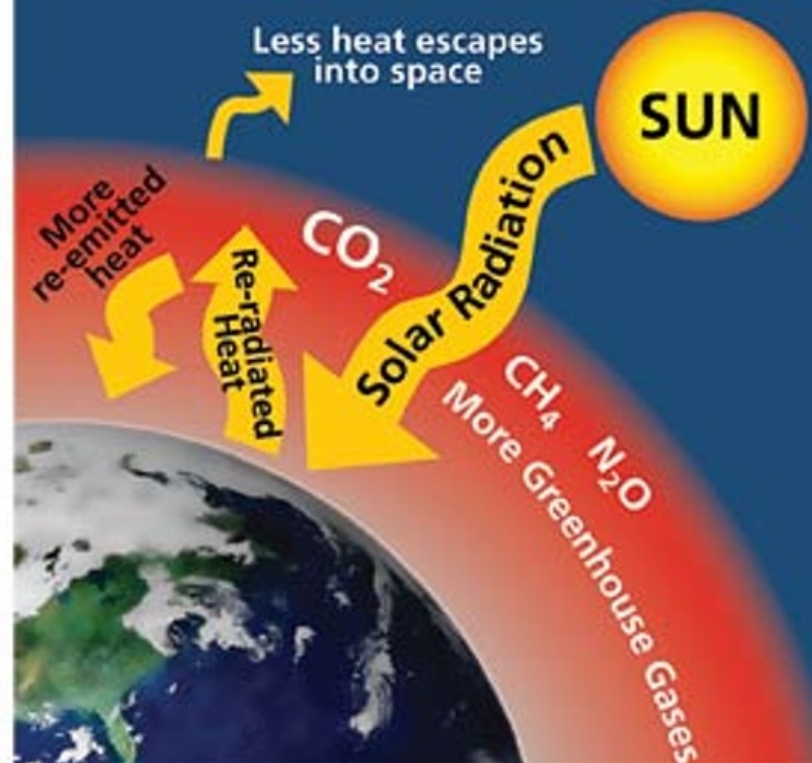


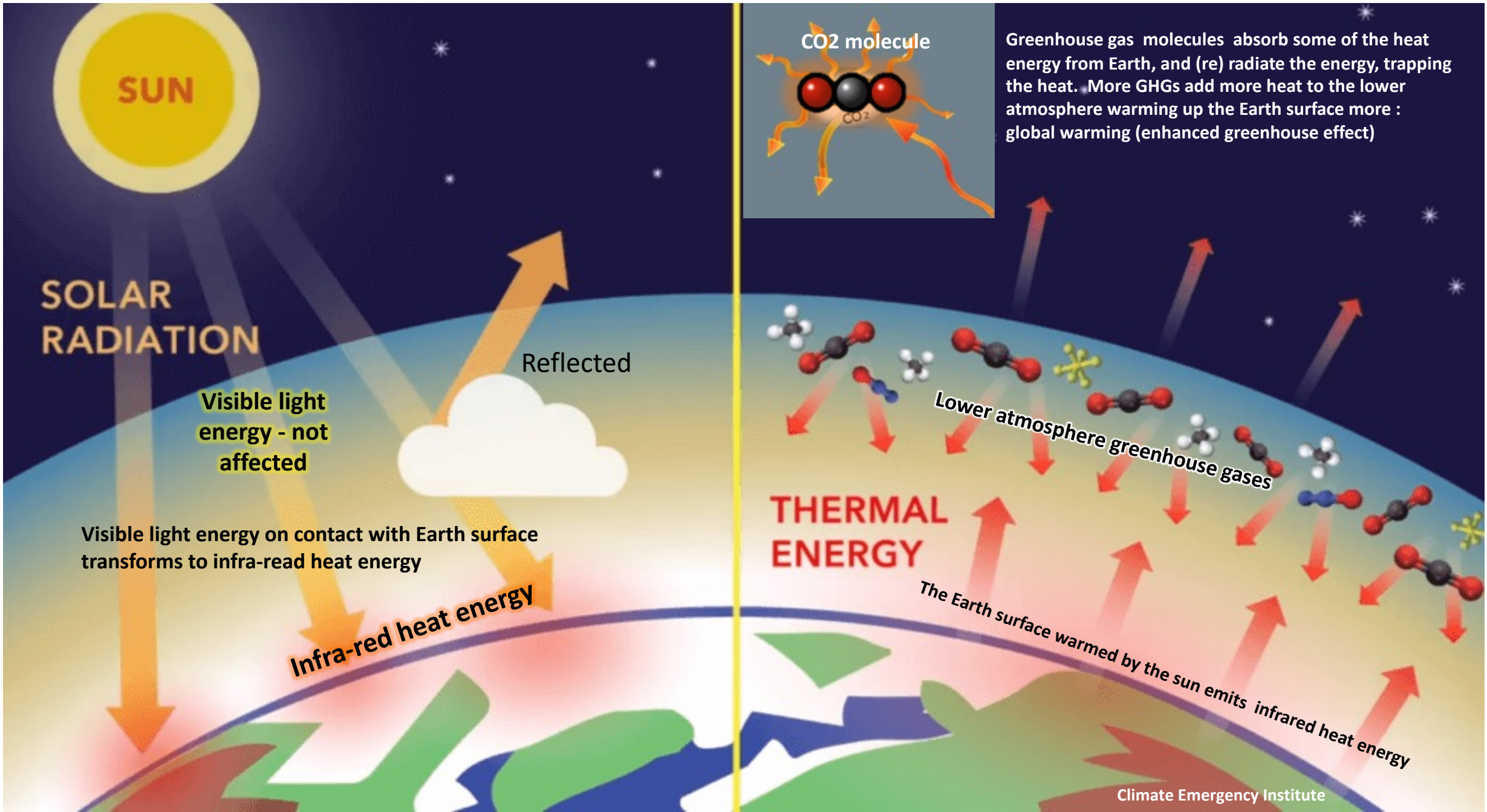
## Natural Greenhouse Effect



## Human Enhanced Greenhouse Effect



# Global warming: the enhanced greenhouse effect





# Science of enhanced greenhouse effect - global warming

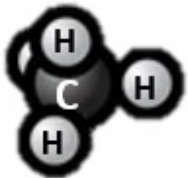
GHG molecules  
in lower atmosphere

carbon dioxide

CO<sub>2</sub>



methane CH<sub>4</sub>



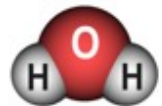
nitrous oxide

N<sub>2</sub>O

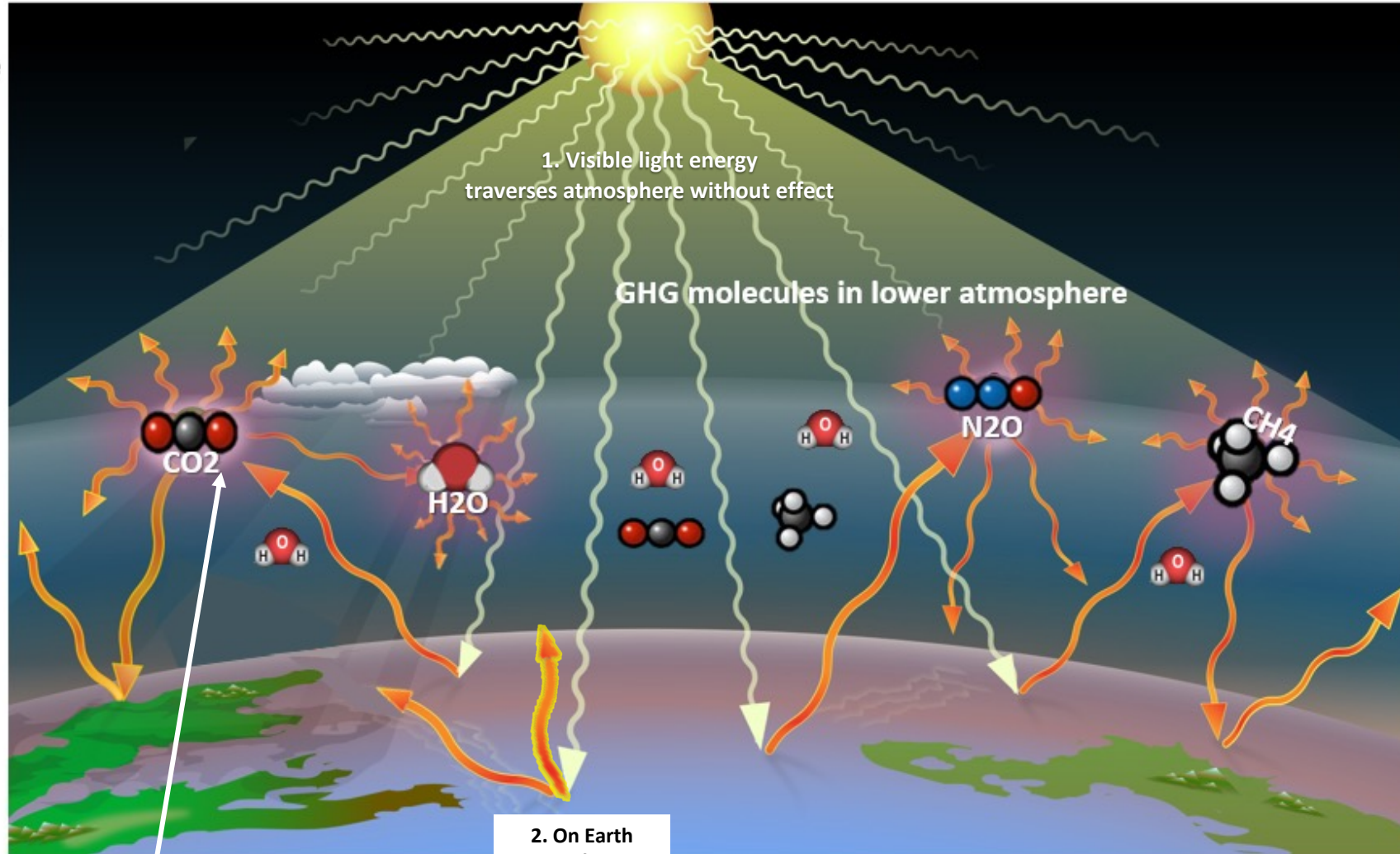


water vapor

H<sub>2</sub>O



most abundant  
GHG by far



Visible light energy from the sun on contact with Earth surface transforms to heat energy (infra-red). This heat energy radiating from Earth surface activates GHG molecules on contact, so-called 'absorb' or 'trap' the heat. In fact activated GHG molecules re-radiate the heat, thereby adding heat to the lower atmosphere and warming the Earth surface. The more GHG molecules the more warming

**WATER VAPOR FEEDBACK**  
Abundant water vapor acts as a feedback doubling the warming of the GHG alone .

**CLOUDS**  
Some clouds reflect solar energy away and some absorb energy as heat

3, Heat energy from Earth on contact with GHG is absorbed- activates GHG which becomes heat radiator. Heat radiating GHGs results in lower atmosphere so surface warming

2. On Earth surface contact, light energy transforms to heat energy radiating up from surface

## From the NOAA

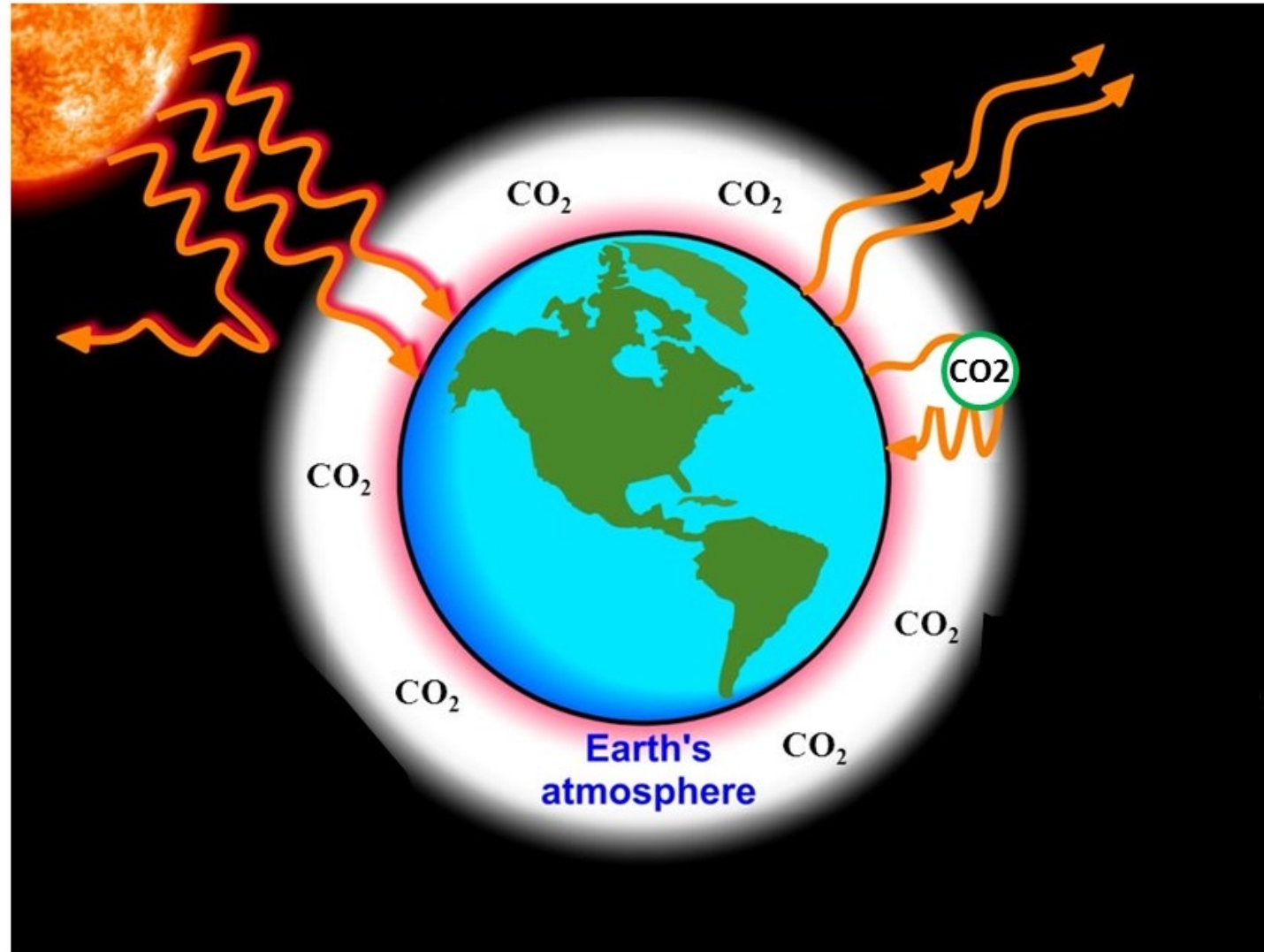
The increased atmospheric greenhouse gas heat energy (from emissions) is analogous to the dial on an electric blanket.. You do know, that if the dial is turned up a little, the blanket will get warmer – and not immediately. If you turn it up a lot, you know the blanket will get a lot warmer – eventually.

But each year the increasing AGGI reminds us that our on-going emission of long-lived greenhouse gases results in more of the sun's heat being trapped in the Earth system. In essence, we continue to increase the setting on Earth's "thermostat" by a small amount every year.



“Either we’ve both woke up with a fever or we left the electric blanket on again.”

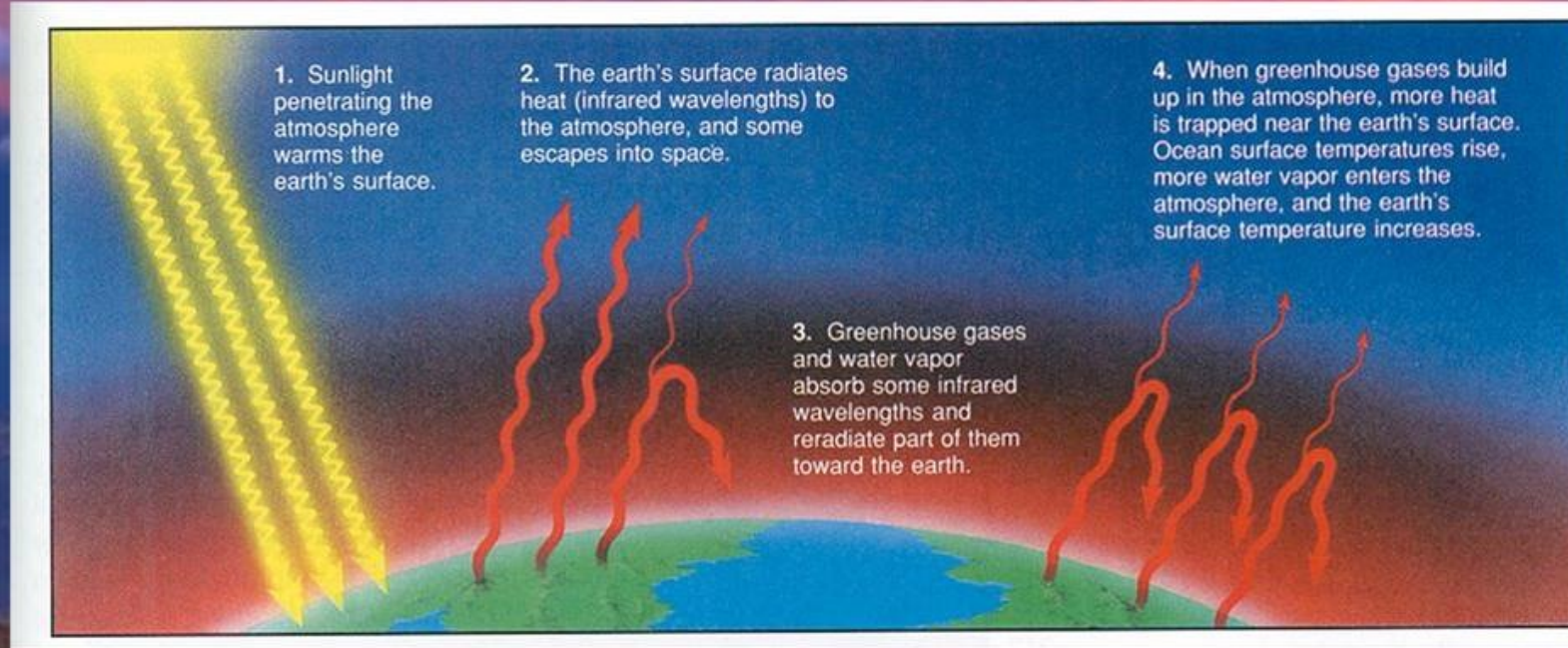
# Global Warming Caused by Increased Atmospheric CO<sub>2</sub>







# Global Warming





# The natural greenhouse effect and unnatural enhanced greenhouse effect of global warming

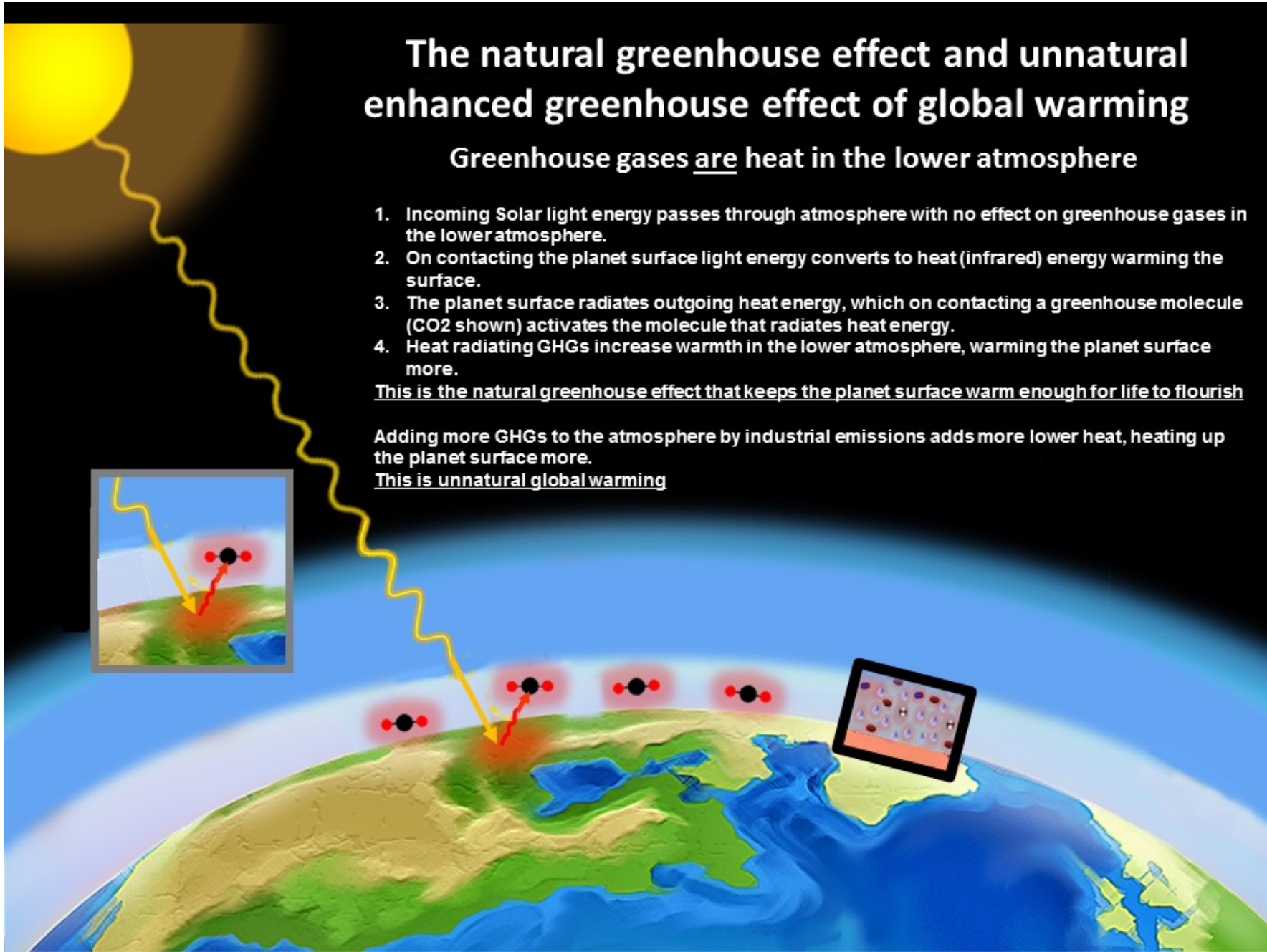
Greenhouse gases are heat in the lower atmosphere

1. Incoming Solar light energy passes through atmosphere with no effect on greenhouse gases in the lower atmosphere.
2. On contacting the planet surface light energy converts to heat (infrared) energy warming the surface.
3. The planet surface radiates outgoing heat energy, which on contacting a greenhouse molecule (CO<sub>2</sub> shown) activates the molecule that radiates heat energy.
4. Heat radiating GHGs increase warmth in the lower atmosphere, warming the planet surface more.

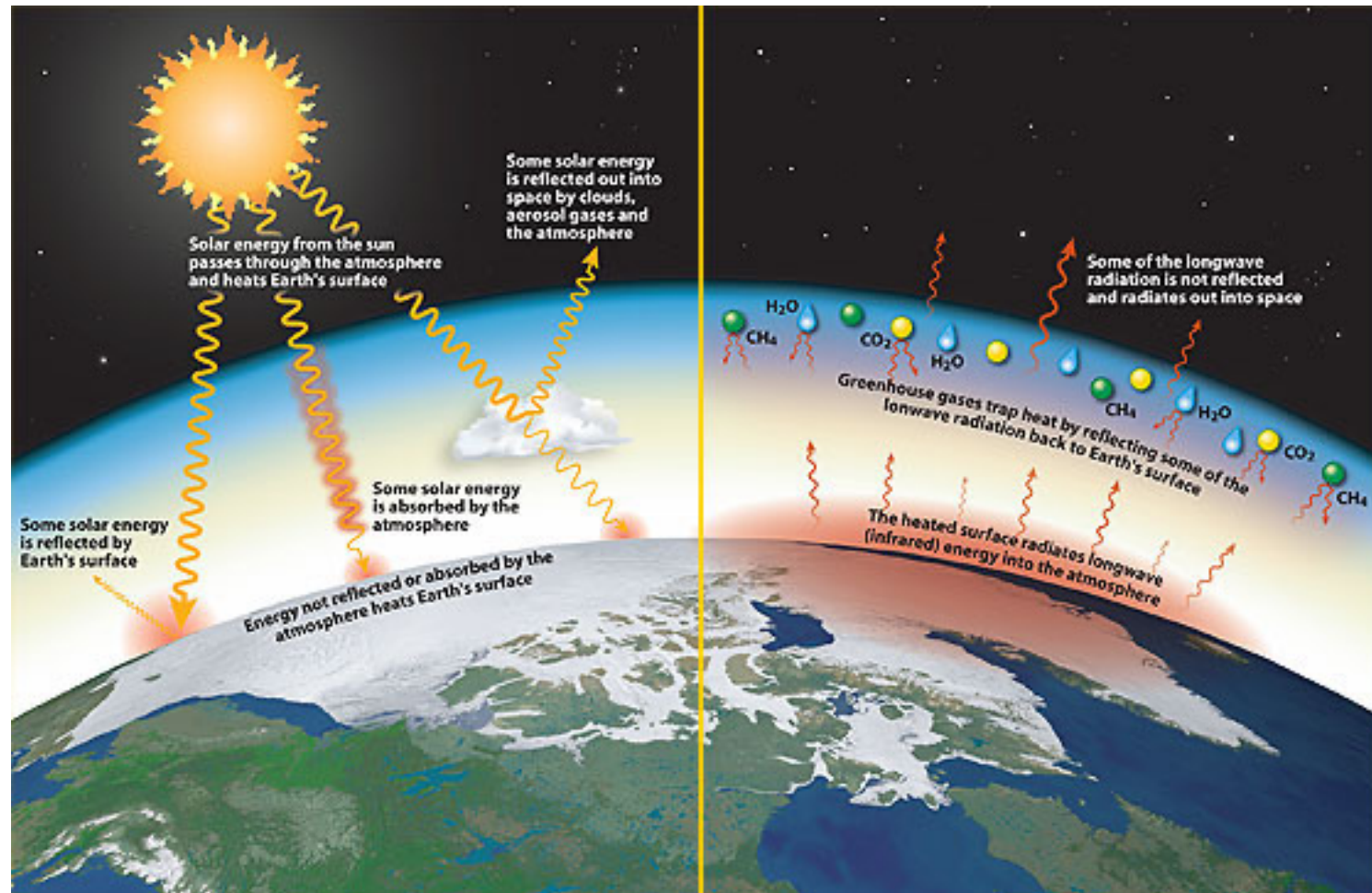
This is the natural greenhouse effect that keeps the planet surface warm enough for life to flourish

Adding more GHGs to the atmosphere by industrial emissions adds more lower heat, heating up the planet surface more.

This is unnatural global warming

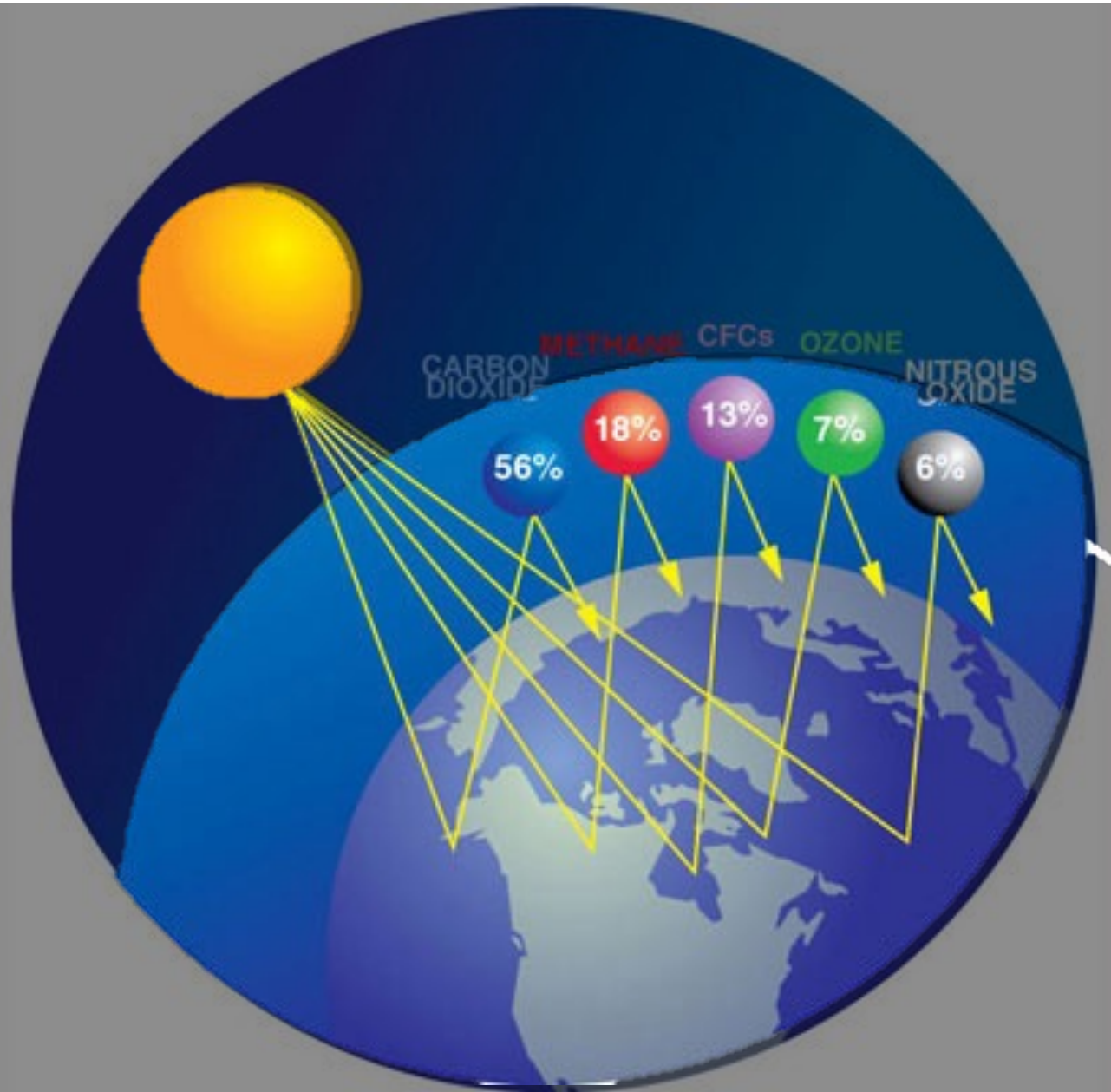
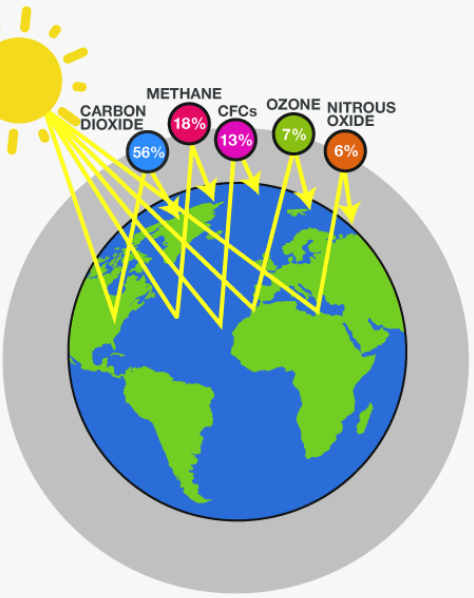






# HOUSE GASES

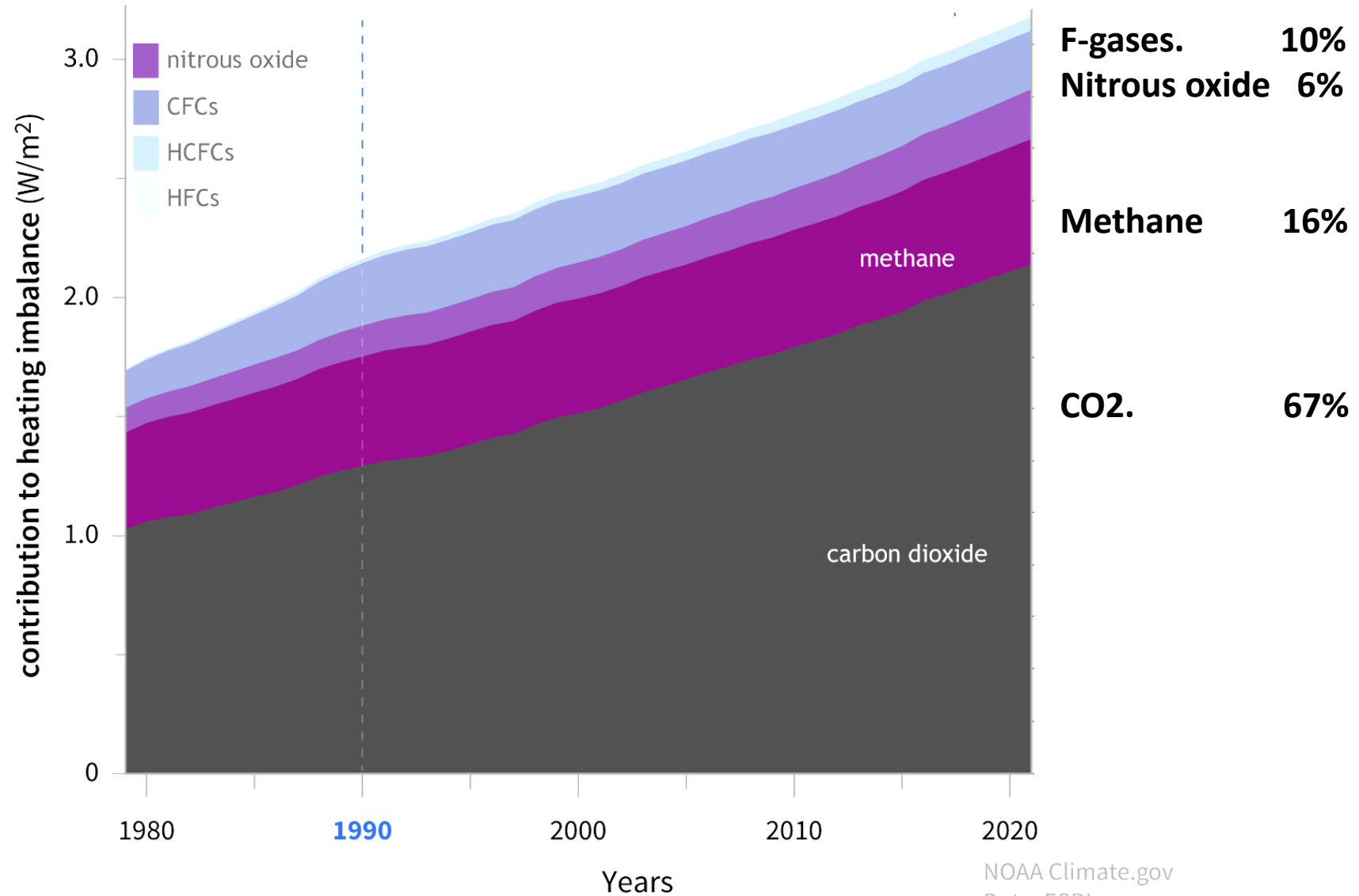
BYJU'S  
The Learning App

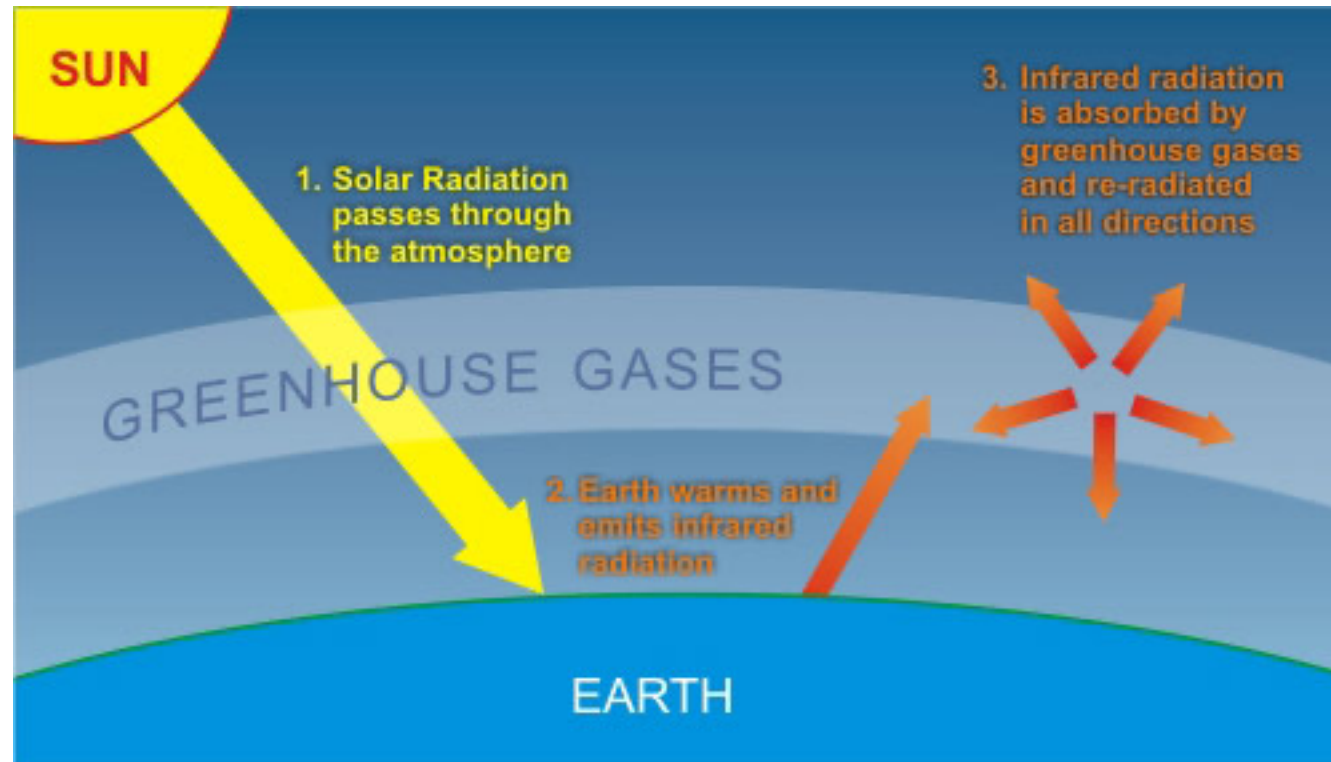




Source: NOAA Greenhouse Gas Index (2022)

## COMBINED HEATING INFLUENCE







# The Greenhouse Effect



Atmosphere

[climate.nasa.gov](https://climate.nasa.gov)

# Science of enhanced greenhouse effect - global warming

carbon dioxide

CO<sub>2</sub>



methane CH<sub>4</sub>



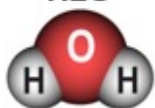
nitrous oxide

N<sub>2</sub>O

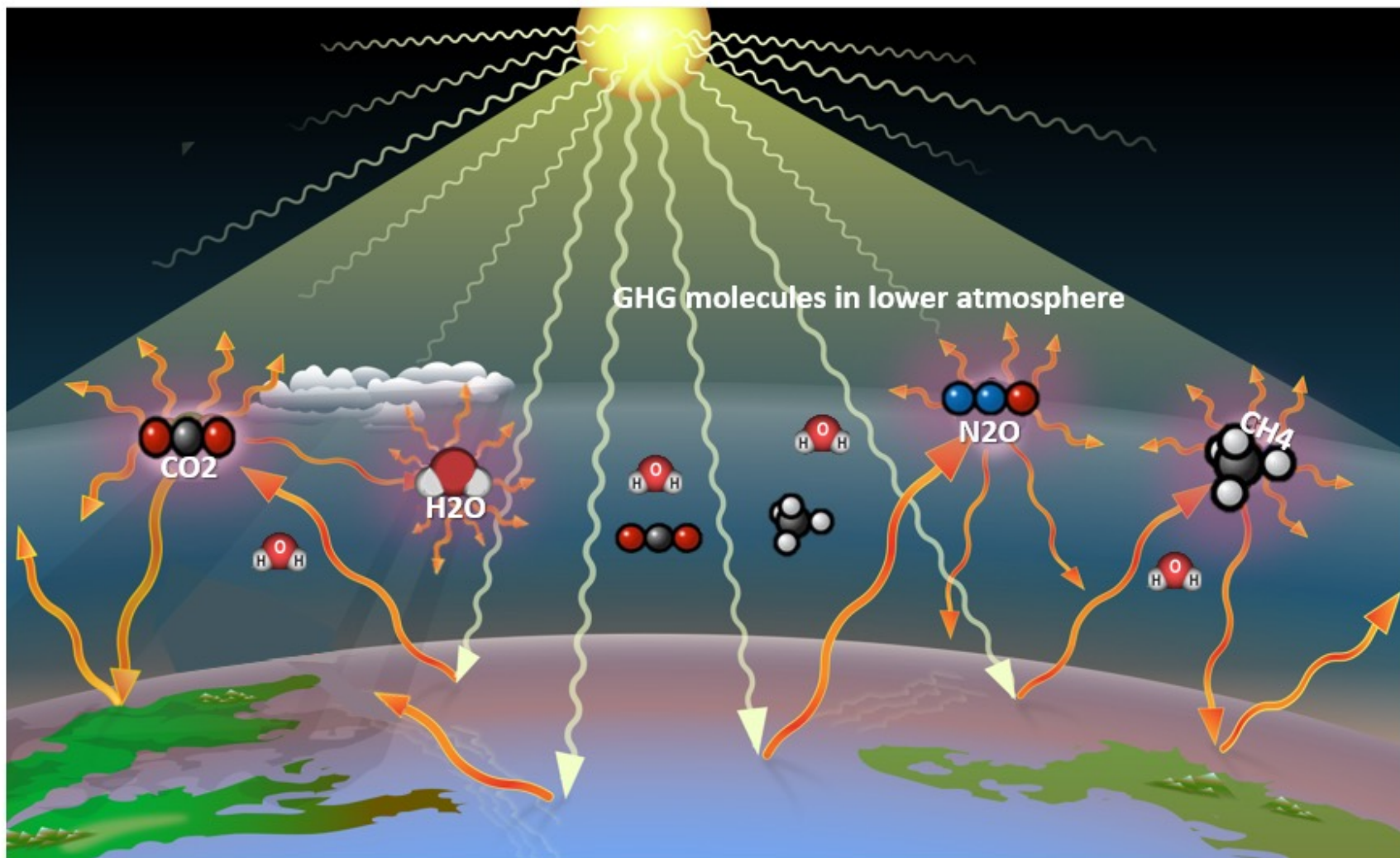


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