# Section 11.2.
# Human Activity and Climate Change.

Textbook pages 482 to 501.

## Before You Read.

How might climate change affect the region where you live?

## What are climate change and global warming?

**Climate change** refers to changes in long-term weather patterns in certain regions. These changes affect the redistribution of thermal energy around Earth. **Global warming** describes an increase in Earth's average global temperature. It is one aspect of climate change. As greenhouse gases increase, the atmosphere is able to absorb and emit more thermal energy. This is known as the **enhanced greenhouse effect. Global warming potential (GWP)** describes the ability of a substance to warm the atmosphere by absorbing and emitting thermal energy. The table below shows the GWP of various greenhouse gases. The greatest carbon source resulting from human activity is fossil fuel combustion. Water vapour accounts for approximately sixty five percent of greenhouse gases, carbon dioxide twenty five percent, and other gases ten percent. Chlorofluorocarbons are thought to be the main cause of the depletion of Earth's protective ozone layer. Humans have very little effect on the amount of water vapour in the atmosphere. Ozone, while an important greenhouse gas, is continually forming and breaking down, so it is difficult to determine its global warming potential.

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## How do general circulation models model climate?

**General circulation models** are computer models designed to study climate. They take into account multiple factors, such as changes in greenhouse gas concentrations, ocean currents, winds, surface temperatures, and albedo. The **albedo** at Earth's surface affects the amount of solar radiation that a region receives. General circulation models are able to determine both past and present climate. Some models predict a temperature rise of six degrees Celsius in northern regions and a sea level rise of almost eighty eight centimeters within the next hundred years.

The effects of global warming may be most severe in northern countries, such as Canada. General circulation models predict heavier spring rains and longer heat waves in some parts of the country. These changes will affect biomes across Canada as well as important industries, such as fisheries and forestry. Water resources and the health of Canadians may also be affected. Most regions of British Columbia will also become warmer. Some general circulation models predict a thirty centimeter rise in the sea level along the northern coast of British Columbia over the next century. This could result in serious

flooding in coastal communities. Areas of **permafrost**, ground that usually remains frozen year-round, are melting. The ice cover in the Arctic Ocean is rapidly shrinking.

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## How are governments addressing climate change?

The Intergovernmental Panel on Climate Change was established to address global concern about climate change and global warming. Its goal is to assess evidence of the human influence on climate change and suggest possible ways to respond. To encourage countries to reduce greenhouse gas emissions, the United Nations has set up an international environmental treaty called the United Nations Framework Convention on Climate Change. As part of the treaty, countries determine what greenhouse gas emission limits should be. Because predictions about climate change cannot be certain, the United Nations suggests that governments use the **precautionary principle** to guide their responses to climate change. This principle states that a lack of complete scientific certainty should not postpone cost effective measures to prevent serious environmental damage.

To reduce the amount of greenhouse gases that Canada produces, the Canadian government has reduced allowable emissions from cars and trucks, required some industries to reduce emissions, increased the types of energy-efficient products available, and set guidelines for improving indoor air quality.