

## EcoSchools Multimedia Presentation: *Changing Climate, Changing Attitudes*

This answer key corresponds to the student question sheet for the EcoSchools multimedia presentation, *Changing Climate, Changing Attitudes*. Video clips are linked to some of the slides. These provide additional information that describes the impact on specific people and communities. Answers to the questions are found in both the slides and the video clips.

The student question sheet is designed to help focus the attention of the class as the teacher is delivering the multimedia presentation. This answer key/extension suggestions resource is meant to support the delivery of the presentation. Many of the questions link to the Big Ideas found in the EcoSchools curriculum documents. This multimedia presentation complements all of the EcoSchools' documents and is suitable for students from grades 7-12.

The presentation can be viewed over a number of periods. Below is a suggested schedule, based on 40 minute periods:

**Period 1:** Introduction to climate change: Slides 1 – 23

**Period 2:** Impacts of climate change: Slides 24 – 40

**Period 3:** Climate Change Challenge: Slides 41 – 59

### Answer Key

The numbered questions below correspond to the questions found on the student question sheet. The student questions appear in regular type; *answers appear in italics*.

### Extensions for Teachers

Opportunities to engage in class discussion and extend students' learning as the presentation is being made are identified in the text below as:

- ▶ **Making Connections:** Here is a chance to make links to other subject areas. You may want to use these to illustrate to students how climate change affects many areas of our lives. Climate change is a complex issue that requires multidisciplinary study and numerous solutions.
  
- ▶ **Skills Building:** activities or questions that can be used during or after the presentation that help to build skills listed in the curriculum.

## **Introduction: Slides 1-23**

- ▶ **Making Connections:** Ask students if they have heard of the terms climate change or global warming.

1. What is climate?

*Climate is the characteristic pattern or course of weather that an area has over a long period of time.*

2. Describe the greenhouse effect.

*Heat and light energy (radiation) from the sun is either reflected back into space by the atmosphere or passes through the atmosphere and warms the Earth's surface. Some of this energy is radiated back out from Earth. Some gases in the atmosphere absorb or "trap" some of the radiation, increasing the temperature of the Earth's surface. Thus the gases are said to act like a greenhouse.*

3. Draw a diagram of the greenhouse effect

*Answers will vary, but see slide #6 for reference.*

4. What is the climate-changing gas that humans have released the most of (by volume)?

*Carbon dioxide*

5. What are two natural sources of carbon in the global climate system?

- *Oceans (through direct exchange with the atmosphere)*
- *Decomposition and respiration by plants and animals*
- *Volcanic eruptions*

6. What are two natural sinks (absorbers) of carbon?

*Oceans, wetlands, forests*

7. What human processes release carbon into the atmosphere at a rate faster than the natural system can absorb?

*Burning of fossil fuels is the major human-related source of carbon dioxide.*

8. What other human activities have contributed to the reduction in carbon absorption?

*Destruction of forest, wetlands and other natural habitats has reduced the effectiveness of the earth's carbon sinks.*

9. During what period did concentrations of carbon dioxide in the atmosphere show a dramatic increase? What in particular contributed to the increase in carbon dioxide?

- *Late 1800s to the present*
- *The Industrial Revolution: large number of factories built, increased urbanization, change in transportation, beginning of use of fossil fuels in large quantities - coal, gas, oil*

‣ **Making Connections:** History and Chemistry

‣ **Skills Building:** Reading graphs

10. How do scientists know that the climate and the gases in the atmosphere have changed in the past? *Scientists can measure growth rings in trees that are over 10,000 years old and relate changes in tree growth to changes in global temperature. Ice core samples gathered from the Arctic and glaciers around the world contain trapped air bubbles that can be over thousands of years old. The gases in each bubble can be measured and analyzed to determine the composition of the atmosphere in the past.*

11. Slides 17-21 describe the changes in concentration of carbon in the atmosphere. Fill in the table below based on the information from 3 of the slides:

Time period	Major transportation methods	Cooking, heating and light sources	Farming methods	Types of industries	What is the major energy source during this period?
Early 1800's (Slide 17)	<i>Foot Canoe Horses</i>	<i>Wood Candles</i>	<i>Work done by hand or with horses or oxen</i>	<i>Most work done by hand  Some wind or water mills</i>	<i>Wood Water Wind Food to fuel human &amp; animal labour</i>
Early 1900's (Slide 19)	<i>Foot Horses Some cars &amp; streetcars Bicycle</i>	<i>Wood Coal Oil lanterns</i>	<i>Mostly horse-drawn machines</i>	<i>More factories with machines powered by coal and hydro electricity</i>	<i>Coal Wood Some oil &amp; gasoline</i>
Today (Slide 21)	<i>Cars Trucks Train Plane</i>	<i>Electricity Natural gas Oil</i>	<i>Machinery that requires fossil fuels</i>	<i>Factories with machines powered by electricity</i>	<i>Fossil fuels</i>

12. Fill in the blanks:

25% % of Ontario's energy is generated from coal-fired electricity plants.

The greenhouse gas emissions from these plants is equivalent to the greenhouse gas emissions from 6.2 million vehicles.

### ***Impacts of climate change: Slides 24–40***

13. What is the name of the international organization that released a report in 2001 that concluded that the earth's climate was definitely changing because of human activities? Who belongs to this panel? Why is it important?

*The Intergovernmental Panel on Climate Change (IPCC). It is made up of senior climate scientists from all over the world. The IPCC produces reports that bring together the latest scientific research on climate.*

14. What 3 impacts have scientists agreed that climate change has had?

- *Increase in average global temperature*
- *Higher overall sea levels*
- *Decreasing snow and ice cover*

15. List ways that climate change will have an impact on the weather.

*Severe weather events are predicted to become more frequent, more intense and last longer.*

*(Climate change scientists speak of this change in terms of frequency, intensity and duration.)*

16. How might climate change affect natural ecosystems?

*Most plants and animals have evolved over centuries to live in a specific habitat in a specific ecosystem. Rapid changes to parts of the ecosystem (e.g., climate and weather) may change the biotic (living) and abiotic (non-living) conditions of an area more quickly than plants and animals can adapt. Animals and plants already under pressure from other environmental factors (pollution, habitat loss, etc.) will not survive the added threat of climate change.*

17. List ways that climate change will affect human communities.

- *Health problems:*
  - *diseases previously found in other warmer regions (e.g., West Nile virus, dengue fever)*
  - *heat-related ailments (e.g., heat stroke)*
  - *increased respiratory disease (e.g., asthma, bronchitis) and death (children and the elderly are vulnerable to the effects of smog, which in turn is related to the increased use of electricity for keeping cool during hot spells)*
- *Economic problems:*
  - *food supply (agricultural, fisheries)*
  - *potentially less runoff (less water available)*
  - *forestry (reduction in the area covered by boreal forests, the major northern bioregion that supplies wood products)*
  - *rising insurance losses/costs as a result of damaged lives and property*

*Note that these problems will vary regionally.*

18. Describe the international agreement that addresses climate change

*Kyoto Protocol—In 1997, representatives of over 160 countries gathered in Kyoto, Japan to draw up the Kyoto Protocol, an international agreement that seeks to reduce greenhouse gas emissions to below 1990 levels by 2008-2012.*

### ***Climate Change Challenge: Slides 41-59***

19. What is the Canadian government doing about climate change?

- *In 1997, representatives of over 160 countries gathered in Kyoto, Japan to draw up the Kyoto Protocol, an international agreement that seeks to reduce greenhouse gas emissions to below 1990 levels by 2008-2012.*
- *Canada ratified, or committed to the accord in 2002*
- *The Kyoto Protocol will come into effect officially once it has been ratified by enough countries to represent 55% of the global greenhouse gas emissions of the countries who have signed the agreement.*
- *In Canada, implementing Kyoto means reducing our greenhouse gas emissions by 20% below today's levels, or 6% below 1990 levels.*

20. What changes in energy use are needed to reduce the impacts of climate change?

- *Use less energy - conserve*
- *Switch to non-fossil fuels. Hydro, solar and wind power can all produce electricity with fewer GHG emissions than when fossil fuels are burned.*

21. What are three actions you can take to reduce your carbon dioxide emissions?

*Answers will vary.*