



The greenhouse effect is a good thing - it warms the planet and makes life possible. Without it the world would be a frozen ball of ice.

The problem is, human activity is artificially amping up the natural greenhouse effect.

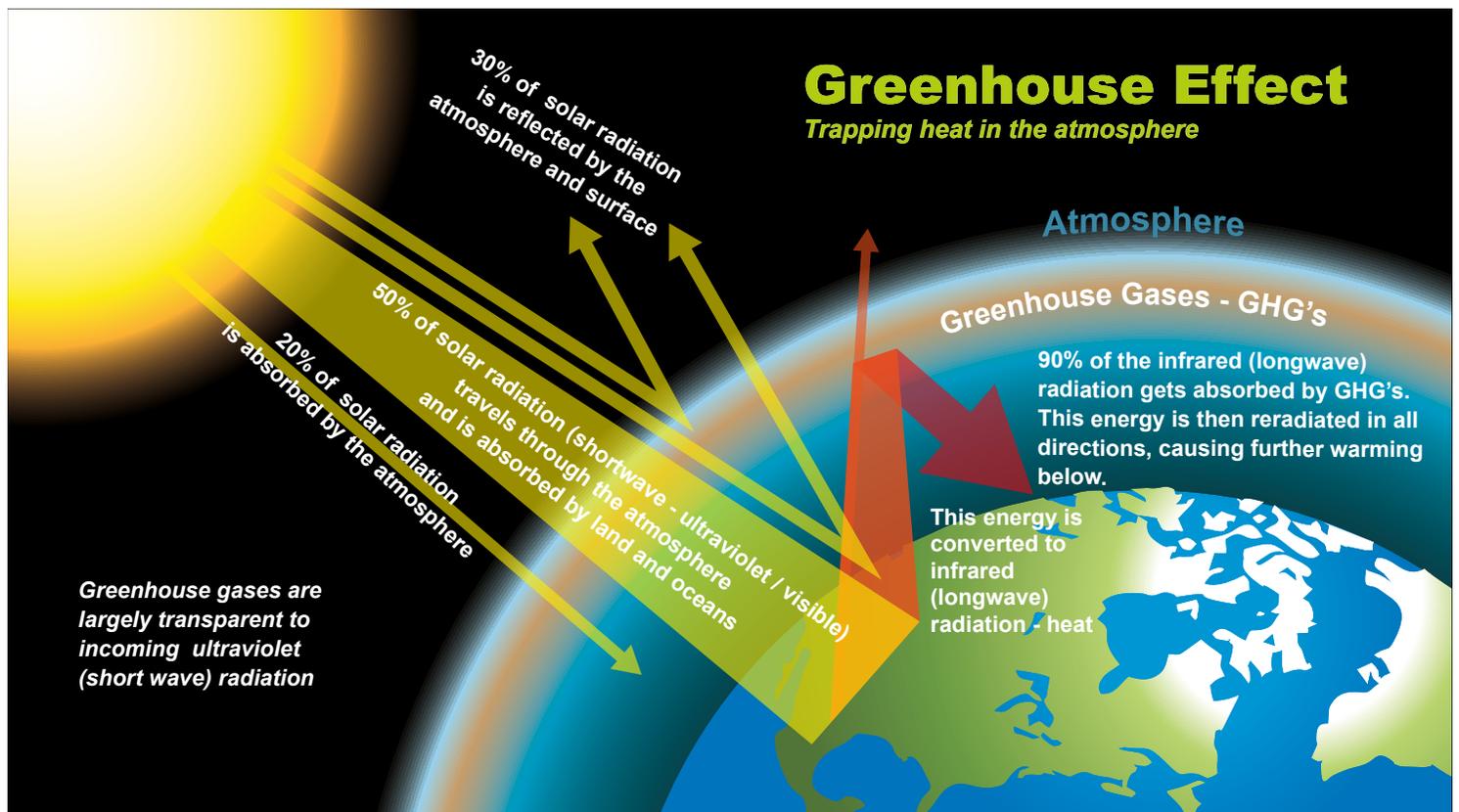
The result? An increase in global warming that is altering the planet's climate systems in countless ways.

What Is the Greenhouse Effect?

- The natural warming of the earth
- Caused when heat from the sun is trapped by certain gases (greenhouse gases) in the atmosphere - heat that would otherwise escape into space.
- Identified by scientists as far back as 1896

What Causes the Greenhouse Effect?

- Earth receives energy from the Sun in the form of ultraviolet, visible, and near-infrared radiation. These have short wavelengths.
- About 30% of the solar energy is reflected back to space by the atmosphere and the Earth's surface.
- A smaller portion (about 20%) is absorbed by the atmosphere while the majority (50%) passes through the atmosphere to the Earth's land and oceans. (Greenhouse gases are largely transparent to incoming solar radiation.)
- This energy is absorbed by the land, oceans and atmosphere as heat
- This heat is then radiated back up in the form of invisible infrared energy. (This radiation now has a longer wavelength)
- Some of this infrared radiation continues on into space
- The majority of the infrared radiation (90%) gets absorbed by certain atmospheric gases, known as greenhouse gases (GHG's).
- GHG's absorb infrared radiation unlike oxygen, nitrogen, etc. which cannot.
- In each layer of atmosphere GHG's re-emitted the energy in all directions, both upwards and downwards.
- This results in more warmth below.



The Human Impact

For most of the past 800,000 years (longer than human civilization) the concentration of greenhouse gases in our atmosphere was between 200 and 280 parts per million. (This means 200 to 280 molecules of the gases per million molecules of air.)

In the past century, that concentration has jumped to more than 400 parts per million, caused by human activities such as burning fossil fuels and deforestation. The majority of this rise occurred in the last 50 years.



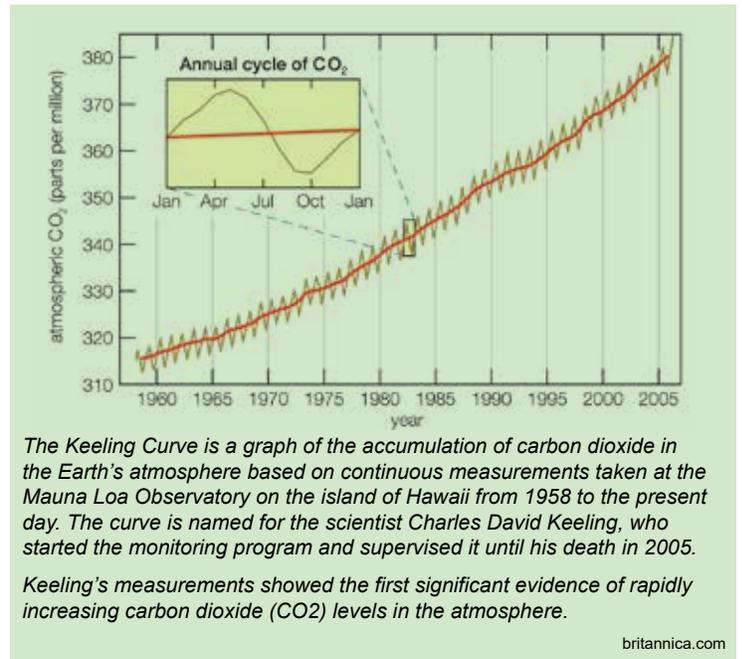
Photo: Ella Ivanescu / Unsplash

The higher concentrations of greenhouse gases—mostly carbon dioxide, methane and nitrous oxide - is causing extra heat to be trapped and global average temperatures to rise. (See Fact Sheets on Greenhouse Gases for more details.)

The enhanced greenhouse effect is leading to a significant changes in our climate - and accelerated global warming.

- There has always been variations in Earth's climate over the millennia but intense research has shown the current trends to be unlike any in the past and is caused by human impact.
- Warmer temperatures mean more energy in the atmosphere which will produce more violent and erratic weather patterns – storms, floods, heat waves, droughts, severe winters, etc.
- An enhanced greenhouse effect will warm the oceans and partially melt glaciers and other ice sheets, increasing sea levels and flooding coastal areas.
- Higher temperatures and shifting climate patterns may change the areas where crops grow best and affect the makeup of natural plant and animal communities.

(See Fact Sheet on Climate Change for more details.)



Other Resources

General Information

The Greenhouse Effect - Environment Canada

<https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-effect.html>

Climate Change Information Kit - United Nations

<http://unfccc.int/resource/kiuckit/cckit2001en.pdf> - United Nations Climate Change Information Kit (PDF Booklet)

Greenhouse Effect 101 - NRDC

<https://www.nrdc.org/stories/greenhouse-effect-101>

Earth's Energy Budget - NASA

<https://earthobservatory.nasa.gov/features/EnergyBalance>

Videos

What Does Climate Change Mean For Canada?

<https://www.youtube.com/watch?v=9SvIT6z5nhc> - 1 °C and its impacts: what does climate change mean for Canada?

State of the Climate 2018

<https://www.youtube.com/watch?v=6r5wKrC7p50> - State of the Climate 2018 - Updated version (February 2019)

Climate Change 101 with Bill Nye - National Geographic

<https://www.youtube.com/watch?v=EtW2rrLHs08> - Climate Change 101 with Bill Nye | National Geographic

