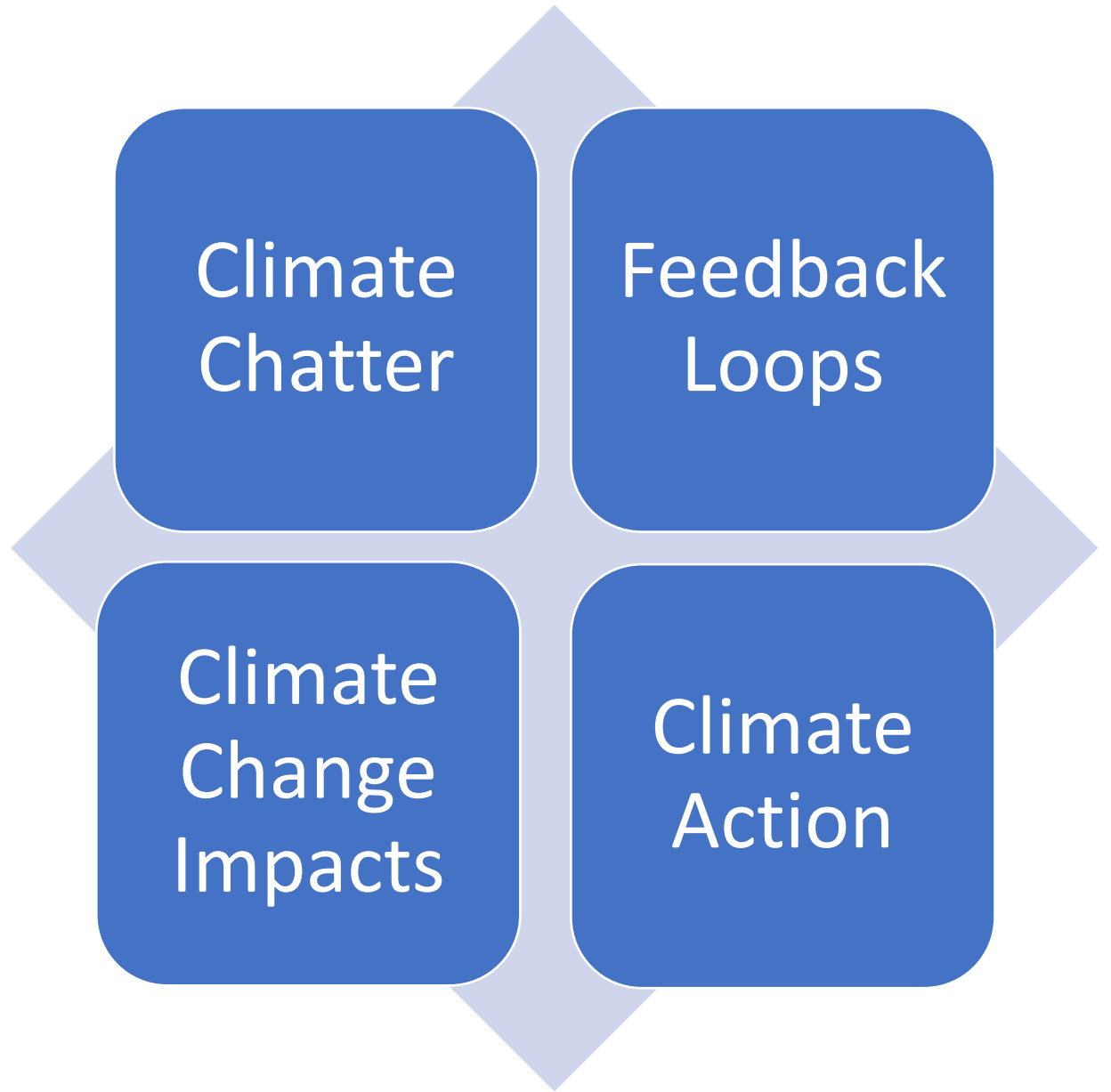


Introduction to Climate Change

Lisete Ochoa (She/Her/Ella)
Recycling Specialist I



Agenda

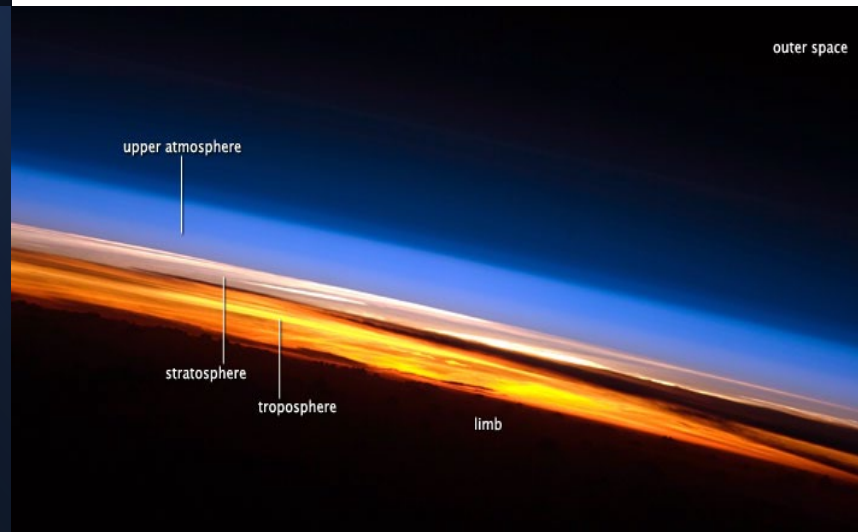


Climate Chatter

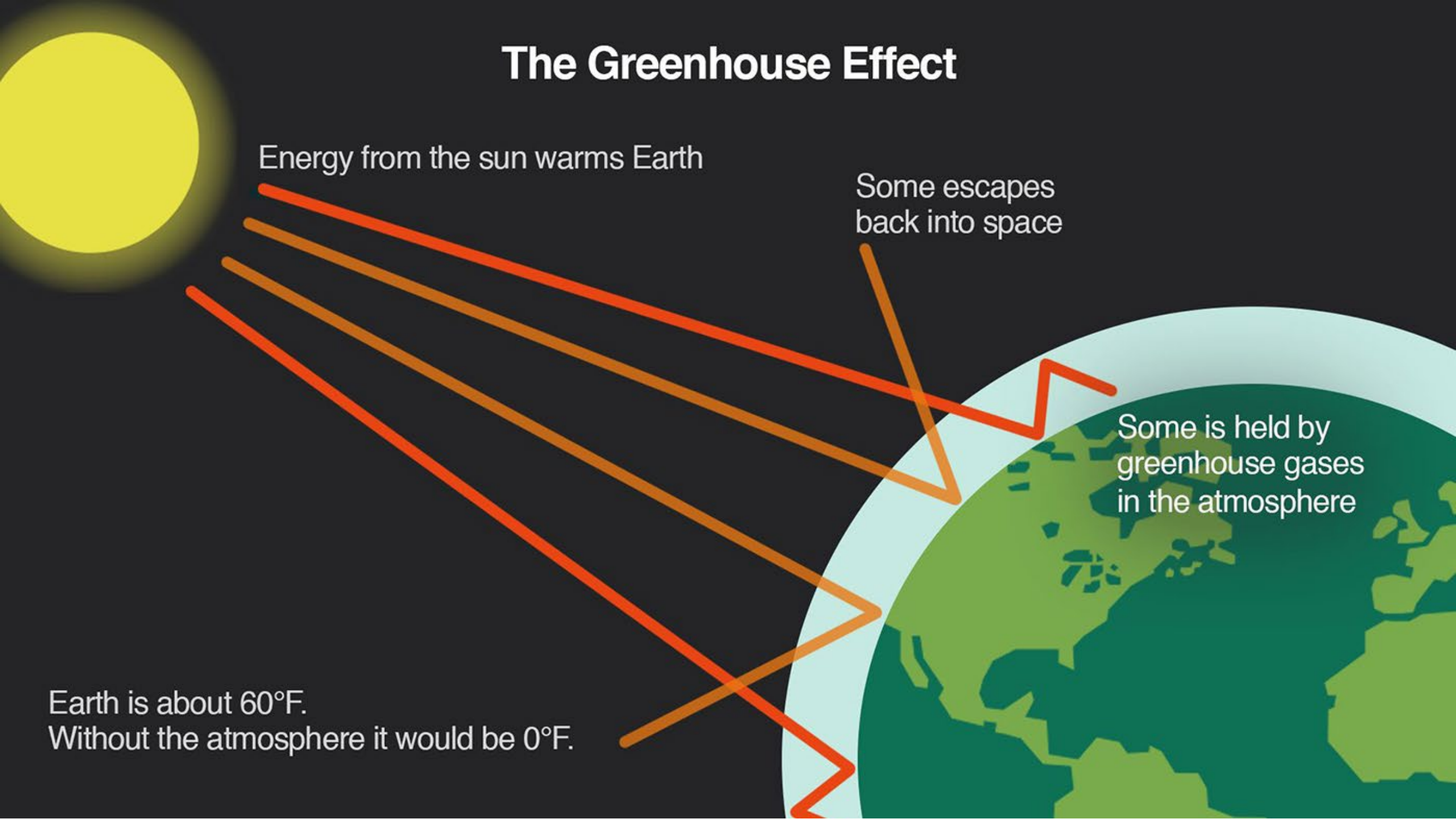
ANTHROPOGENIC: Made by humans or resulting from human activities.

ATMOSPHERE: The gaseous envelope surrounding the Earth (78.1% Nitrogen, 20.9% Oxygen and other trace gases).

CLIMATE: The average pattern of weather conditions over a long period of time for a large area.



The Greenhouse Effect



Energy from the sun warms Earth

Some escapes back into space

Some is held by greenhouse gases in the atmosphere

Earth is about 60°F.
Without the atmosphere it would be 0°F.

Climate Chatter

FOSSIL FUELS: Coal, Crude Oil, and Natural Gas derived from ancient plants and animals over millions of years old. Fossil fuels are burned and/or refined to provide electricity, heat, and transportation.



What Is Climate Change?

Climate change refers to changes in global or regional climate patterns attributed largely to human-caused increased levels of atmospheric greenhouse gases.

In other words, climate change includes major changes in temperature, precipitation, or wind patterns, among others, that occur over several decades or longer.



What Causes Climate Change?

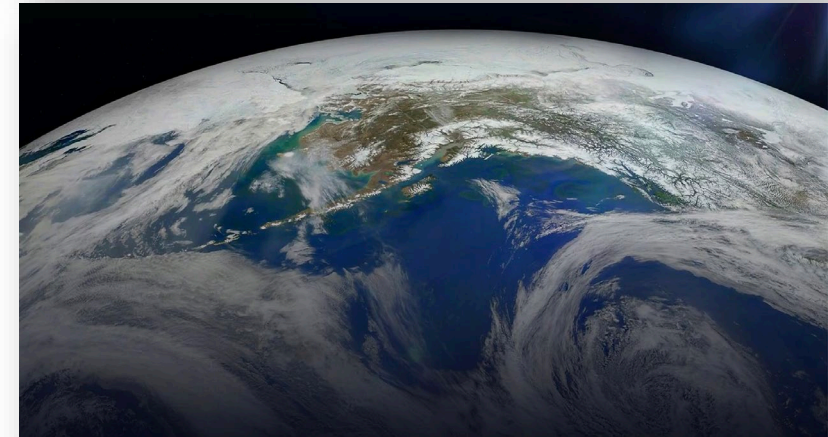
Natural Processes



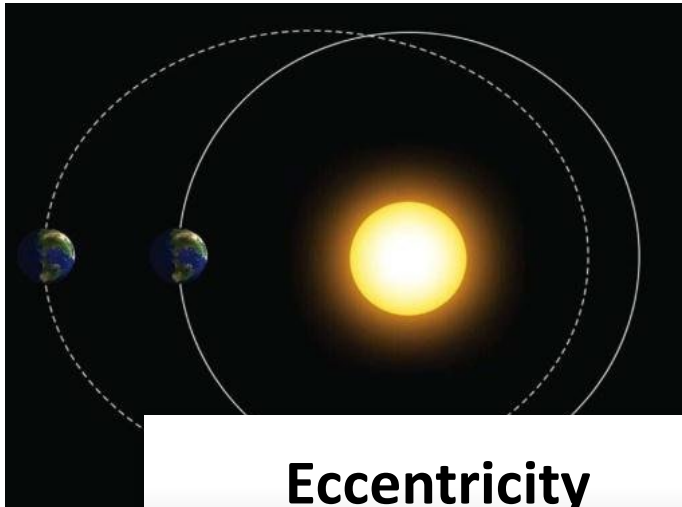
**Anthropogenic
Activities**



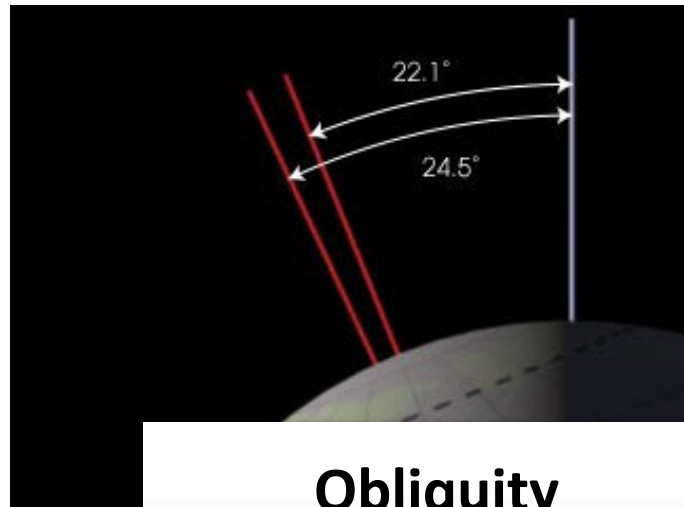
**Climate Feedback
Loops**



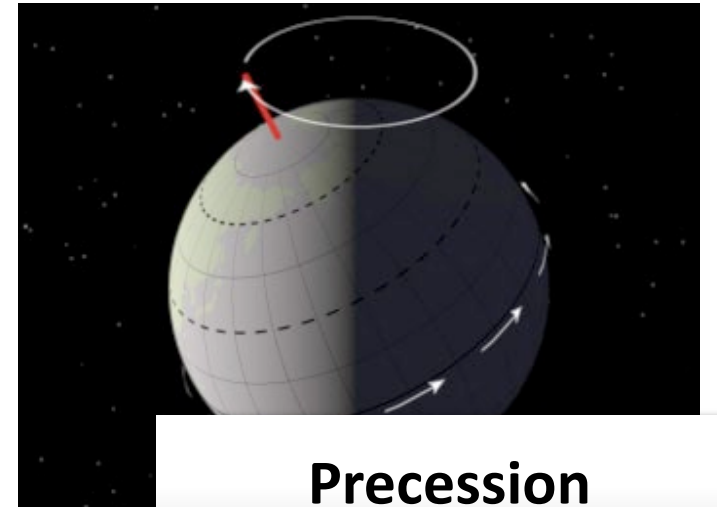
Earth's Orbit and Rotation (Milankovitch Cycles)



Eccentricity

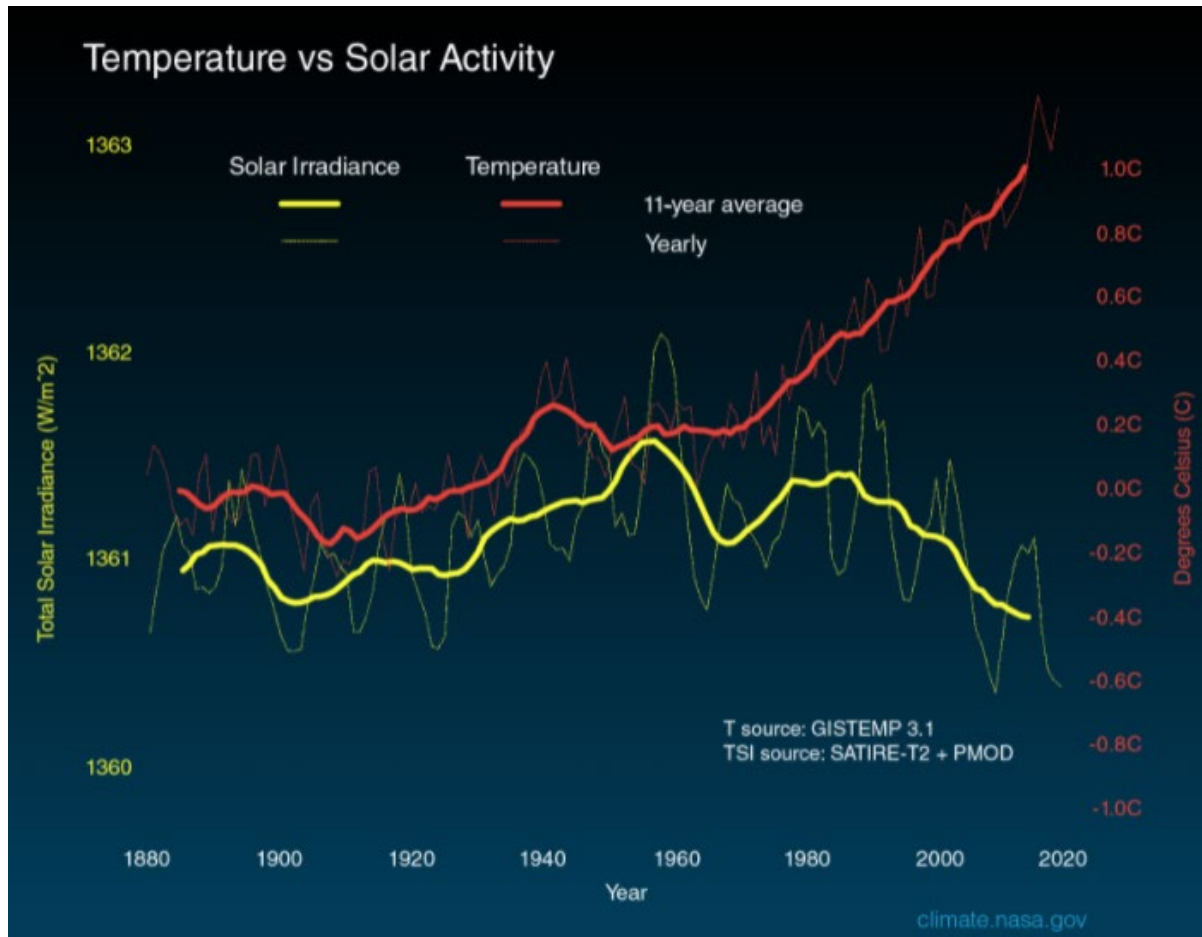


Obliquity



Precession

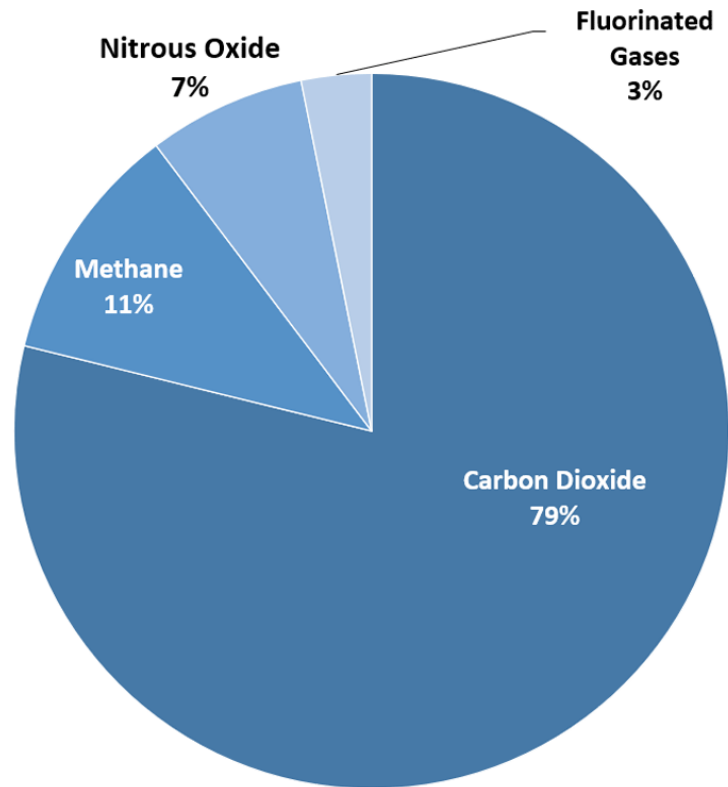
Variations in Solar Activity



- According to the United Nations' Intergovernmental Panel on Climate Change (IPCC), the current scientific consensus is that long and short-term variations in solar activity play only a very **small** role in Earth's climate.
- Since 1750, the warming driven by greenhouse gases coming from the human burning of fossil fuels is over **50 times greater** than the slight extra warming coming from the Sun.

Key Greenhouse Gases

Overview of U.S. Greenhouse Gas Emissions in 2020



U.S. Environmental Protection Agency (2022). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2020

3 Main Factors

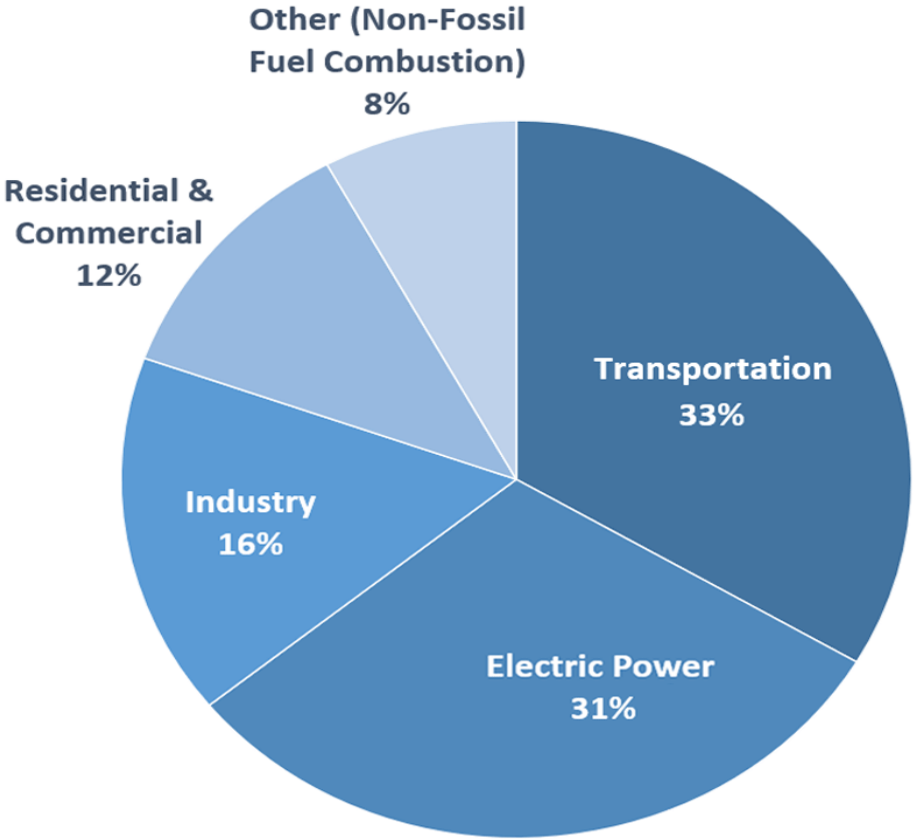
How much is in the atmosphere?

How long do they stay in the atmosphere?

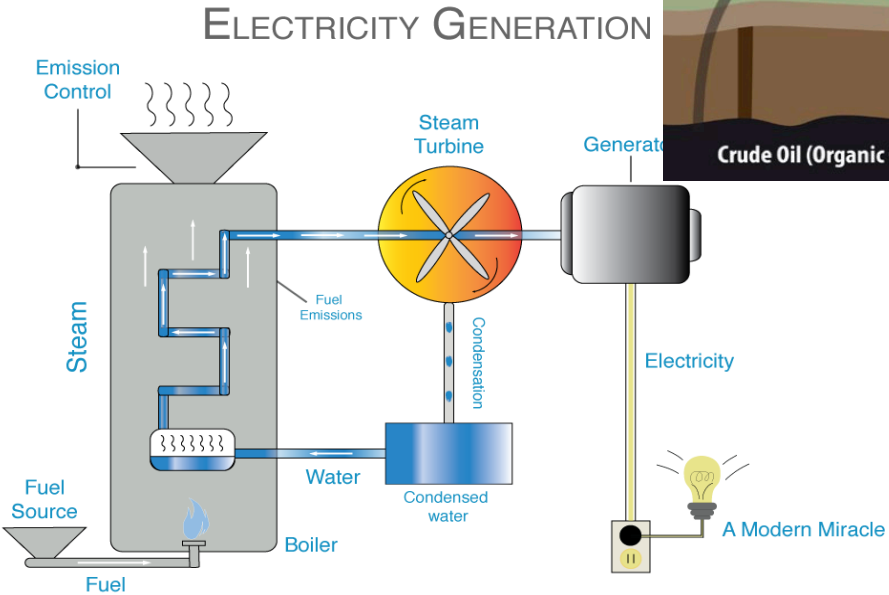
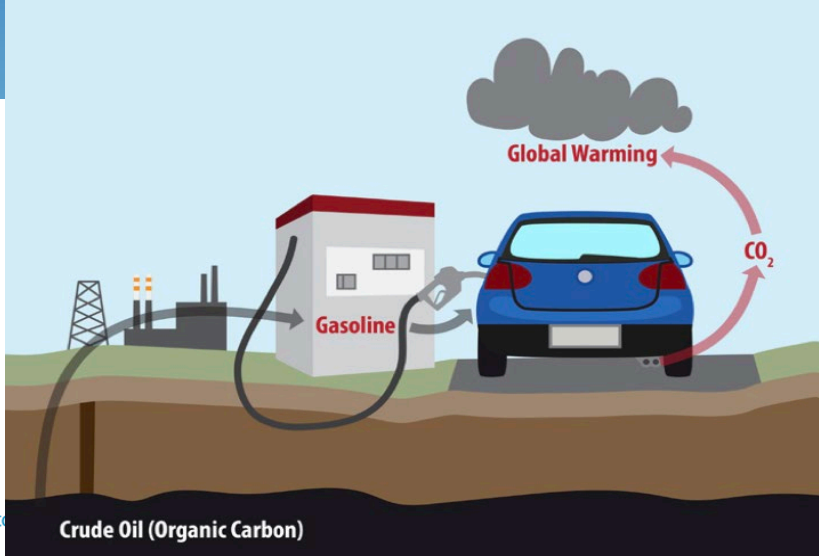
How strongly do they impact the atmosphere?

Carbon Dioxide (CO₂)

2020 U.S. Carbon Dioxide Emissions, By Source

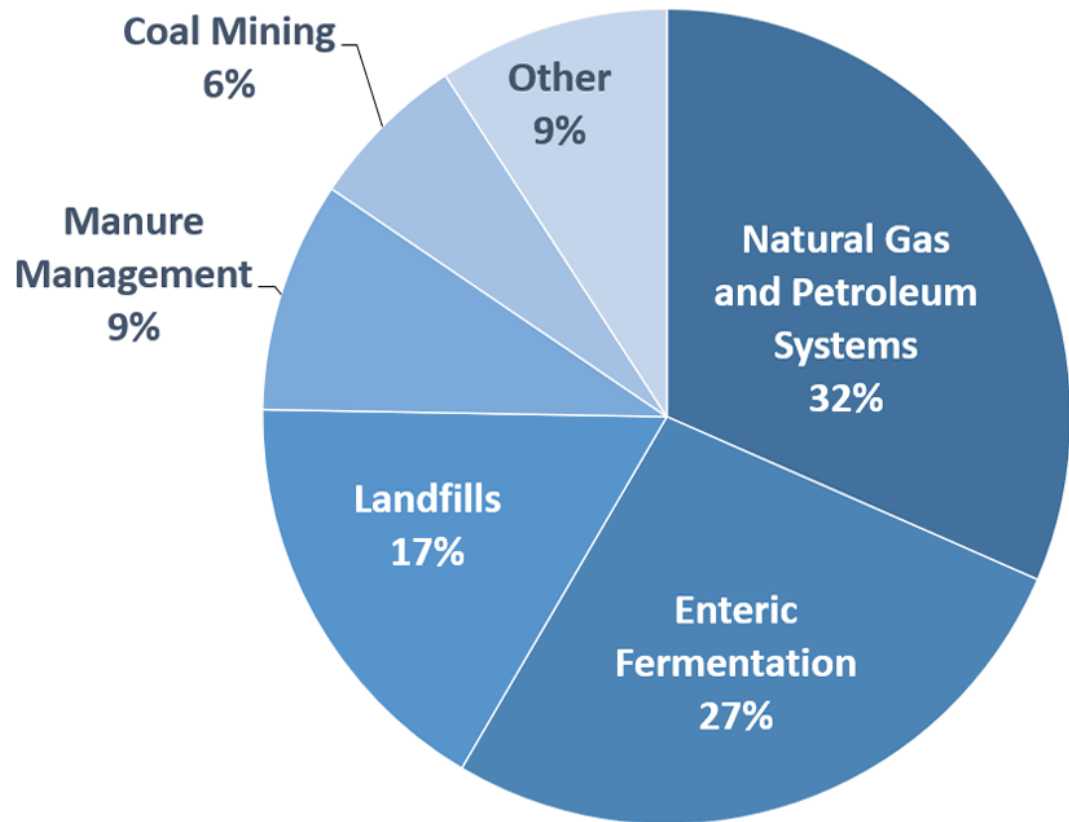


U.S. Environmental Protection Agency (2022). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2020

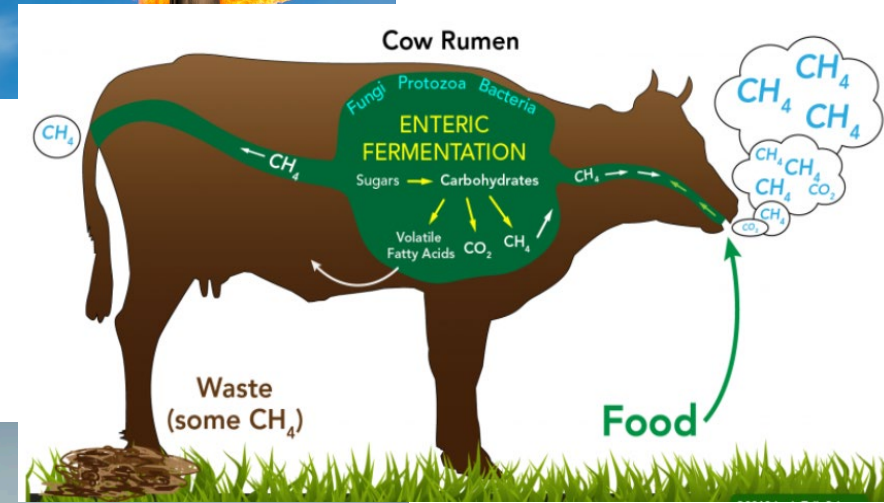


Methane (CH₄)

2020 U.S. Methane Emissions, By Source

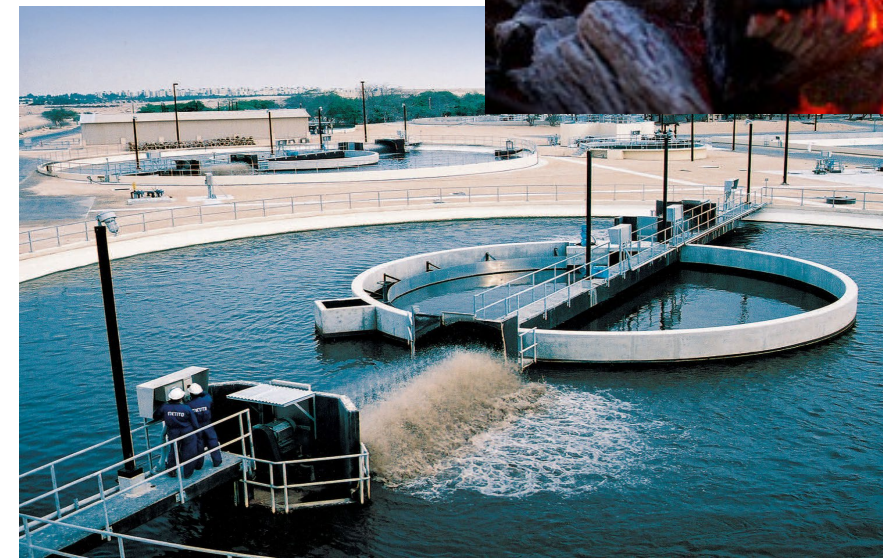
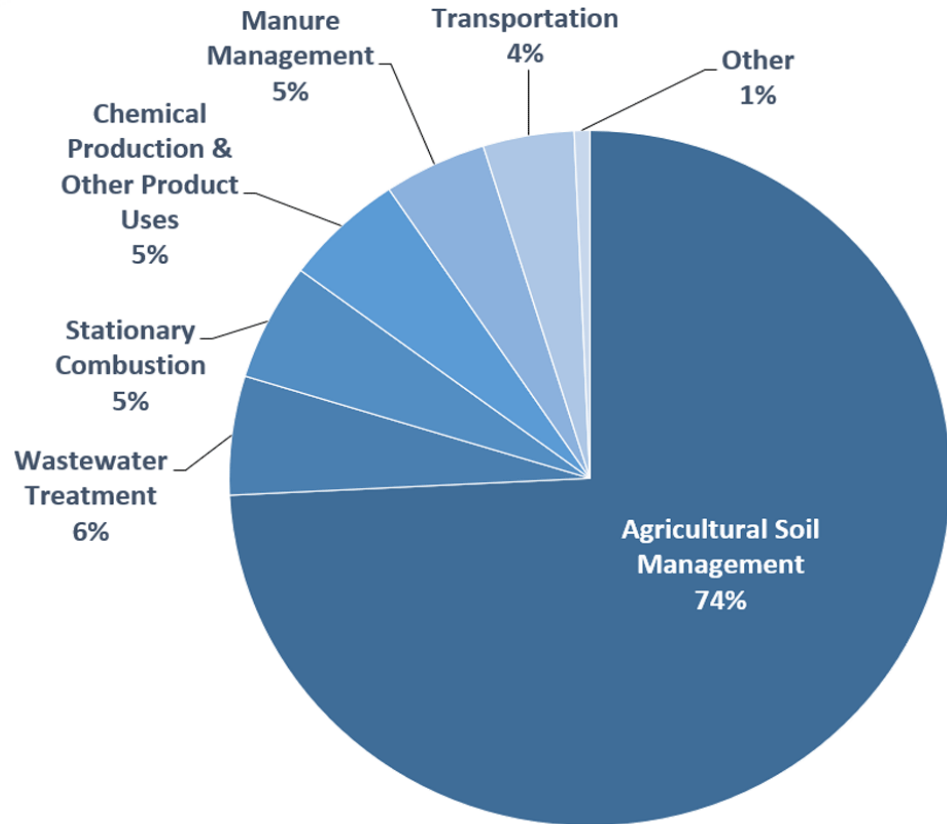


U.S. Environmental Protection Agency (2022). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2020



Nitrous Oxide (N₂O)

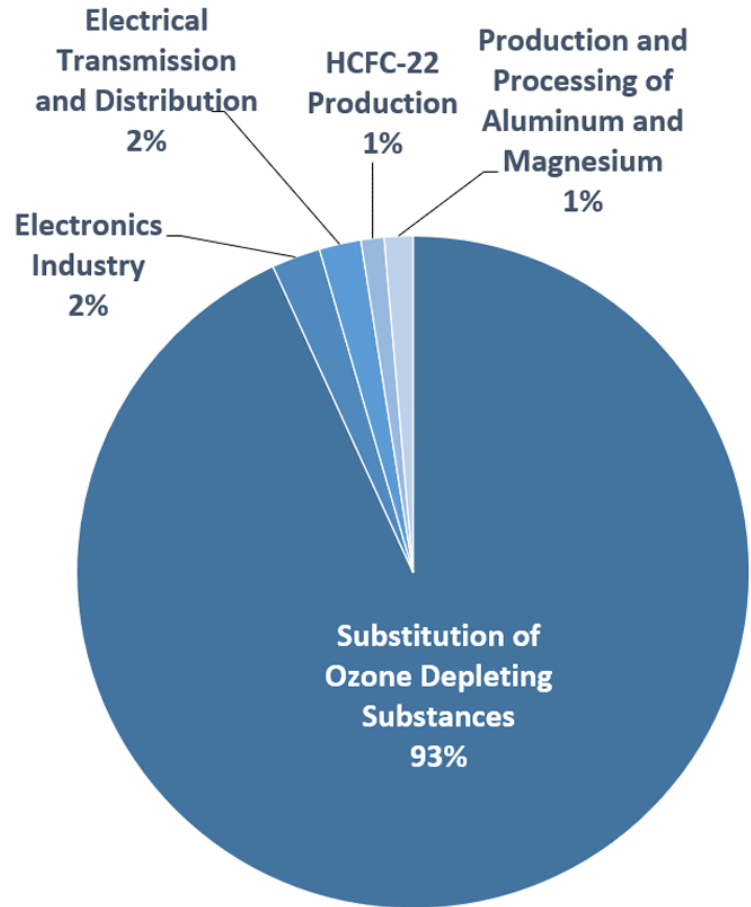
2020 U.S. Nitrous Oxide Emissions, By Source



U.S. Environmental Protection Agency (2022). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2020

Fluorinated Gases

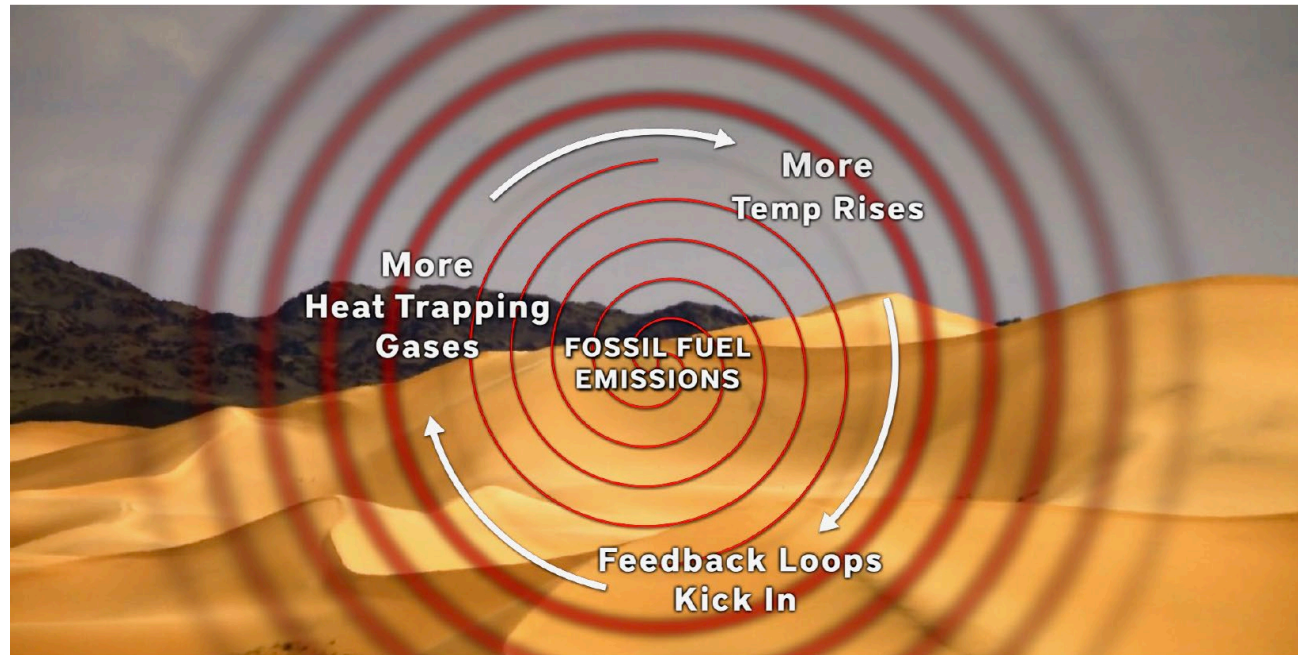
2020 U.S. Fluorinated Gas Emissions, By Source



U.S. Environmental Protection Agency (2022). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2020

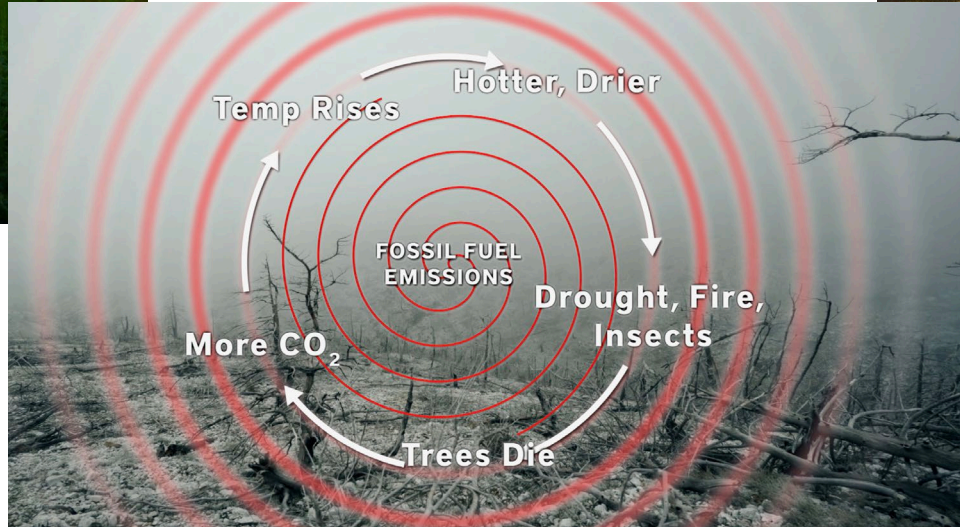


Climate Feedback Loops



Fossil fuel emissions ⇒ warming climate ⇒ feedback loops triggered ⇒ heat-trapping gases emitted ⇒ more warming ⇒ more feedback loops

Forests



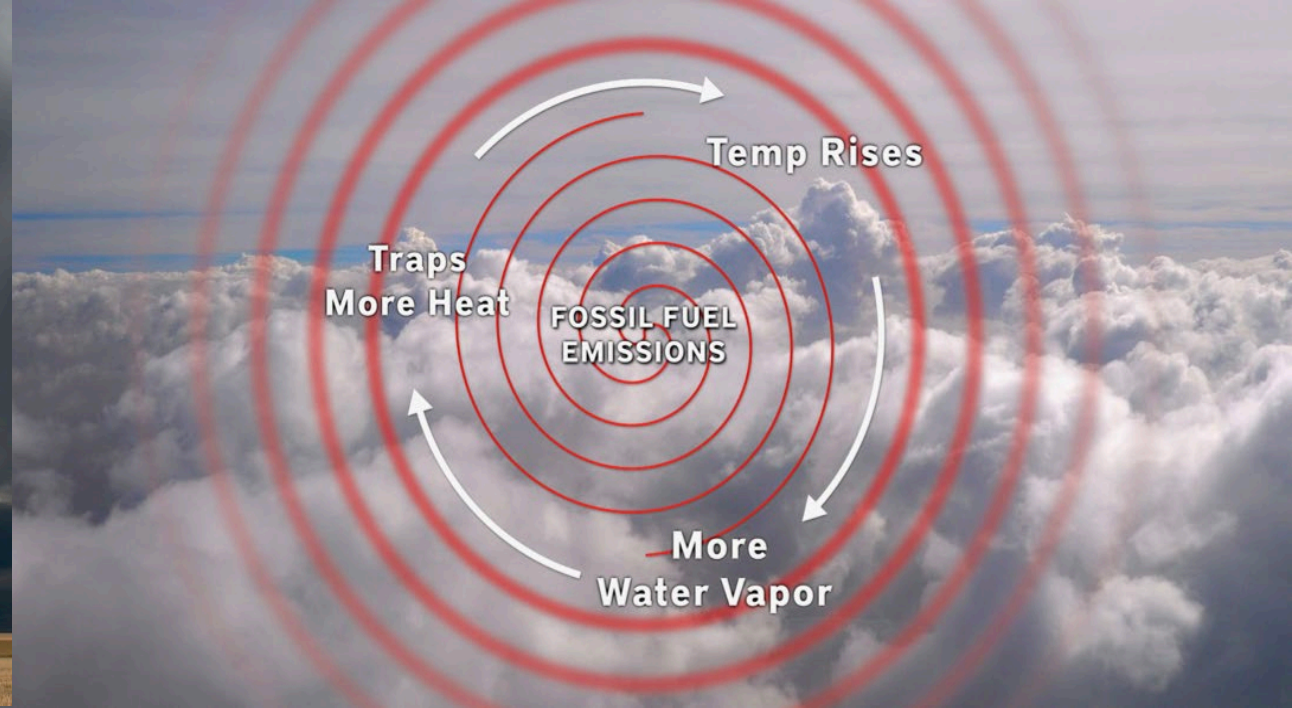
Fossil fuel emissions ⇒ Drier, warmer climate ⇒ spreading fires ⇒ trees die, carbon deep in soil burns ⇒ release of carbon (and sometimes methane) ⇒ climate becomes warmer and drier.

Permafrost



Fossil fuel emissions \Rightarrow warming climate \Rightarrow permafrost thaws \Rightarrow microbes digest newly-thawed carbon remains \Rightarrow carbon dioxide and methane produced \Rightarrow heat-trapping gases released into atmosphere \Rightarrow more warming.

Atmosphere



Fossil fuel emissions \Rightarrow warming climate \Rightarrow warmer atmosphere holds more water vapor \Rightarrow water vapor traps more heat \Rightarrow more warming.

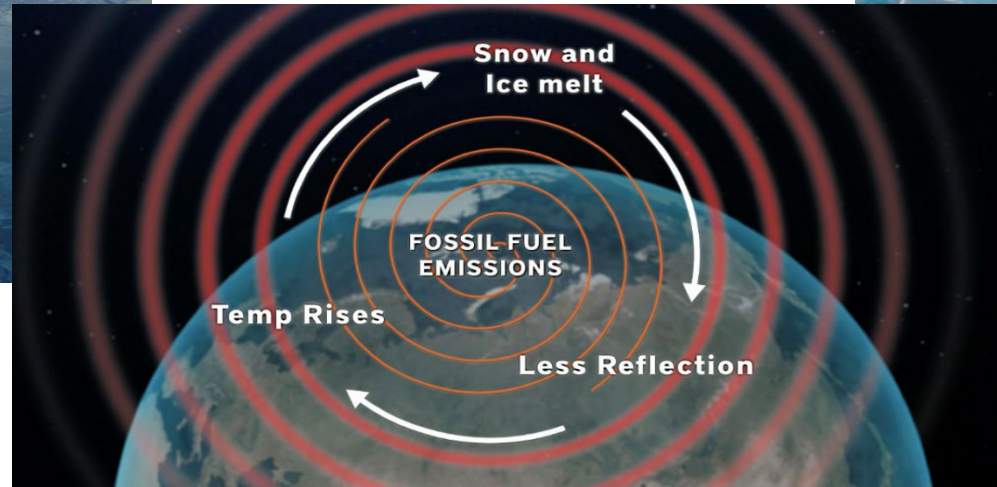
Atmosphere



Fossil fuel emissions \Rightarrow warming climate \Rightarrow oceans heat up \Rightarrow increased evaporation \Rightarrow more water vapor into atmosphere \Rightarrow more heat trapped \Rightarrow warming climate.

Fossil fuel emissions \Rightarrow warming Arctic \Rightarrow jet stream weakens \Rightarrow larger north-south swings \Rightarrow more heat moves from south to north \Rightarrow more Arctic warming.

Albedo



Fossil fuel emissions \Rightarrow warming climate \Rightarrow Arctic snow and ice melt, ocean exposed \Rightarrow less reflectivity and more heat absorption \Rightarrow more warming.

Higher, warmer water \Rightarrow land ice melts \Rightarrow sea level rises further \Rightarrow more land ice melts \Rightarrow higher, warmer water.

Climate Change Indicators

Greenhouse Gases

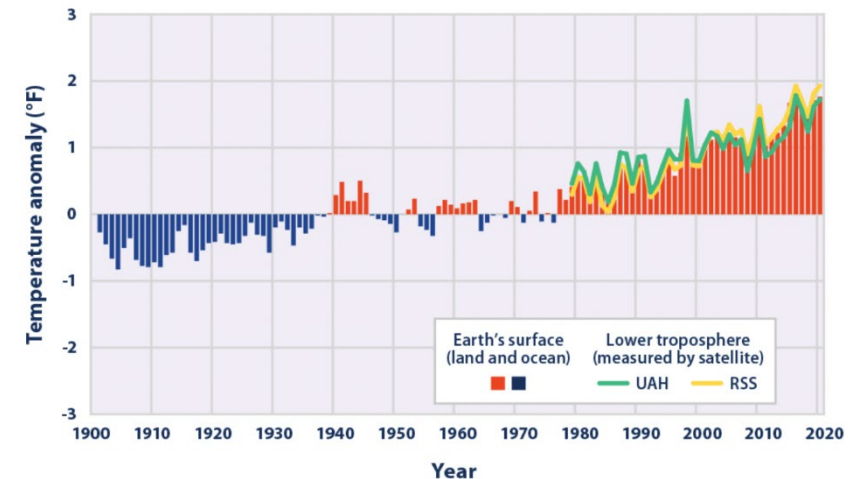
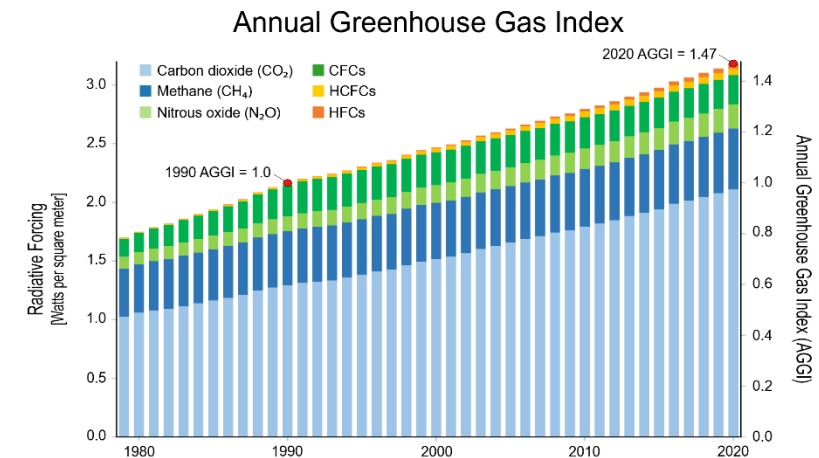
- Increase in Global Emissions and Atmospheric Concentrations

Weather and Climate

- Global Temperature Rise, Heat Waves, and Drought

Oceans

- Increase in Surface Temperature, Sea Level Rise, and Ocean Acidity



Climate Change Indicators

Snow and Ice

- Reduced Snowfall, Less Snow and Ice Cover

Health and Society

- Public Health, Residential Energy Use, and Length of Growing Season

Changing Ecosystems

- Wildfires, Streamflow, Species Migration



Figure 1. Climate Change and Health Pathway

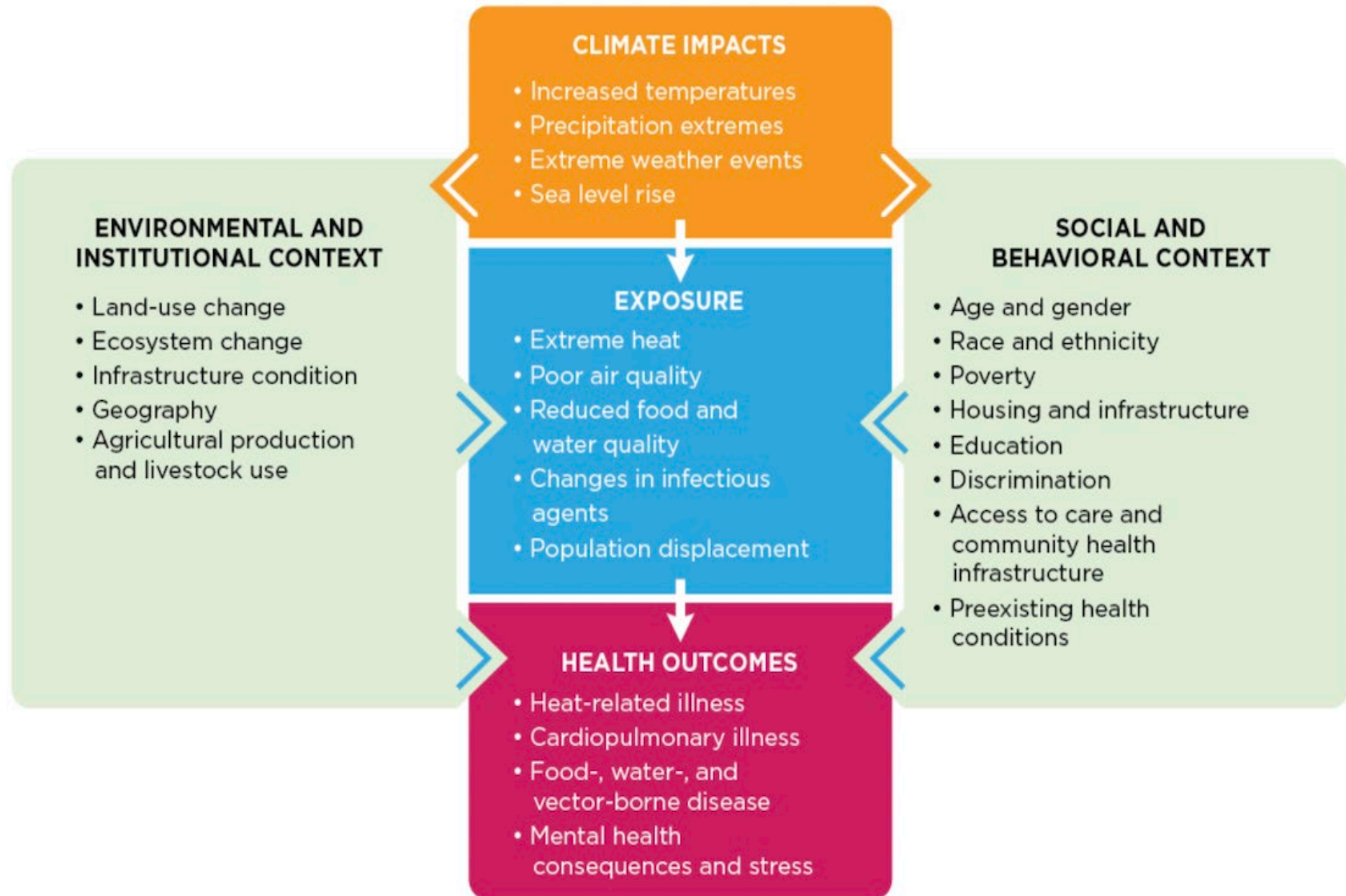


Figure 2. Connecting Climate Change Indicators to Health Pathways

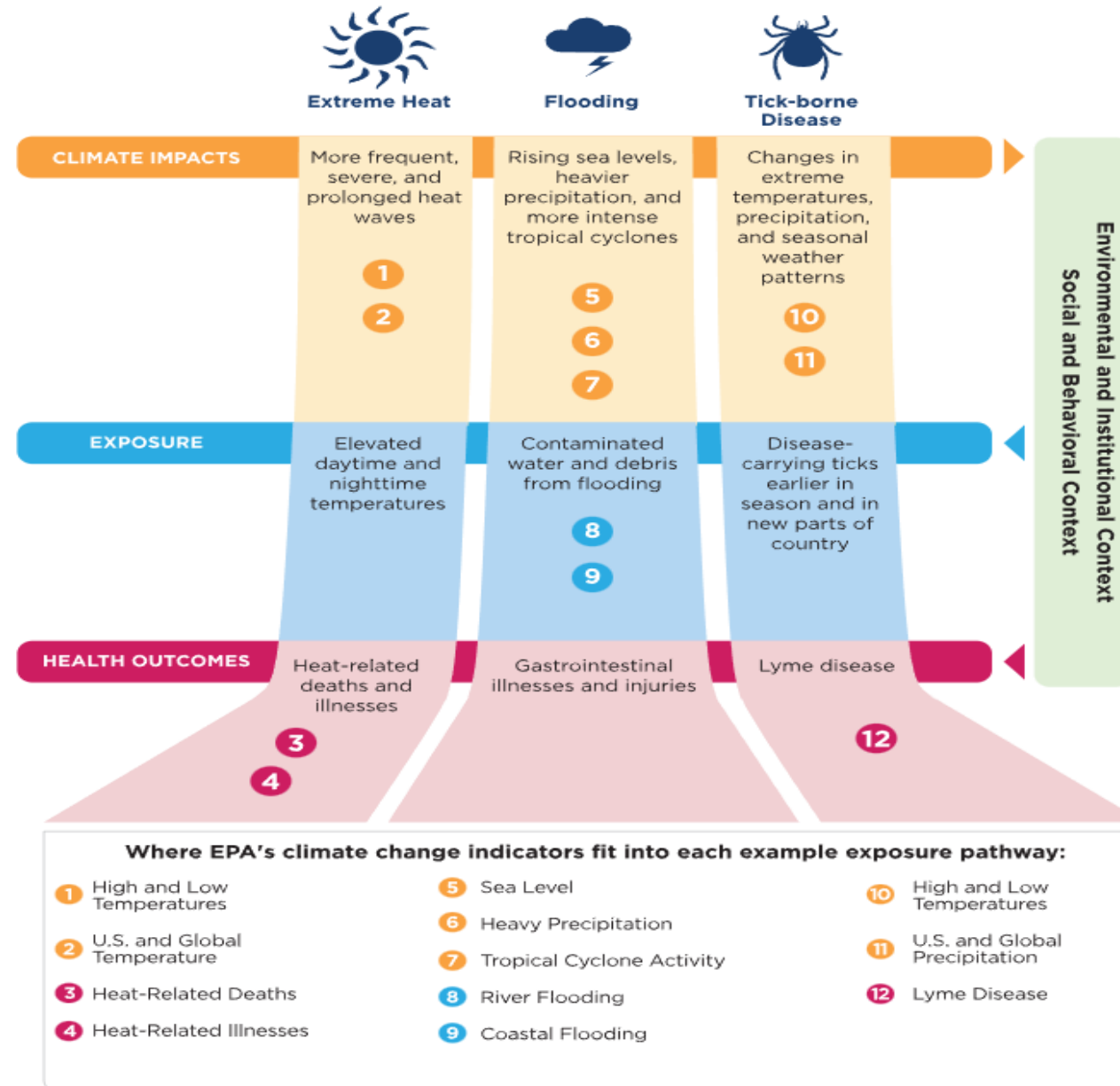


Figure 3. Determinants of Vulnerability

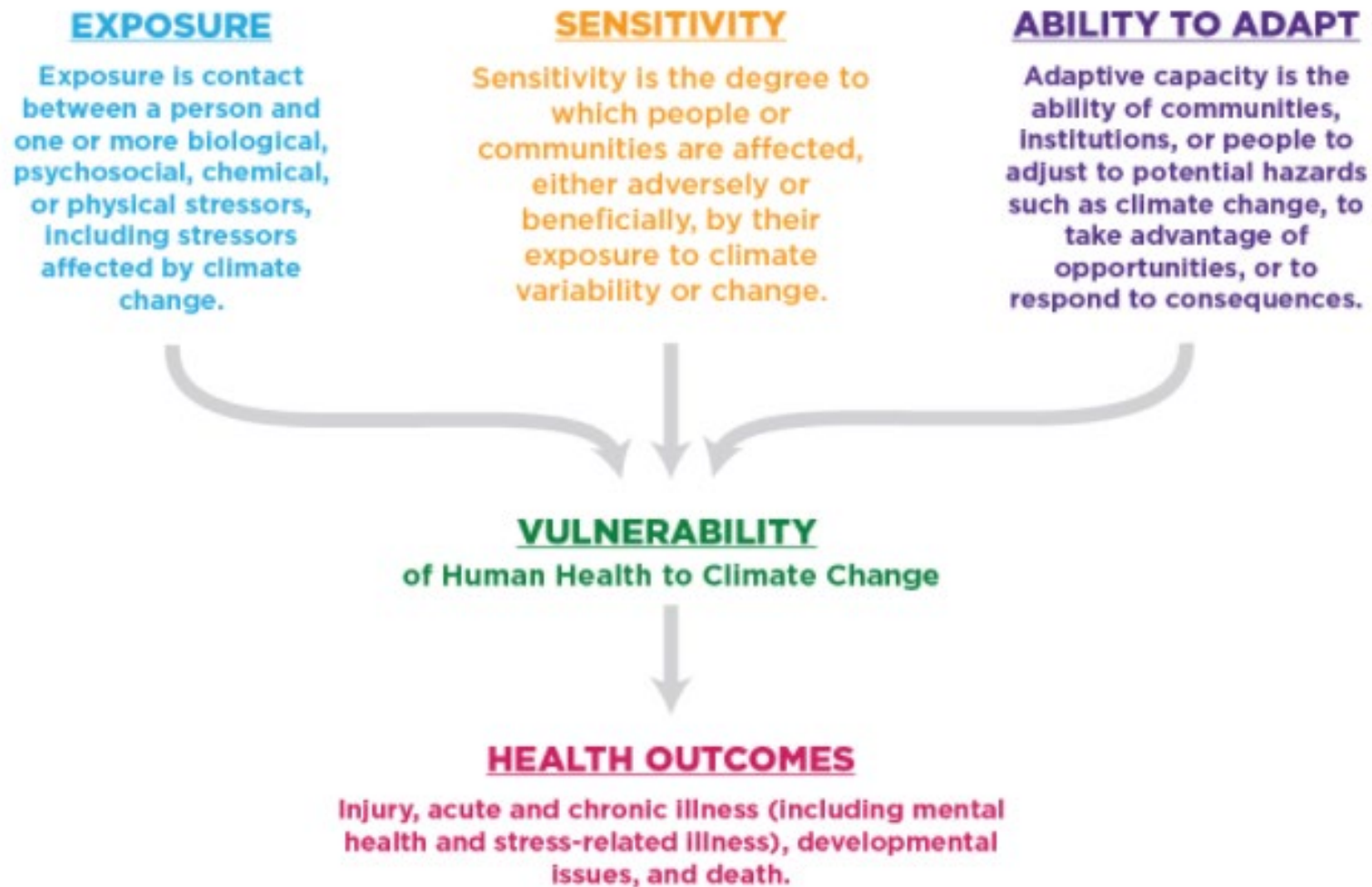


Figure 4. Examples of Climate Change Vulnerability

EXPOSURE



Low-income populations may be exposed to climate change threats because of socioeconomic factors. For example, people who cannot afford air conditioning are more likely to suffer from unsafe indoor air temperatures.

SENSITIVITY



Pregnant women are sensitive to health risks from extreme weather such as hurricanes and floods. These events can affect their mental health and the health of their unborn babies by contributing to low birthweight or preterm birth.

ABILITY TO ADAPT



Older adults may have limited ability to cope with extreme weather if, for example, they have difficulty accessing cooling centers or other support services during a heat wave. Heat-related deaths are most commonly reported among adults aged 65 and over.



Occupational groups such as first responders and construction workers face more frequent or longer exposure to climate change threats. For example, extreme heat and disease-carrying insects and ticks particularly affect outdoor workers.



People with pre-existing medical conditions, such as asthma, are particularly sensitive to climate change impacts on air quality. People who have diabetes or who take medications that make it difficult to regulate body temperature are sensitive to extreme heat.



People with disabilities face challenges preparing for and responding to extreme weather events. For example, emergency or evacuation instructions are often not accessible to people with learning, hearing, or visual disabilities.



People in certain locations may be exposed to climate change threats, such as droughts, floods, or severe storms, that are specific to where they live. For example, people living by the coast are at increased risk from hurricanes, sea level rise, and storm surge.



Children are more sensitive to respiratory hazards than adults because of their lower body weight, higher levels of physical activity, and still-developing lungs. Longer pollen seasons may lead to more asthma episodes.



Indigenous people who rely on subsistence food have limited options to adapt to climate change threats to traditional food sources. Rising temperatures and changes in the growing season affect the safety, availability, and nutritional value of some traditional foods and medicinal plants.

Climate Action – Individual

HOW CAN EACH OF US TAKE ACTION?

SIMPLE CHOICES IN OUR DAILY LIVES CAN MAKE A DIFFERENCE.

GREEN UP YOUR TRAVEL



Public transit, carpooling, biking, or walking reduces emissions and roadway congestion.

PLANT & PROTECT TREES



Healthy forests, parks, and natural areas help keep our air and water clean and reduce carbon pollution.

CUT FOOD WASTE & SAVE



Look for smart ways to shop, store, and cook food to reduce food waste.

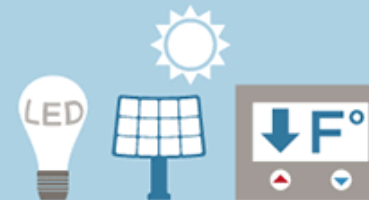
BUY WISELY & RECYCLE MORE

Recycle everything possible and buy products that are long-lasting, energy efficient, reusable, and have less packaging to prevent waste in the first place.



REDUCE ENERGY USE

Using LED lightbulbs and other energy saving steps reduces utility bills and environmental impact.




SPEAK UP!

Help shape community action on climate change. Provide your input on climate actions.




BENEFITS OF COMPOSTING

RETAINS MORE WATER




Compost helps strengthen soil's ability to retain water. This causes plants to not need to be watered as frequently.

REDUCES LANDFILL WASTE




Composting helps divert materials from going to the landfills, minimizing the amount of greenhouse gas emissions released into the atmosphere and lengthening the capacity of landfills.

REDUCES SOIL EROSION




Erosion occurs when top soil is blown or washed away causing infertile topsoil. Compost can restore topsoil and build stable soil structure.

REDUCES NEED FOR SYNTHETIC FERTILIZERS






Compost sufficiently supplies soil with nutrients like phosphorus and nitrogen. This reduces the need for additional fertilizer because compost naturally provides the necessary nutrients for the soil.

HELPS CARBON SEQUESTRATION



Carbon is stored in the top 3 feet of soil and is released into the atmosphere when soil structure is poor. Applied compost helps improve soil structure to combat against this.

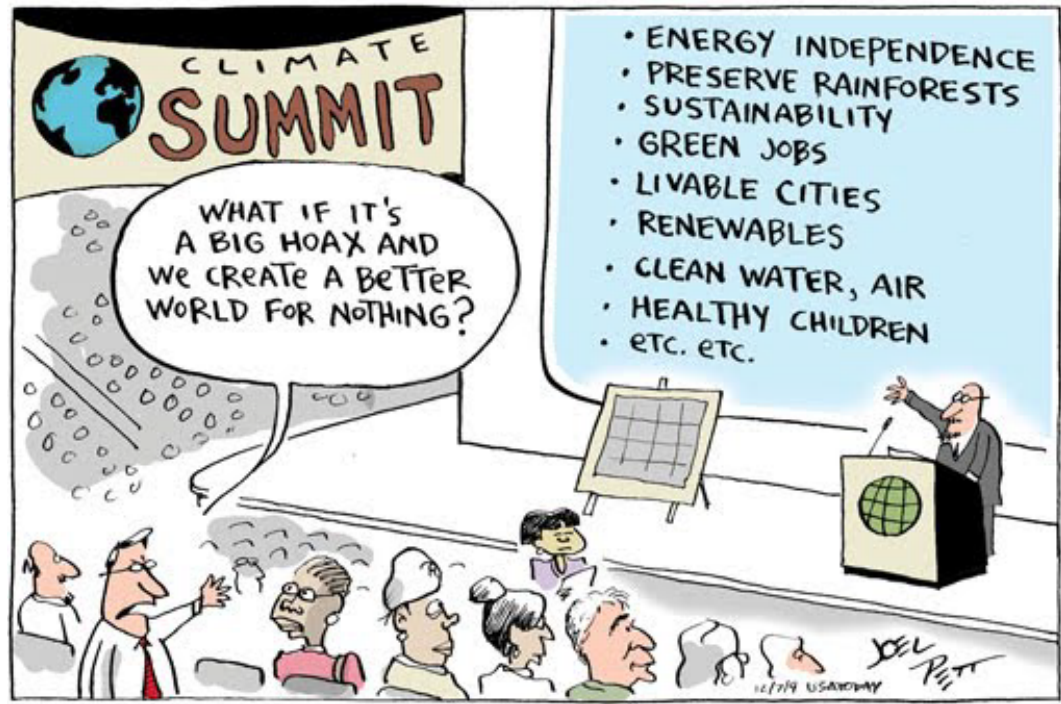
How much do we save by recycling?

| CANS AND METAL | PAPER | PLASTIC | GLASS |
|--|--|---|---|
|  |  |  |  |
| Recycling cans and metal saves about 95% of the energy needed to make them new. | Recycling paper requires 40% less energy and 30% less water compared to new paper. | Seventeen trees are saved for every ton of recycled paper. | Recycling glass saves about 30% of the energy. |

Source: <http://www.campaignforrecycling.org/faq/ghg>

Climate Change Myths

1. I have never been affected by Climate Change
2. Climate Change will happen in 50 years
3. Climate Change does not occur in the United States





Introduction to Climate Change

This class provides an overview of the global climate crisis. We explore the natural and human-induced causes of climate change, climate change indicators, feedback loops, and more! Attendees will leave with a better understanding of climate change and feel empowered to take on climate action.

On Demand Climate Change Classes



RCDWR INFORMATION REGARDING

COVID-19 (CORONAVIRUS)

[CLICK HERE](#)

Community Outreach Links

[FREE Classes](#)

[Schedule a Speaker](#)

[Schedule an Exhibitor Table](#)

[Visit the Education Center](#)

[Visit the Resource Garden](#)