

# CLIMATE CHANGE!!

**Instructions: Read the following and watch the videos in the links provided. For each of the HIGHLIGHTED phrases you can (CONTROL + CLICK) to open up the links to various videos.**

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There is mounting evidence that Earth's climate is changing. Still, there are so many different ideas and opinions on the issue that we don't always know how to talk about it. We do know that patterns of extreme weather, pollution, and the availability of natural resources are linked to climate change. But how? What role do we have in that? Better understanding of the science behind the rise in global temperatures can help us talk about our changing climate and take action. With a sound understanding, we can begin to think critically about the historical causes and—most importantly—make informed decisions about solutions for the future.

## What is climate change?

[Climate Change 101](#), with Bill Nye, explains the rise in global temperatures since the industrial revolution. Bill Nye describes the science behind greenhouse gases and the implications of a changing climate on both our natural world and built environment. He also provides a few suggestions for how we can all be a part of the solution.

To better understand climate change, imagine a game of Tetris. [Climate Change: Earth's Giant Game of Tetris](#) is a video that does just that. Using this analogy, you'll learn about the carbon cycle, the greenhouse effect, and the environmental impacts of burning fossil fuels.

VIDEO: <https://www.youtube.com/watch?v=ztWHqUFJRTs>

## What is the carbon cycle and why does it matter?

[What's the Deal with Carbon](#) explains the carbon cycle? Developed by the University of Minnesota Bell Museum of Natural History and the Centre for Sustainable Building Research, this animated video describes what carbon is, how it interacts in nature, and where it is stored. Viewers will also learn about the role of human activity in the carbon cycle and the links between the production of carbon emissions and climate change.

VIDEO: [https://www.youtube.com/watch?v=2Jp1D1dzzj8&feature=emb\\_logo](https://www.youtube.com/watch?v=2Jp1D1dzzj8&feature=emb_logo)

[Exploring the Carbon Cycle](#) dives deeper into the science behind the unique element that is carbon, which is essential to all living things and is often called the building block of life. This video defines important terms such as carbon pool and carbon flux,

while also detailing carbon's movement through photosynthesis and respiration. The video is highlighted in Activity 7—Carbon on the Move in [PLT's \*South-eastern Forest and Climate Change curriculum\*](#) designed to help high school students learn about the impacts of climate change on forests and carbon sequestration.

VIDEO: <https://www.youtube.com/watch?v=HK8LLWSIIIm4>

## **What is climate science?**

Brought to you by PBS's "It's Okay to Be Smart" with Joe Hanson, [Climate Science: What You Need to Know](#) provides 24 quick facts on how and why global temperatures are rising, where we see some of the most extreme changes, and how species are being impacted. (Length: 6:19)

Developed by Planet Nutshell, [Climate Science in a Nutshell: #4 Too Much Carbon Dioxide](#) explains the relationship between carbon dioxide and the increase in global temperatures. This video describes the ways in which carbon dioxide and global temperatures are connected and explains how excess amounts of carbon prevent heat from escaping the atmosphere, causing a greenhouse effect.

VIDEO: [https://www.youtube.com/watch?v=HK8LLWSIIIm4&feature=emb\\_logo](https://www.youtube.com/watch?v=HK8LLWSIIIm4&feature=emb_logo)

## **Does 2°C really make a difference?**

Learn more about what the 2°C increase in global temperature really means with [What Happens if Earth Gets 2°C Warmer?](#) from Popular Science. The video describes the Paris Agreement within the United Nations, a strategy designed to keep the average global temperature from rising 2°C above pre-industrial levels. It explores the history and significance of this 2°C benchmark, as well as the data surrounding patterns of extreme weather due to increases in global temperatures.

VIDEO: [https://www.youtube.com/watch?v=KeX7x5NtNFg&feature=emb\\_logo](https://www.youtube.com/watch?v=KeX7x5NtNFg&feature=emb_logo)

## **What are some effects of a changing climate and how will we adapt?**

[Modeling Climate and Tree Growth](#) presents a model for measuring the impact of climate change on tree growth. Learn how scientists make predictions of tree growth in the future and how forest landowners might adapt to changes in climate.

Developed by the Consortium for Research on Renewable Industrial Materials, [Cut Trees to Save the Environment—Who Knew?](#) describes how trees capture and store carbon. It explains how forestry plays an important role in reducing carbon emissions for the long term. Viewers learn about why wood is a sustainable, renewable resource.

VIDEO: [https://www.youtube.com/watch?v=XyGuZI3I50I&feature=emb\\_logo](https://www.youtube.com/watch?v=XyGuZI3I50I&feature=emb_logo)

The Nature Conservancy explains some of the natural solutions that can help slow climate changes, with [Natural Climate Solutions](#). This video details some of the lesser appreciated natural climate solutions, such as the ability of wetlands and grasslands to absorb and store large amounts of carbon. (Length: 4:05)

Solutions to climate change require innovation and these kids have some ideas for that! In this video, [Kids Describe Solutions to Global Warming](#), students describe various visions for a sustainable future: cars with solar panels, factories run by renewable energy, and inventions for disaster relief. (Length: 7:24)

Did you know that just one kid has the power to make a difference and help stop climate change? Get inspired with [I'm only a kid, I can't do anything about climate change.... right?](#) from Global Weirding with Katharine Hayhoe. Dr. Hayhoe shares stories of kids across the country making an impact on climate change and encourages students with suggestions on how to use their strengths to make a difference. (Length: 6:58)

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## Meet the Greenhouse Gases!

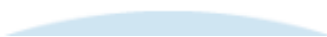


The Short Answer:

### What are greenhouse gases?

Greenhouse gases are gases in Earth's atmosphere that trap heat. They let sunlight pass through the atmosphere, but they prevent the heat that the sunlight brings from leaving the atmosphere. The main greenhouse gases are:


- Water vapor
- Carbon dioxide
- Methane
- Ozone
- Nitrous oxide
- Chlorofluorocarbons






Greenhouse gases are gases that can trap heat. They get their name from greenhouses. A greenhouse is full of windows that let in sunlight. That sunlight creates warmth. The big trick of a greenhouse is that it doesn't let that warmth escape.

That's exactly how greenhouse gases act. They let sunlight pass through the atmosphere, but they prevent the heat that the sunlight brings from leaving the atmosphere. Overall, greenhouse gases are a good thing. Without them, our planet would be too cold, and life as we know it would not exist. But there can be too much of a good thing. Scientists are worried that human activities are adding too much of these gases to the atmosphere.

National Aeronautics and Space Administration 


## WATER VAPOR




Visit [climatekids.nasa.gov](http://climatekids.nasa.gov)


**H<sub>2</sub>O**

This is water in gas form, like steam above a boiling pot or water evaporating off a lake. It forms clouds and rains back on Earth. This can cause a cooling effect.



National Aeronautics and Space Administration 


## CARBON DIOXIDE



Visit [climatekids.nasa.gov](http://climatekids.nasa.gov)

**CO<sub>2</sub>**

Made up of carbon and oxygen, CO<sub>2</sub> is all around us naturally. It comes from decaying and living organisms, and from volcanoes.



# NITROUS OXIDE



**N<sub>2</sub>O**

Nitrous oxide is released by some types of factories, power plants, and plant fertilizer. It damages the protective ozone layer and is a powerful greenhouse gas.

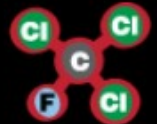


# CHLOROFLUOROCARBONS



**CFCs**

You probably shouldn't have created me.



National Aeronautics and Space Administration



# NITROUS OXIDE



**N<sub>2</sub>O**

Nitrous oxide is a natural part of the nitrogen cycle. Bacteria in soil and the ocean make it.



Visit [climatekids.nasa.gov](http://climatekids.nasa.gov)

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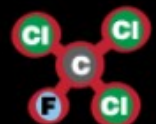


# CHLOROFLUOROCARBONS



**CFCs**

Fluorinated gases are not created in nature. They damage the protective ozone layer and are powerful greenhouse gases.



Visit [climatekids.nasa.gov](http://climatekids.nasa.gov)

# METHANE



It traps a lot of heat. Scientists consider it the second most important contributor to human-caused global warming of all the greenhouse gases.



# OZONE



Close to the ground, ozone acts as a greenhouse gas and can be formed by burning gas in cars and factories.



National Aeronautics and  
Space Administration



# METHANE



Methane, made of carbon and hydrogen, is a normal gas released from wetlands, growing rice, raising cattle, using natural gas, and mining coal.



Visit [climatekids.nasa.gov](http://climatekids.nasa.gov)

National Aeronautics and  
Space Administration



# OZONE



Up in the atmosphere where the planes fly, the ozone layer blocks the sun's radiation, which helps protect us from the powerful rays.



Visit [climatekids.nasa.gov](http://climatekids.nasa.gov)

## WATER VAPOR



**H<sub>2</sub>O**

Water vapor blocks heat from escaping, so it gets warmer. That makes even more water evaporate. Once this process happens, it can happen again more easily.



## CARBON DIOXIDE



**CO<sub>2</sub>**

CO<sub>2</sub> is released when burning fossil fuels like coal and oil. It's the most important contributor to human-caused global warming.



### ACTIVITY: Essay

Use the information and videos to write the following essay.  
Conduct your own research if needed.

You are an environmental officer who is tasked with preparing a document to present to a group of students on Climate Change.

Your document must include:

- Definitions
- Causes and consequences
- Strategies and action plan to combat climate change
- Examples of situations from your research