



# **Effects of *Greenhouse* *Gases***

***Unit 7 – Ch 21.2-21.4***

# Atmospheric *Gases*

<b>GAS</b>	<b>% Abundance</b>
<b>Nitrogen</b>	<b>~78%</b>
<b>Oxygen</b>	<b>~20%</b>
<b>Argon</b>	<b>~0.97%</b>
<b><i>Water Vapor</i></b>	<b><i>1%</i></b>
<b><i>CO<sub>2</sub></i></b>	<b><i>0.03%</i></b>

***Greenhouse  
Gases***

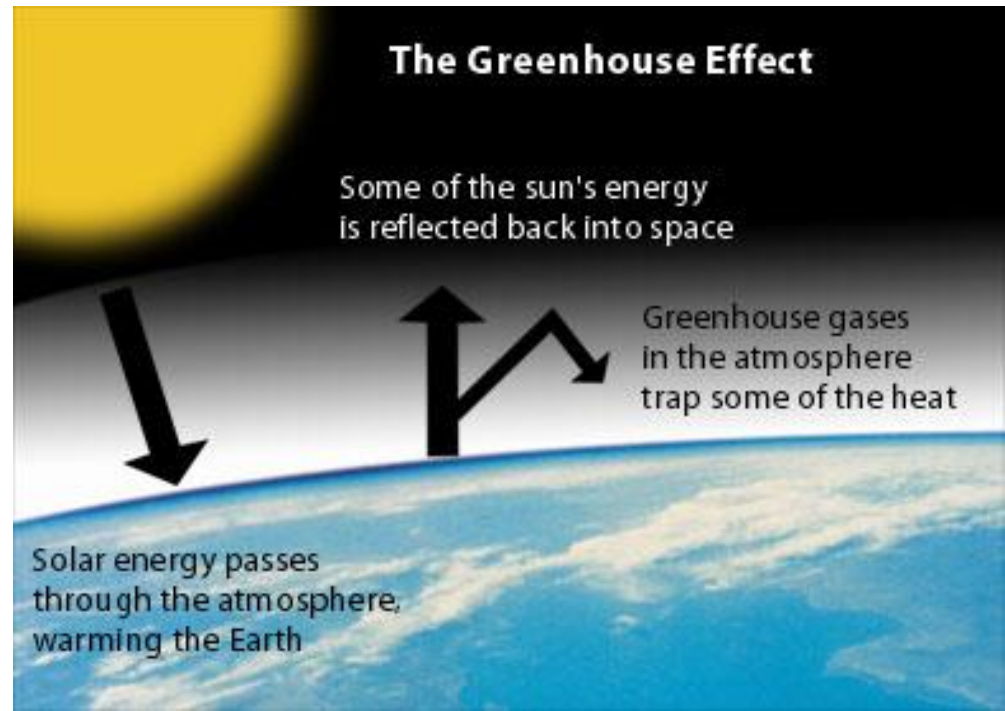


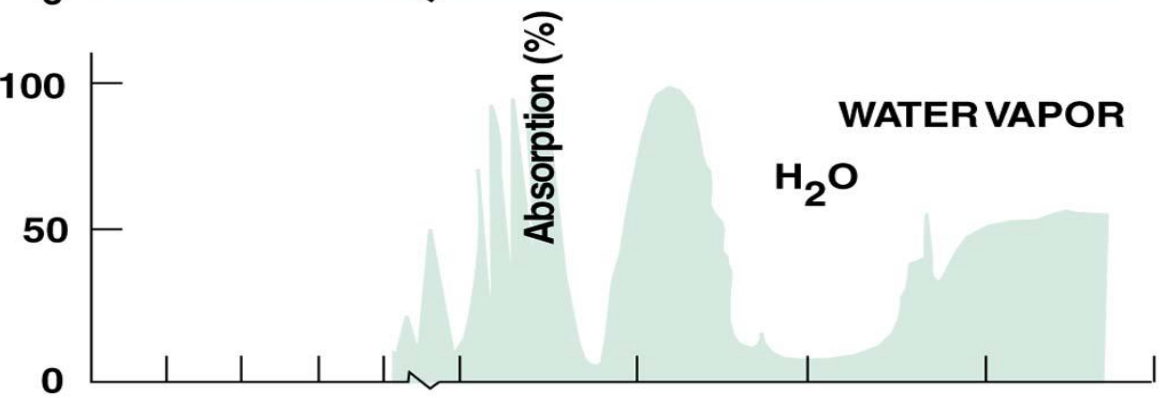
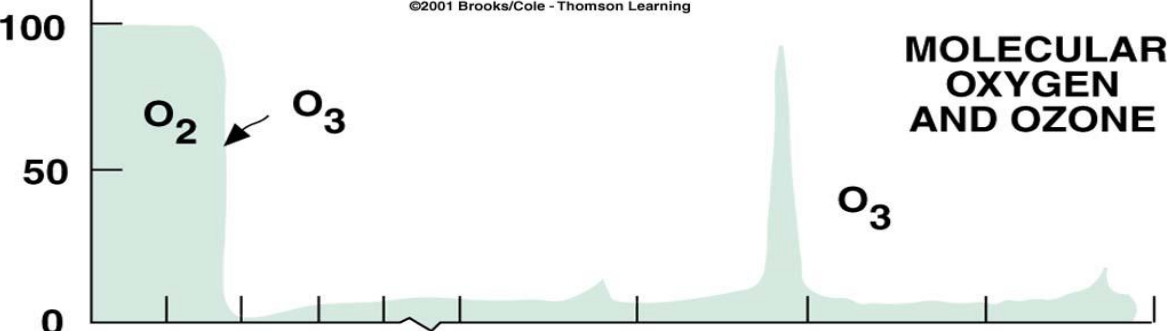
# Greenhouse Effect

- **Natural** warming of **lower atmosphere** and **surface** where radiation is **trapped**
  - Due to **GREENHOUSE GASES**

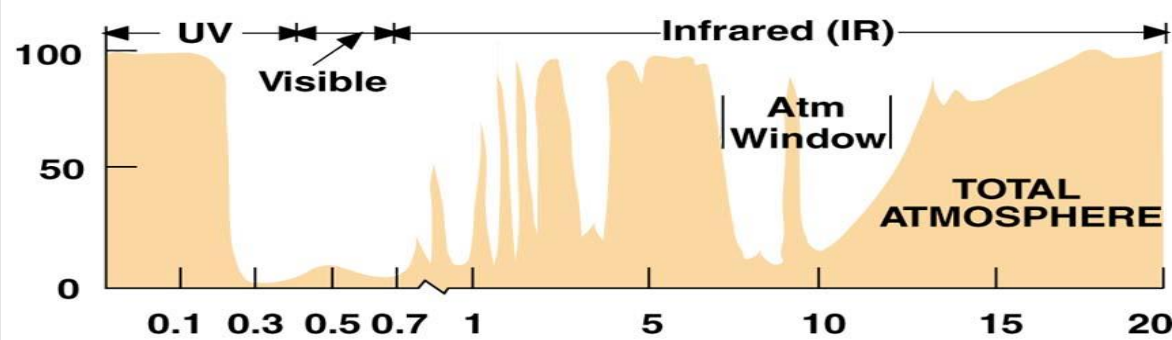
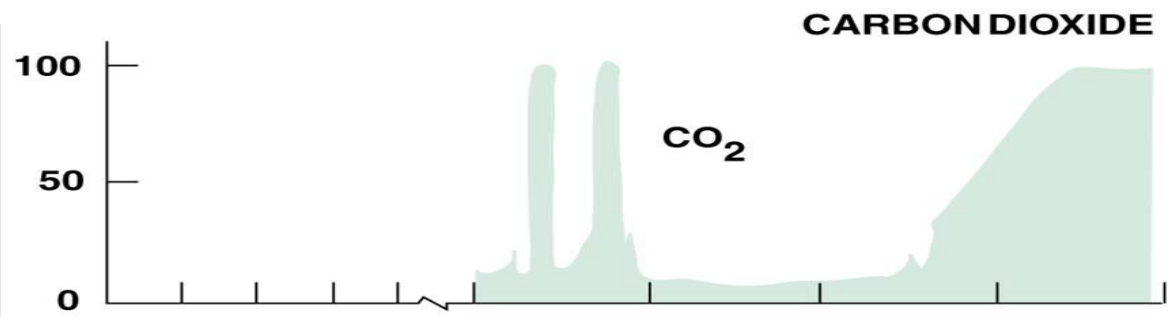
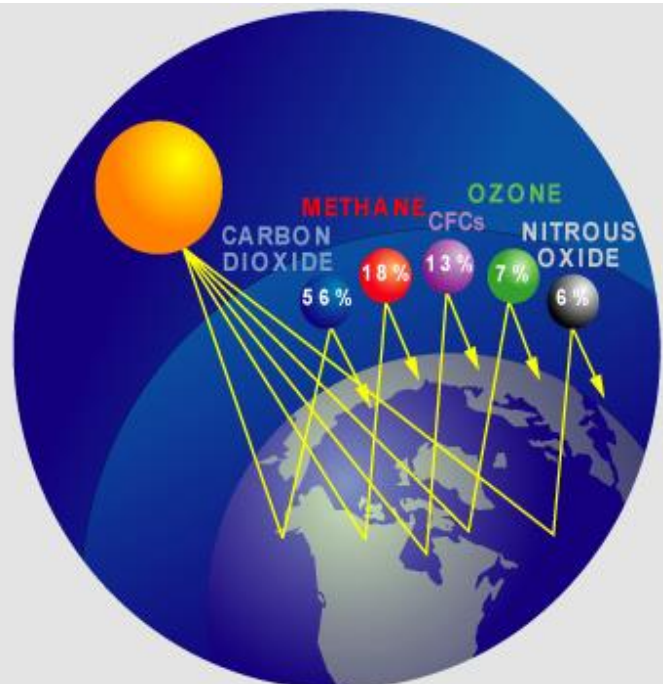
- **Gases Involved:**

- **Water Vapor**
- **Carbon Dioxide**
- **Ozone (O<sub>3</sub>)**
- **Methane**





*Absorption* of radiation in Earth's atmosphere



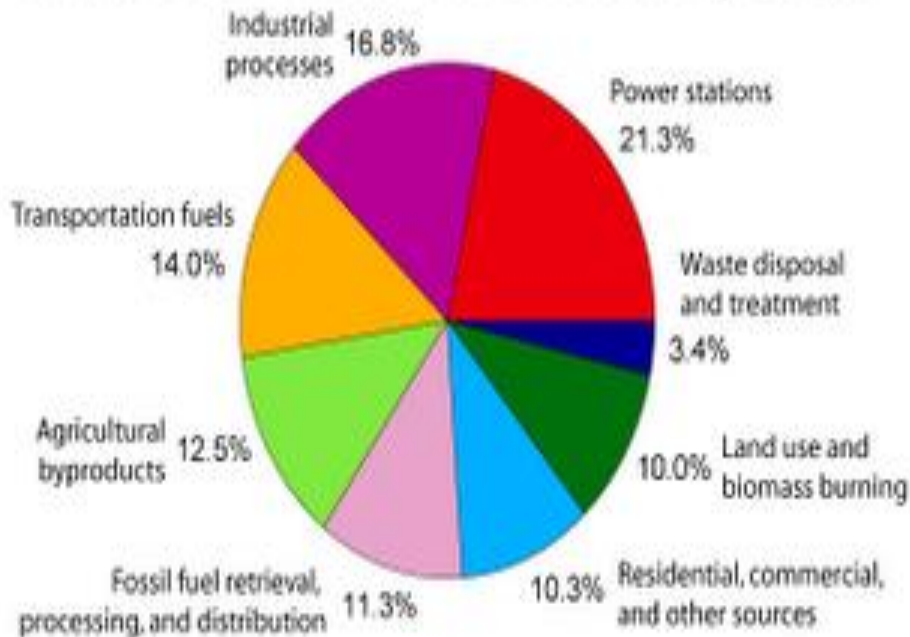
# Natural Causes

- Volcanoes emit *ash, dust, & sulfur* (with other gases) into atmosphere
  - *Larger* particles *reflect* solar radiation back to surface
  - *Smaller* particles *reflect* radiation back into space
- *Oceans, land, and atmosphere* exchange naturally produced *CO<sub>2</sub> continuously*

# Human Causes

- ENHANCED Greenhouse Effect (66% total):

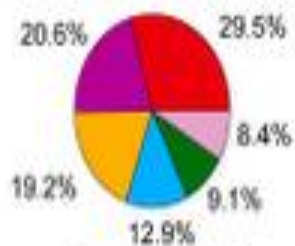
Annual Greenhouse Gas Emissions by Sector



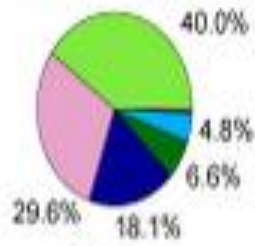
- Burning fossil fuels
  - coal, natural gas, petroleum
  - *Industrial Revolution*

– Deforestation – Land clearing

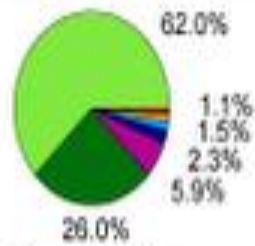
– Landfills – Waste disposal sites



Carbon Dioxide  
(72% of total)



Methane  
(18% of total)



Nitrous Oxide  
(9% of total)

# *Benefits & Dangers*

- *Benefits:*

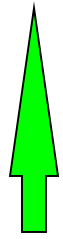
- *Trapped* gases help keep temps on Earth *mild* and *suitable* for life (“*Earth blanket*”)

- *Dangers:*

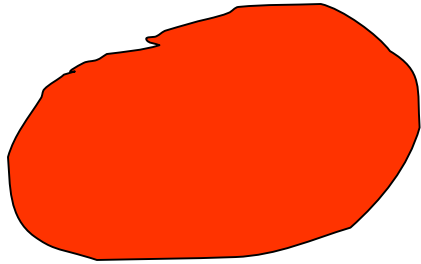
- *Amount* and *RATE of production* at alarming increase

- Leads to *GLOBAL WARMING!*

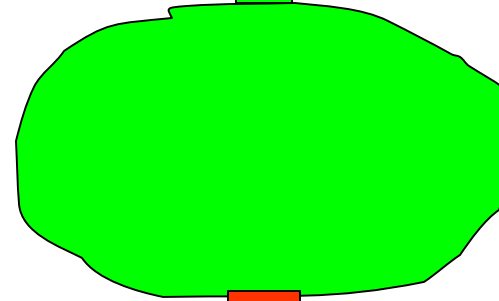
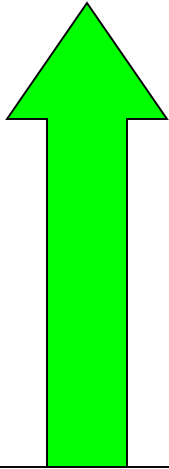
- Global *temp increase* & global *sea level increase*



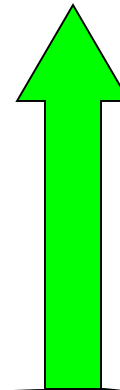
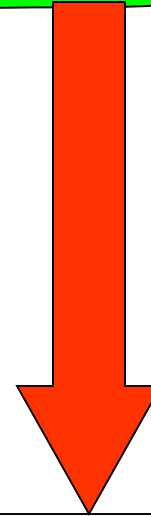
Some *surface* radiation escapes to space



*Greenhouse gases absorb* outgoing infrared



*Greenhouse gases emit* infrared *upward* and *downward*



Some *atmospheric* radiation escapes to space

*Infrared* radiation is *emitted* FROM surface

*Atmospheric* radiation is *absorbed* BY surface