modest late-20th century warming of the planet, and thus may be expected to do so in future.<sup>4</sup>

## December 2007: Vice President Albert Gore's Nobel Prize Acceptance Speech on Climate Change

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Albert Gore, vice president under President Bill Clinton, devoted years of his life researching and writing about global warming.

[T]oday, we dumped another 70 million tons of global-warming pollution into the thin shell of atmosphere surrounding our planet, as if it were an open sewer. And tomorrow, we will dump a slightly larger amount, with the cumulative concentrations now trapping more and more heat from the sun...

In the last few months, it has been harder and harder to misinterpret the signs that our world is spinning out of kilter. Major cities in North and South America, Asia and Australia, are nearly out of water due to massive droughts and melting glaciers. Desperate farmers are losing their livelihoods. Peoples in the frozen Arctic and on low-lying Pacific islands are planning evacuations of places they have long called home.. Stronger storms in the Atlantic and the Pacific have threatened whole cities... Millions have been displaced by massive flooding in South Asia, Mexico, and 18 countries in Africa... We are recklessly burning and clearing our forests and driving more and more species into extinction. The very web of life on which we depend is being ripped and frayed.<sup>5</sup>

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4. Nigel Lawson, The real inconvenient truth: Zealotry over global warming could damage our Earth far more than climate change, Mailonline, October 4, 2010

5. Al Gore, "Nobel Peace Prize Acceptance Speech," Oslo, Norway, 10 Dec 2007

Name: \_\_\_\_\_

Date: \_\_\_\_\_

# Student Activities

## Global Warming: Caused by Human Activity?

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### A. Multiple-choice:

1. Which of the following is a definite sign that human activity is causing global warming:
  - a. A drought in the USSR
  - b. Floods in Pakistan
  - c. A very hot summer in the U.S. in 2010
  - d. None of the above
2. On what fact about global warming, if any, do the authors of the various documents in this chapter agree?
  - a. That average global temperatures have increased considerably
  - b. That human activity is the cause of global warming
  - c. That melting ice caps will raise ocean levels and flood major coastal cities
  - d. None of the above
3. Which of the following is true:
  - a. Global warming is the result of human activity.
  - b. There is no such thing as global warming.
  - c. Global temperatures were higher in the beginning of the 21st century than they were at the end of the 18th
  - d. None of the above
4. The British official quoted in this chapter believes that:
  - a. human activity causes global warming
  - b. there has been no global warming during the first decade of the 21st century
  - c. politicians are too quick to accept what most people believe to be true
  - d. both b and c.

5. The chart in this chapter shows that:
- global warming is caused by human activity
  - there has been a decrease in global warming between 1940–1955
  - there has been a great decrease in global warming
  - there has been a steady increase in global warming since 1880.

## B. Essay

Write an essay of no fewer than 100 words explaining what you believe the relationship is between global warming and human activities. In your essay, indicate why you agree with at least one of the documents in the reading and why you disagree with at least one other document. Also note what your opinion was before you read this chapter.