Explaining the Greenhouse Effect

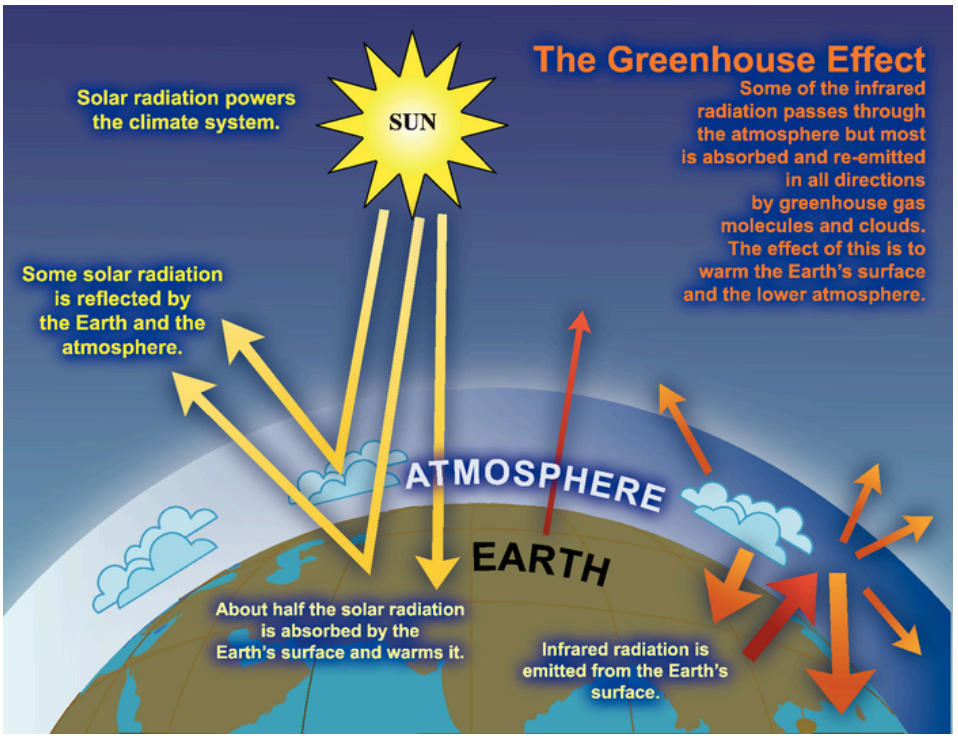
Richelle Choi, Environmental Science

The greenhouse effect is a crucial system that is built in the Earth's atmosphere, allowing the planet to stay at optimal temperatures for life to thrive. Greenhouse gases could be thought of as a blanket on top of Earth's surface, designed to keep the Earth warm.

When ultraviolet (UV) waves are emitted from the sun, some of the waves bounce off Earth's atmosphere, but most energy is absorbed by Earth's atmosphere. This is often because the Albedo effect*. After absorption, the UV wavelength becomes longer, and its frequency becomes lower, turning them into infrared radiation (IR) waves. IR waves have lower energy potential, meaning it is harder for them to escape Earth's atmosphere.

These waves will then be absorbed by greenhouse gases; and throughout the process of releasing these waves again, energy will be released in the form of heat, warming Earth up in the process.

* The Albedo effect is when lighter surfaces, such as ice, reflect energy/light back into space; while darker surfaces, like the ocean, absorb the energy/light.



Why is it an issue?

It is totally normal for greenhouse gases to be in the atmosphere, and in fact, essential to keep humans, animals and plants warm enough for living. However, scientists have been finding abnormal trends of our planet's temperature in the recent years since the industrial revolution.

There has been controversy and debate around what actually caused this spike of temperature for years. Then, the 2023 IPCC Climate Change Synthesis Report stated that "Human activities, principally through emissions of greenhouse gases, have unequivocally caused global warming".

This statement has debunked a lot of officials who claim that climate change is not real, when the reality is that, climate change is happening right now, right before our eyes. The report shows how humans have been producing way too many greenhouse gases through burning fossil fuels and other ways since the industrial revolution, which creates the issue of imbalance in the greenhouse effect. More heat is being trapped in the atmosphere, increasing the atmospheric temperature and causing thermal pollution, coral bleaching, sea ice melting, heatwaves, etc.

How Can We Mitigate This Issue on a Personal Level?

1. **Eliminating Food Waste**- Sure, throwing away food waste and dumping it back into the landfill might seem like an easy solution. Many believe food will decompose and provide nutrients for the soil. However, carbon dioxide is emitted into the atmosphere during this process of aerobic decomposition.
2. **Say NO to fast fashion**- Fast fashion and the clothing industry are one of the leading contributors to the emissions of carbon dioxide. Their business models and highly fossil fuel-dependent exports involving disposal of clothes that are not "in-season" create a huge amount of waste and carbon emissions in the process of decomposing, assuming the synthetic fibres even decompose at all.

3. **Reduce the consumption of beef**- Believe it or not- one of the largest contributors to methane, a GHG, are COWS! Because of the bacteria in their intestines, the burp of the fart of cows contains a lot of methane. Replacing beef with chicken occasionally can already reduce your personal emissions of greenhouse gases by a hefty amount!

To learn more about the current state of our environment, click here.

Works Cited

IPCC (2023). *CLIMATE CHANGE 2023 Synthesis Report A Report of the Intergovernmental Panel on Climate Change*. [online] Available at: https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_FullVolume.pdf.

NASA (2023). *FAQ: What is the greenhouse effect?* [online] Climate Change: Vital Signs of the Planet. Available at: https://climate.nasa.gov/faq/19/what-is-the-greenhouse-effect/ [Accessed 1 Jan. 2024].

NASA (2022). *Global Climate Change- Vital Signs of the Planet*. [online] Responding to Climate Change. Available at: https://climate.nasa.gov/solutions/adaptation-mitigation/ [Accessed 1 Jan. 2024].

NIWA. (2017). *What is the greenhouse effect?* [online] Available at: https://niwa.co.nz/atmosphere/faq/what-is-the-greenhouse-effect [Accessed 1 Jan. 2024].

UCAR (2024). *Earth's Albedo and the Sun's Brightness Affect Climate | Center for Science Education*. [online] Ucar.edu. Available at: https://scied.ucar.edu/interactive/albedo-brightness [Accessed 1 Jan. 2024].