Edible Insect Unit

Lesson 1: Introduction

“Eating insects could help save the planet”

Lesson 2: Preliminary Food Model


nature picture library
01189283 © Ross Hoddinott / naturepl.com

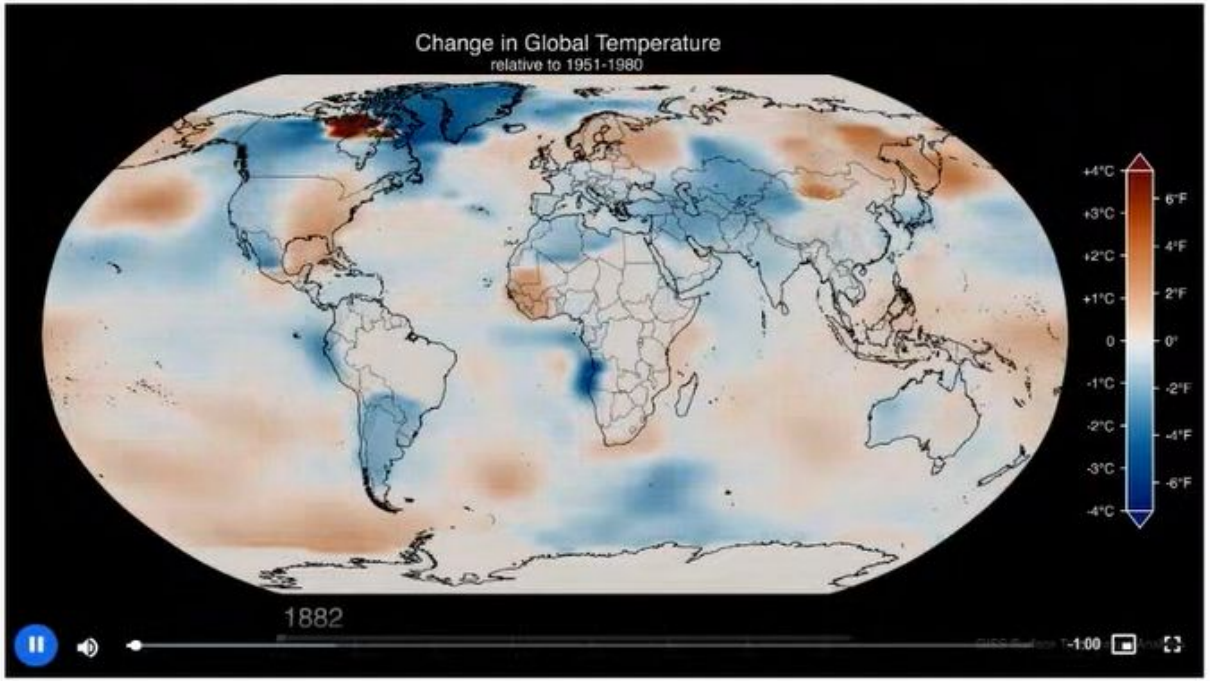
Wheat field

Beef farm

Dairy plant

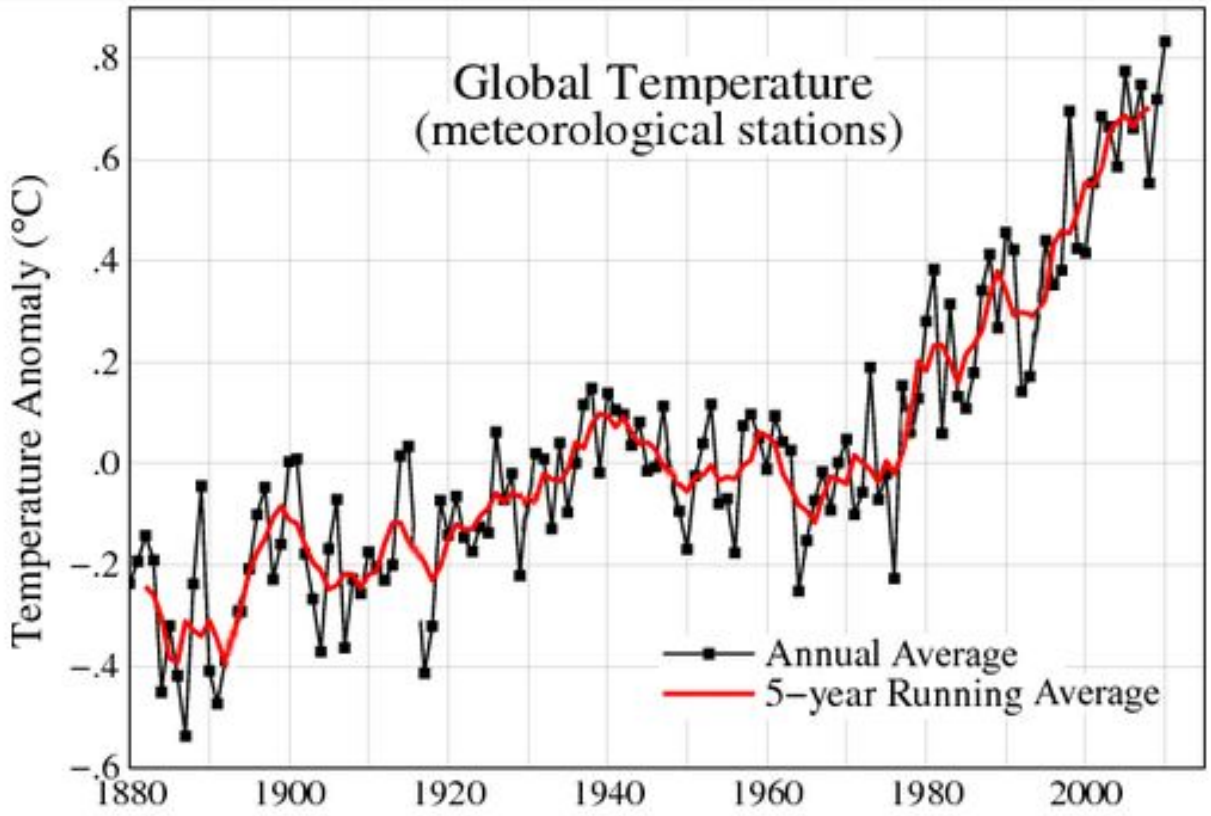
Lettuce field

Lesson 3: See-Think-Wonder



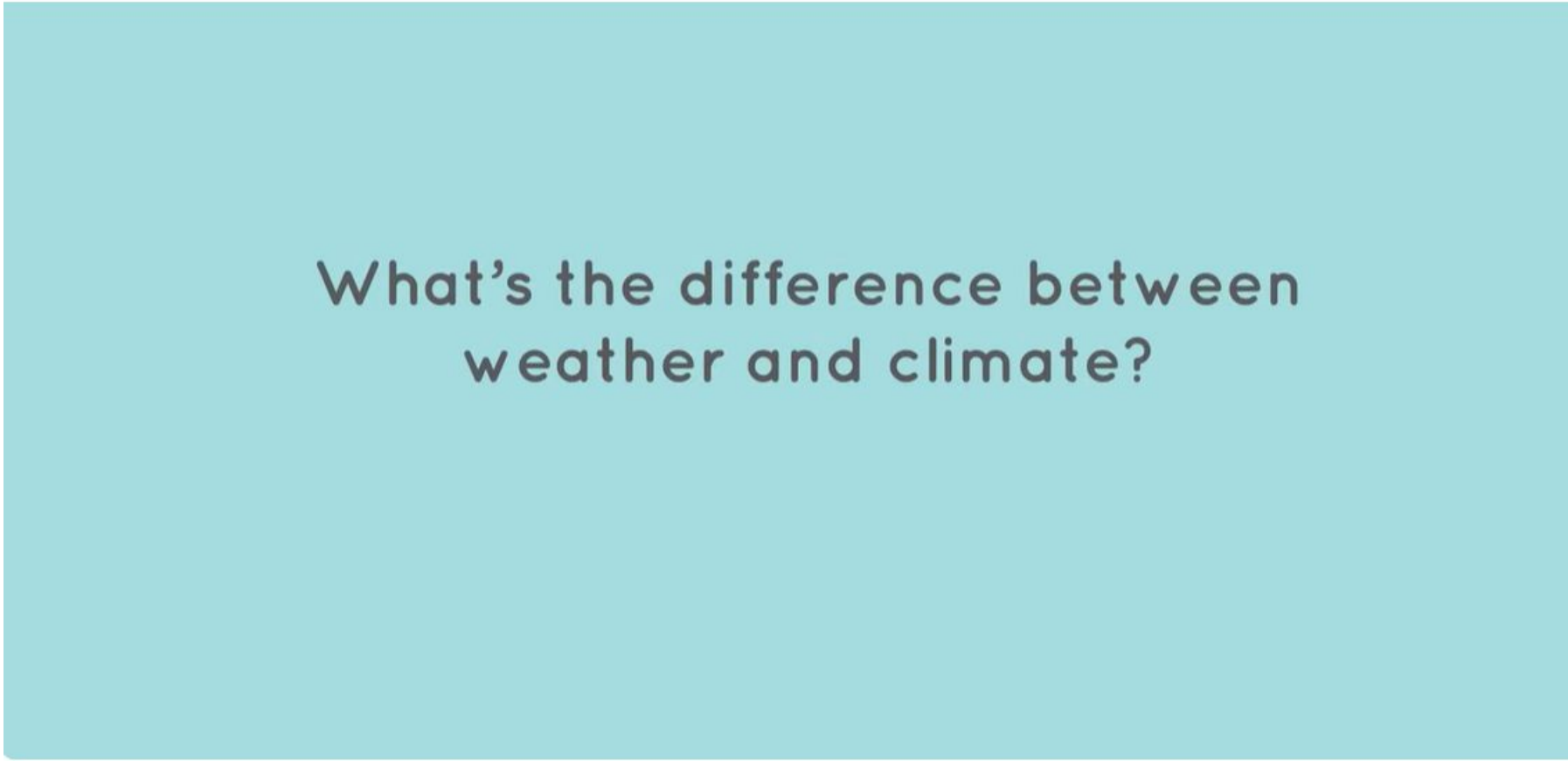
2025 global surface air temperature anomalies. https://svs.gsfc.nasa.gov/5603/
NASA/Scientific Visualization Studio

The animation above shows the change in global surface temperatures. The period used to calculate the average for comparison is 1951–1980. Dark blue shows areas cooler than average. Dark red shows areas warmer than average. Short-term variations are smoothed out using a 5-year running average to make long-term trends more visible in this map.



Global warming refers to the increase in Earth's average near-surface temperatures over the past 100 years. "Anomalies" measure deviation from 1961-1990 averages.

Climate v. Weather



Make a Claim

I think global temperatures are ……

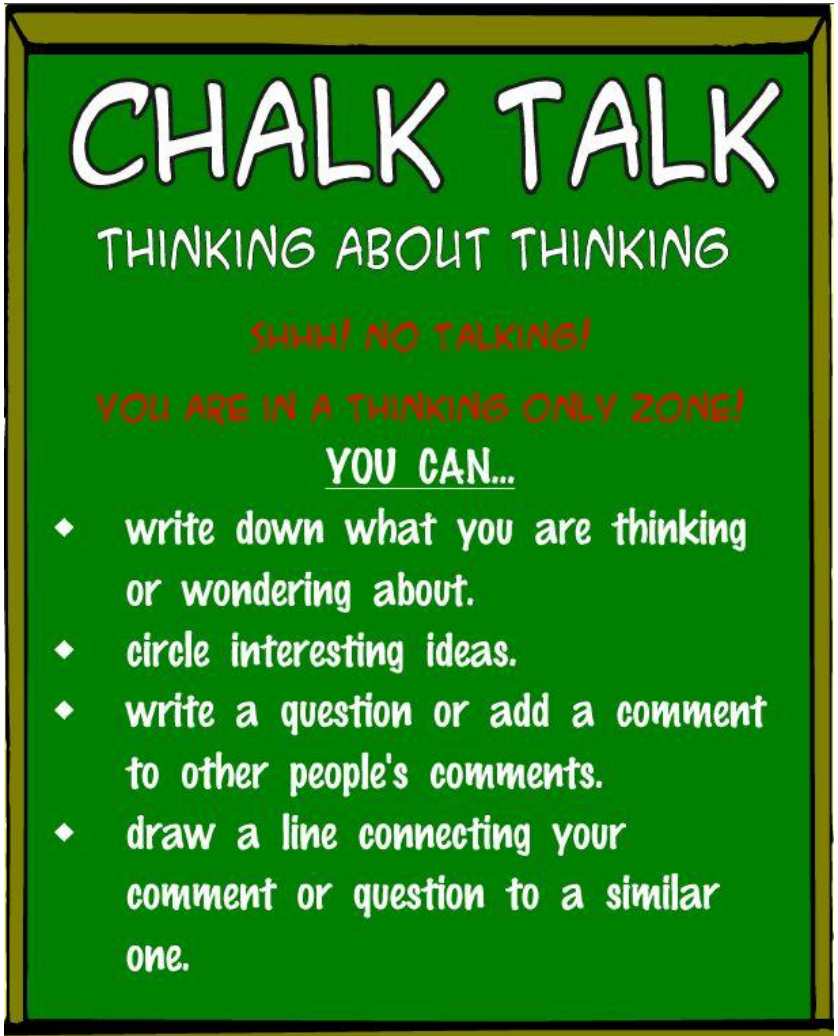
I think this is happening because ……

I think eating insects are related to global temperatures because……

Lesson 4: Explore - Looking at Global Temperatures

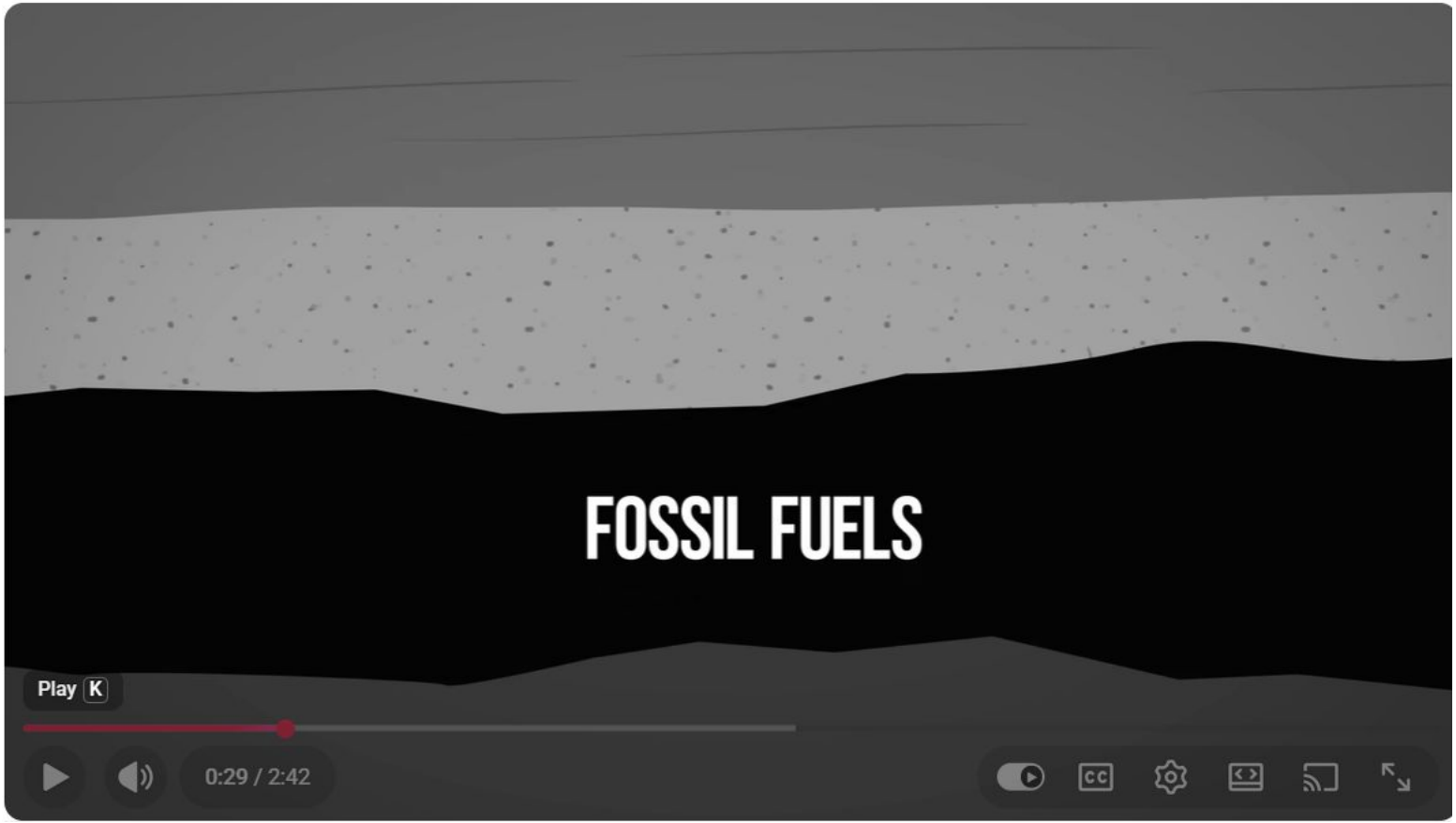
Station # and description of station	**Where the evidence is from**	**What do you see/notice? Record your evidence**	**Does this support your claim? Why or why not? (reasoning)**	**Questions?**
Station 1: Sea Surface Temperatures	NOAA.gov			

Lesson 5: Explain - Looking at Global Temperatures

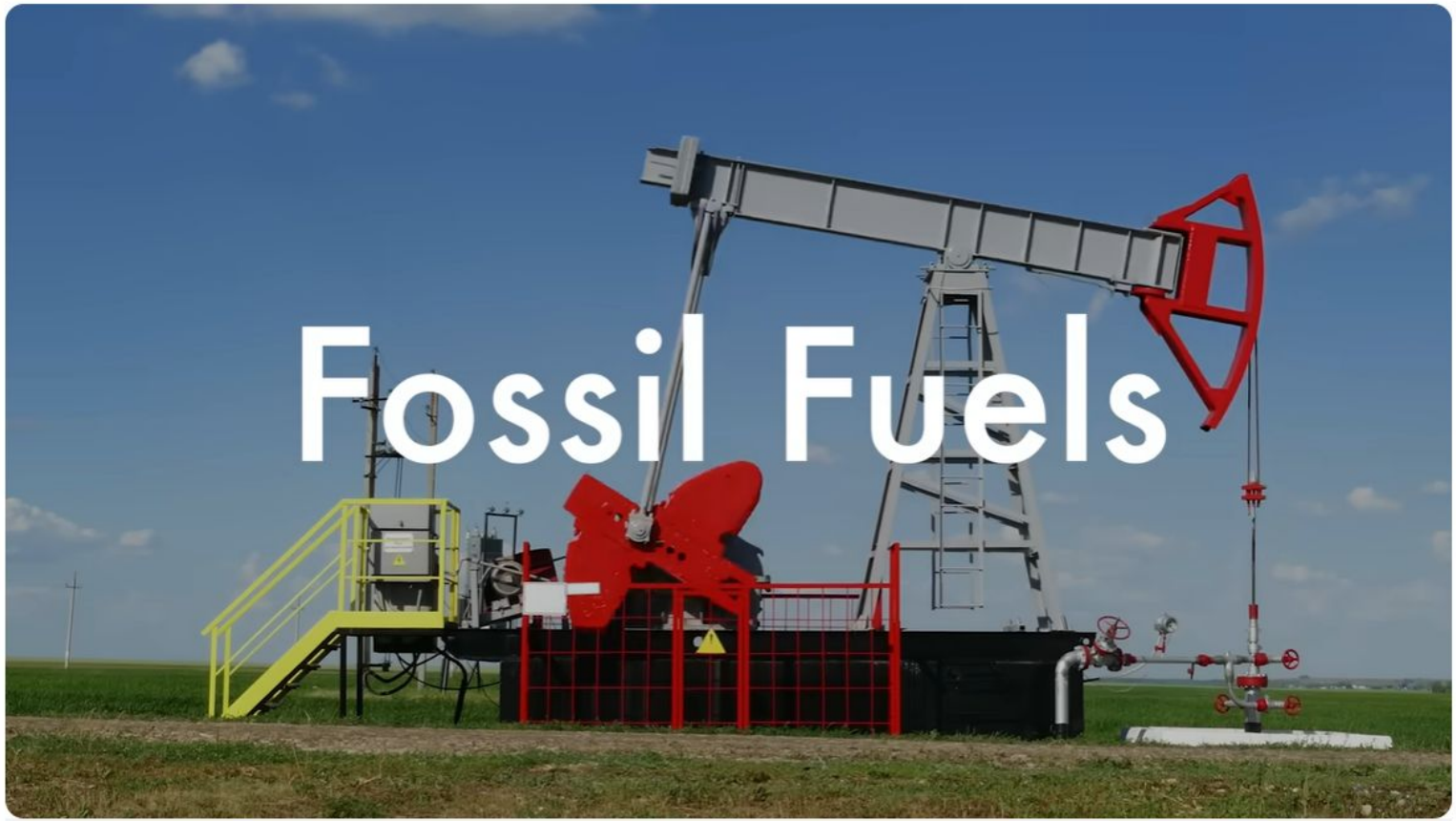

CHALK TALK
THINKING ABOUT THINKING
SHHH! NO TALKING!
YOU ARE IN A THINKING ONLY ZONE!
YOU CAN...
write down what you are thinking or wondering about.
circle interesting ideas.
write a question or add a comment to other people's comments.
draw a line connecting your comment or question to a similar one.

Lesson 6: Explore/Explain - Comparing Graphs

Fossil Fuels



Fossil Fuels



Lesson 7: Explore- Modeling Greenhouse Gasses

Modeling Greenhouse Gasses

1) Set-up 2 jars.
2) Tape a thermometer to the inside of each jar
3) Cover one jar with plastic wrap.
4) Add 1 tablespoon of baking soda and 1 tablespoon of vinegar to the second jar.
5) Cover with a plastic wrap.
6) Place in the sun.
7) Take temperature readings of both jars every 5 minutes.

Data Table

Time	Jar A -	Jar B -
Start		
5 mins		
10 mins		
15 mins		
20 mins		

Reflection Questions

1) Which jar warmed faster? Why?

   Jar _____ warmed faster because……..

2) What might the jars represent?

   The jars might represent …….. because…….

3) What are possible impacts of more heat trapped in the Earth's atmosphere?

   Two possible impacts of more heat trapped in Earth's atmosphere are……

Greenhouse Gases

What is the Greenhouse Effect

The Greenhouse Effect - Animation

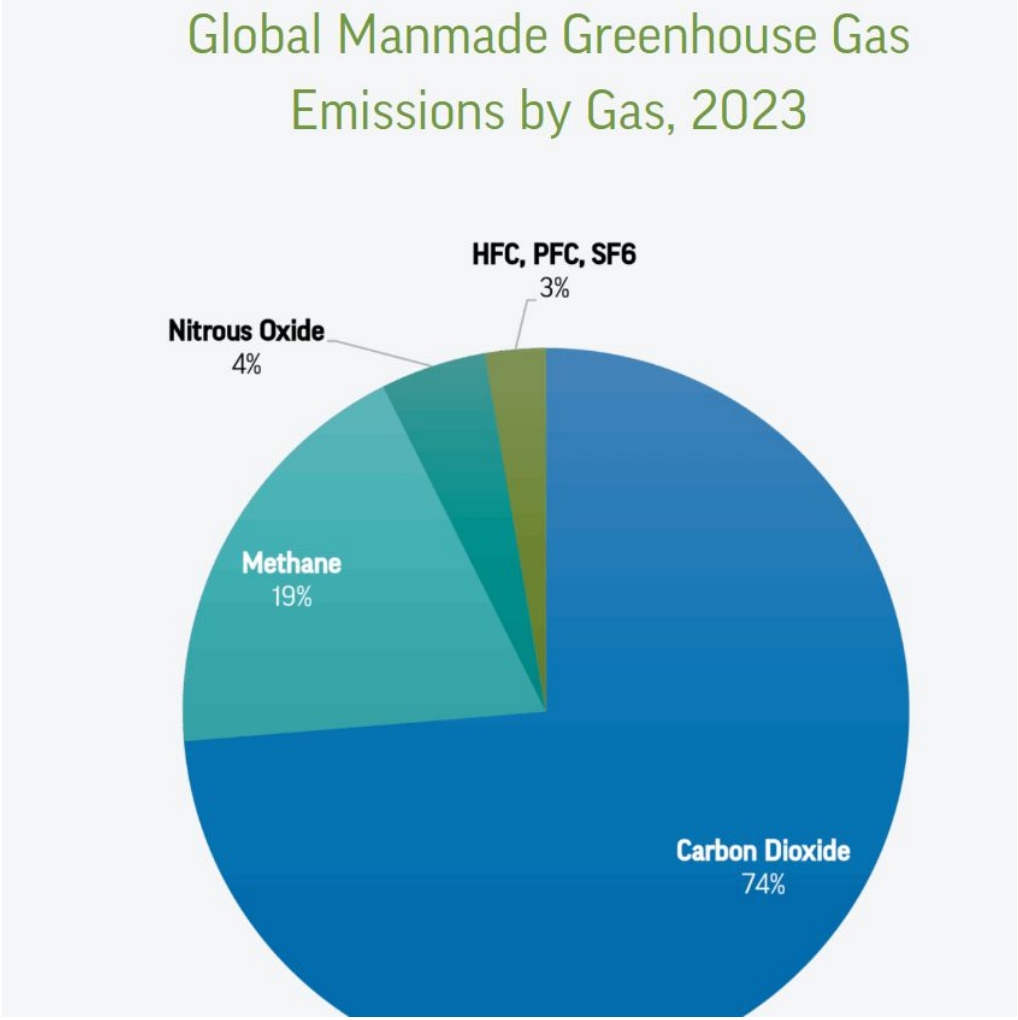
A simplified animation of the greenhouse effect. Credit: NASA/JPL-Caltech

Lesson 8: Explain- Sources of Greenhouse Gasses

The Greenhouse Effect - Animation

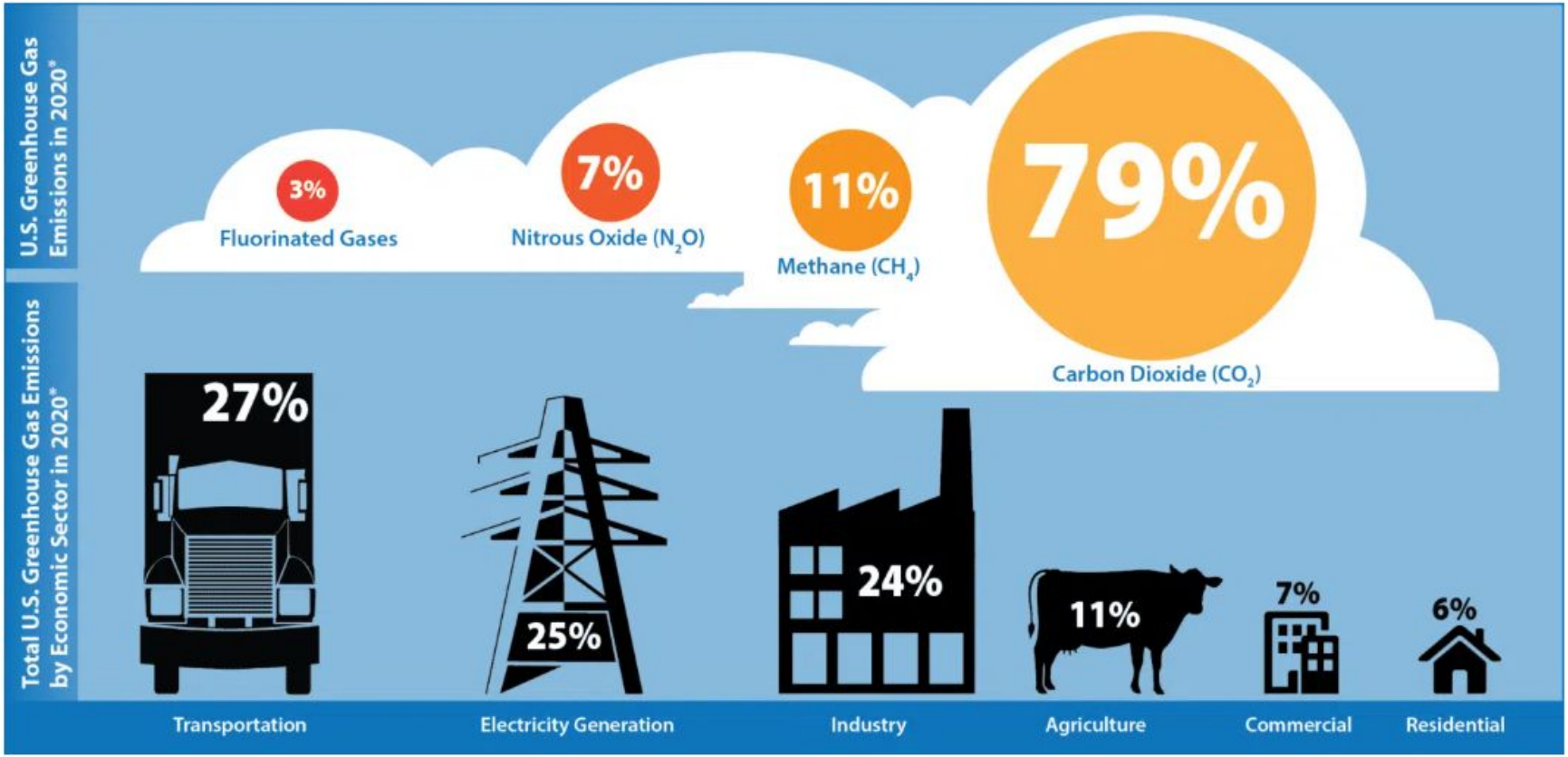
A simplified animation of the greenhouse effect. Credit: NASA/JPL-Caltech

Greenhouse Gases



The Main Greenhouse Gasses

Written by Staff Writer



Contributors to the major greenhouse gases and their fractional contribution per year

Notebook Set-Up

Greenhouse Gasses

Greenhouse Gas	%	Human Causes	Natural Causes	How it relates to food
Carbon Dioxide	82%			
Methane	10%			
Nitrous Oxide and Fluorinated Gases	9%			

Greenhouse Gases Notes

Greenhouse Effect: A **warming** of the earth that results when gases in the atmosphere trap heat from the sun that would otherwise escape into **space**.

Greenhouse Gases Notes

Greenhouse Gases: Gases that trap **heat** in Earth's atmosphere.

Carbon Dioxide Sources

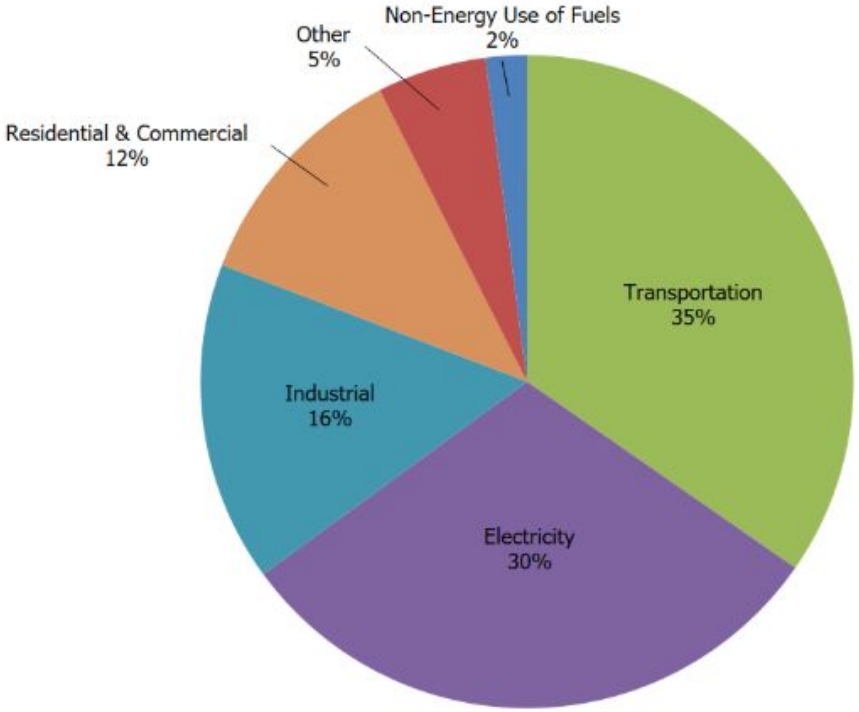
Human Causes

- **Burning Fossil Fuels** - (coal, gas, oil). For industry, electricity, transportation, etc.
- **Deforestation** - permanent removal of trees (for agriculture, construction, human development)

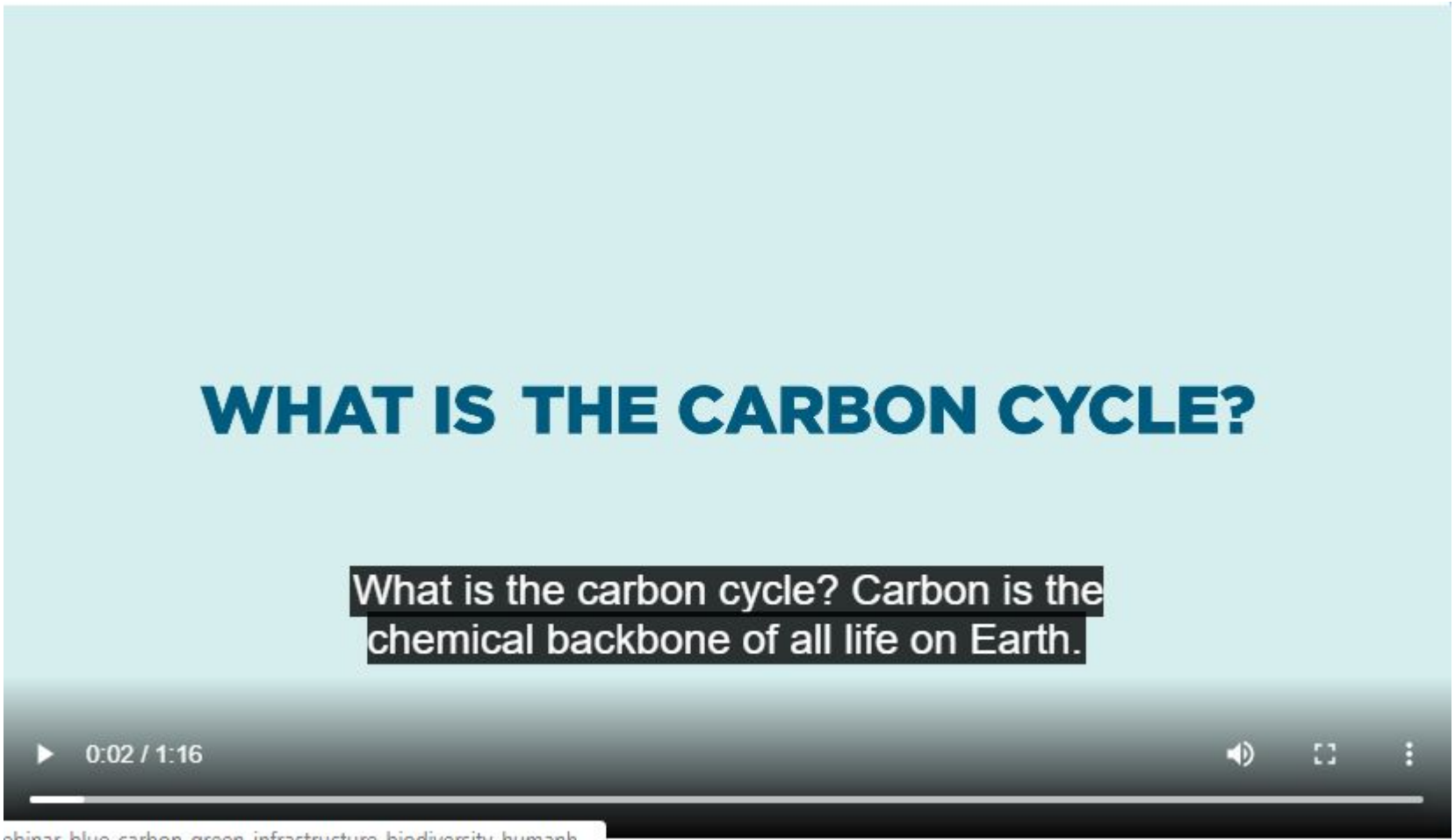
Natural Causes

- **Wildfires**
- **Volcanic eruptions**
- **Decomposition**
- **Respiration**

U.S. CO_2 Emissions, by Source



Short Video about the Carbon Cycle



Methane Sources

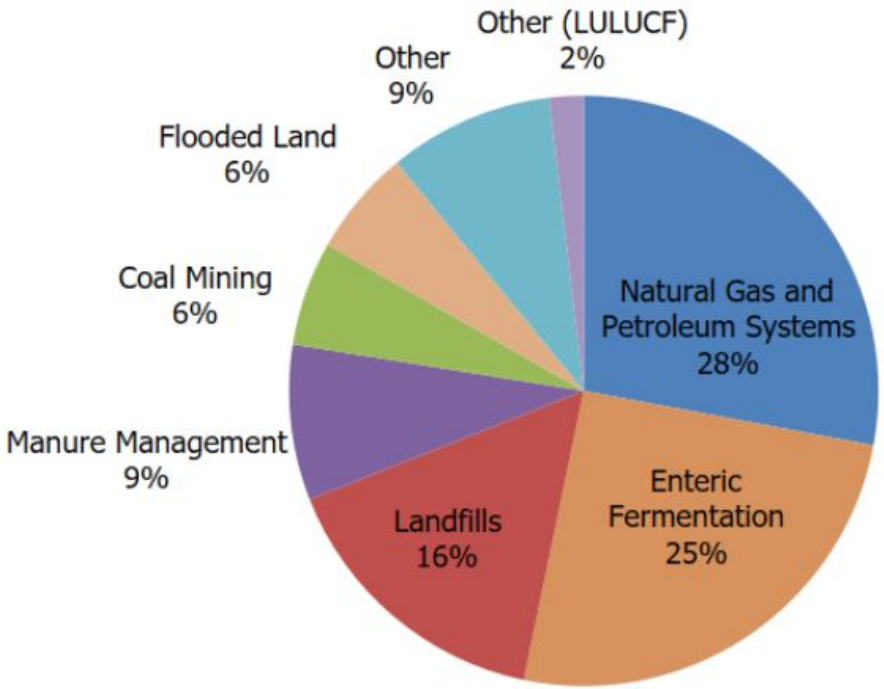
Human Causes

- **Livestock such as cows, pigs and goats -** they produce methane during their digestive process and in their manure.
- **Land use**
- **Energy and Industry**
- **Waste from home and business**

Natural Causes

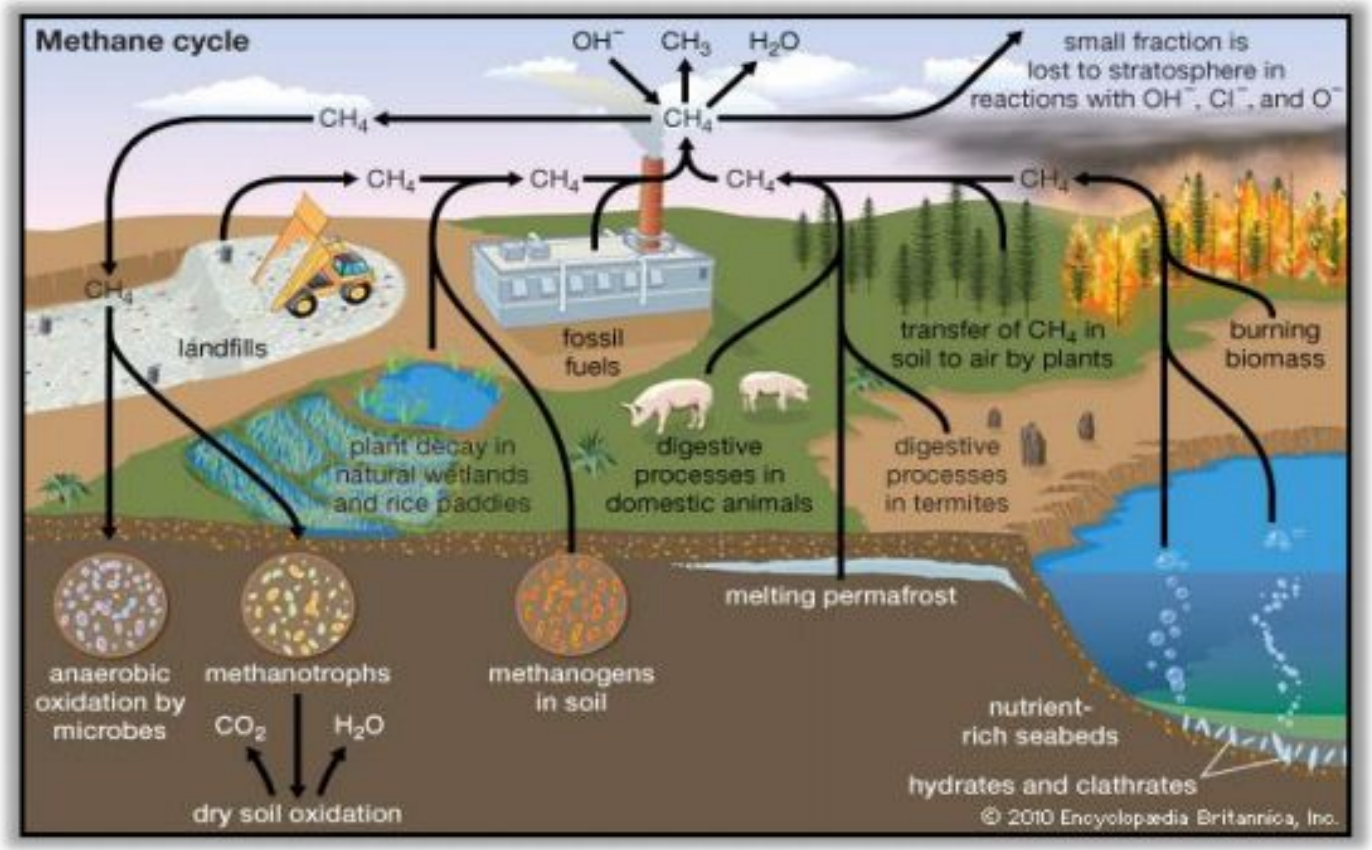
- **Wetlands**

U.S. Methane Emissions, by Source



Note: All emission estimates are sourced from the *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2022*.

THE METHANE CYCLE




Cow Farts Blow Up A Barn!
Seeker
NEWS
YouTube

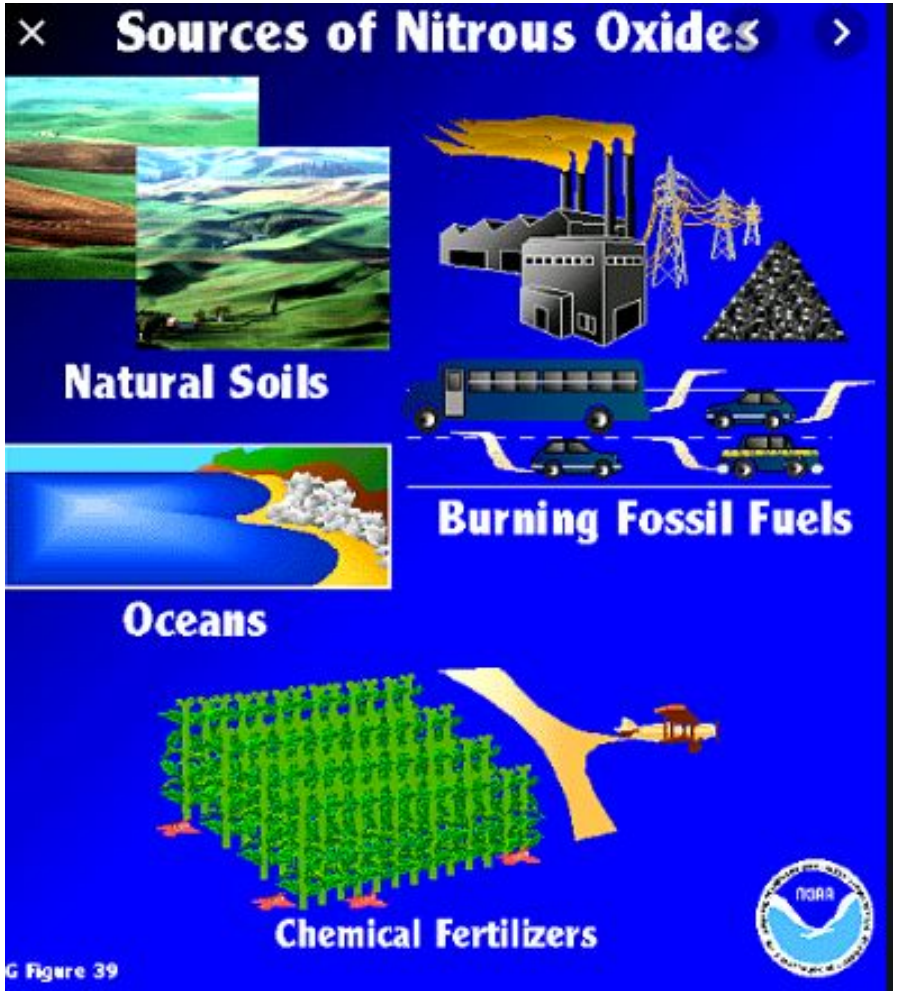
Nitrous Oxide Sources

Human Causes

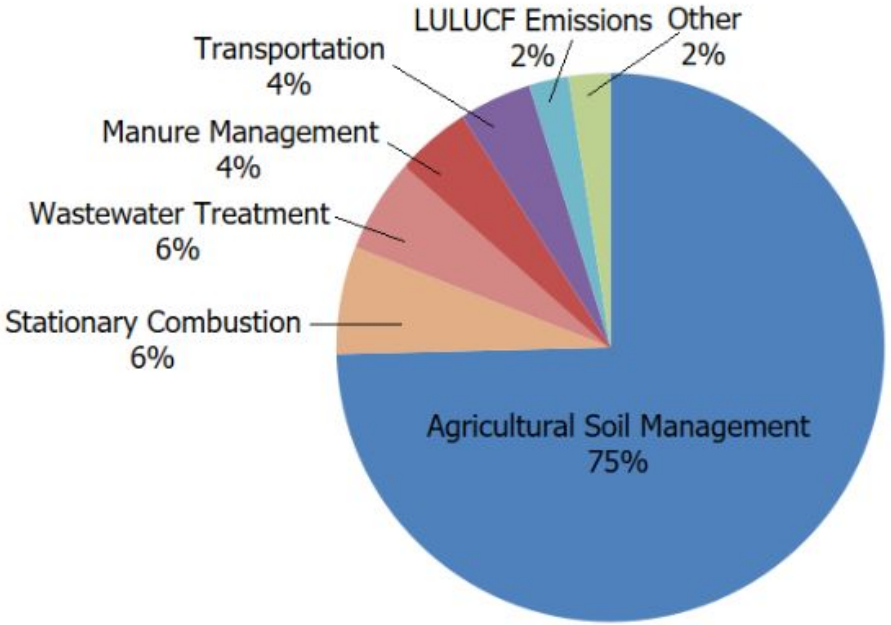
- **Agriculture -** fertilizer, manure, burning crops, soil management
- **Human Industry**
- **Fuel combustion**
- **Wastewater treatment**

Natural Causes

- **Bacteria breaking down nitrogen in soil**


Sources of Nitrous Oxides
Natural Soils
Burning Fossil Fuels
Oceans
Chemical Fertilizers
NOAA
G Figure 39

U.S. Nitrous Oxide Emissions, by Source



Note: All emission estimates are sourced from the *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2022*.

Fluorinated Gases Sources

Human Causes

- **Refrigerants**
- **Human Industry**

Natural Causes

- **n/a**

Climate Change Tetris.

TED Ed

Lessons Worth Sharing

TED Ed

Greenhouse Gases & Climate Change

Sarah Raskin

Lesson 9: Carbon Footprint

Name: Date: Class:

Carbon Footprint Worksheet

Instructions: Answer the questions below, then fill in the corresponding values on the far right. Tally the values to find your carbon footprint. Only fill in one value for each question, unless otherwise stated

Ex. Do you turn off the lights when you leave a room?		
a. Yes	a. 133	*133*
b. No	b. 268	_____

1. How do you get to school?		
a. walk	a. 0	_____
b. bike	b. 0	_____
c. car	c. 1115	_____
d. bus	d. 131	_____
e. carpool	e. 459	_____

Lesson 10: Explain - Food and Global Temperature Changes

Directions

Read your article by yourself. Take notes and highlight important points for your section. Look for evidence to support whether or not eating insects could help save the planet.

Directions

Meet with a new group of people who have read your same article. Talk to other people in your group about important points and evidence

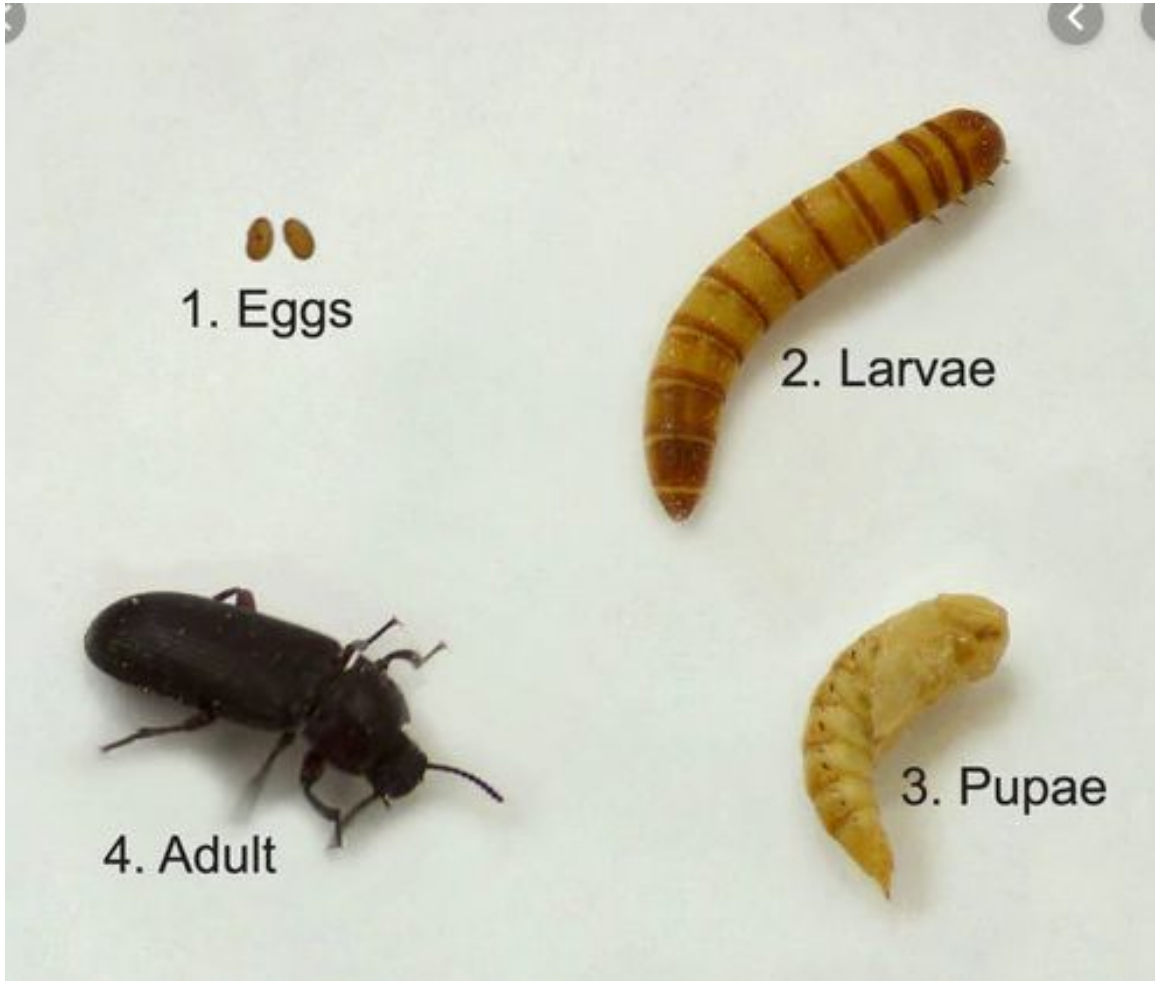
Poster

Include:

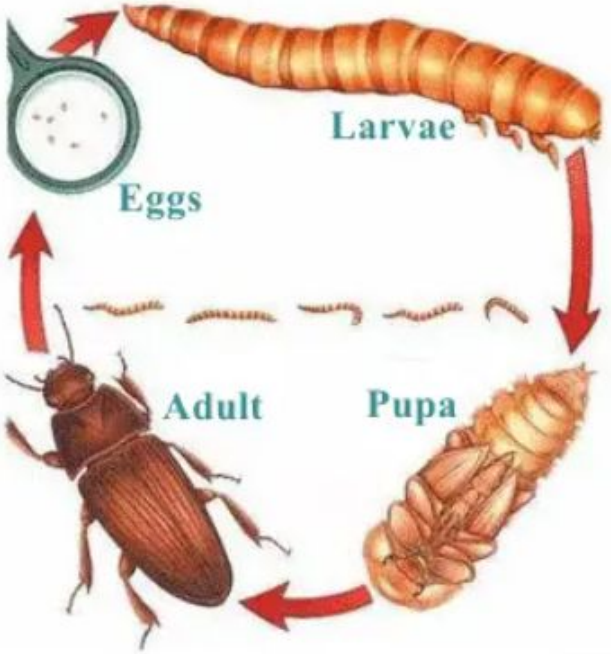
- **Visuals**
- **Written explanations**
- **Information about how it could relate to eating insects.**

Lesson 11: Planning an Investigation - Edible Insect Prep

Mealworms


1. Eggs
2. Larvae
3. Pupae
4. Adult

Mealworm Life Cycle



Lesson 12: Planning an Investigation - Edible Insect Prep

Question sorting

 To Look Up	 To Ponder/ Other	 To Observe or Investigate

a. **To Look Up** – could be easily looked up online.

b. **To Ponder** – questions that may not be able to be answered.

c. **To Investigate** – questions that can be answered through investigations or ongoing observations.

a. **To Investigate** – questions that can be answered through investigations or ongoing observations.

Investigation question criteria

Feasible

Observable

Not too big

Not too small

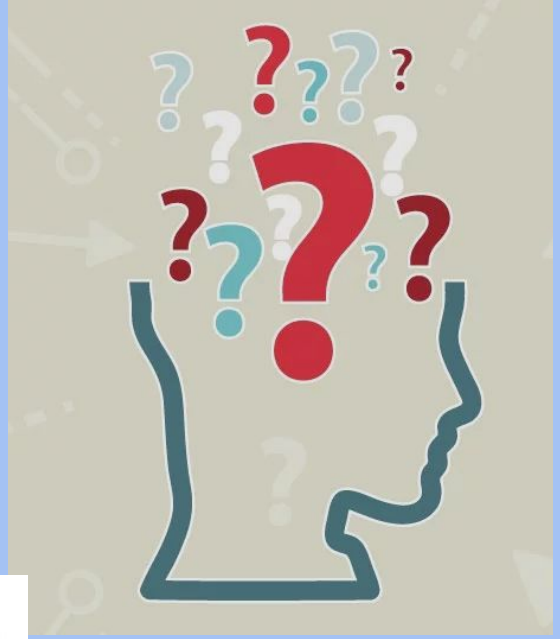
*adapted from a CA Academy of Sciences presentation at CSTA 2018

Our Testable Question:

Lesson 13: Planning an Investigation - Edible Insect Prep

Whats is a Hypothesis?

- A hypothesis is a tentative testable answer to a scientific question.
- It can be proven right or wrong



Hypothesis
If [I do this] _____
_____
_____
then [this]_____
_____
_____ will happen.

Variables

Independent Variable (What you will be changing)	**Dependent Variable** (what you will be measuring or observing)	**Controlled Variable** (what you will be keeping the same)

Lesson 14: Planning an Investigation - Edible Insect Prep

Procedure: What we will do, step-by-step. Write in detail so someone else could read this and reproduce your experiment.

Procedure:

- Set-up two terrariums (or tanks).
- The first tank is the control. Place a layer of oatmeal approximately 3-4 inches thick at the bottom of the tank.
- Place several cut carrots in the control tank as water sources.
- Set-up second tank. Place a layer of _____ approximately 3-4 inches thick at the bottom of the tank.
- Place several cut _____ in the tank as water sources.
- Measure the length of 10 mealworms from each tank.
- Average the length and record data.
- Weigh 10 mealworms from each tank.
- Average the weight and record data.
- Repeat the weighing and measuring twice per week.

What materials or resources are needed?

Materials:

- Mealworms
- Tank
- Digital Scale
- Ruler
- Oatmeal - Food
- Carrots - Water Source
- ……

Data Tables

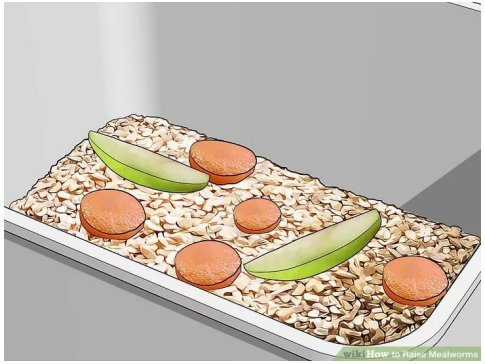
Length (cms)			
Date	Control:	Variable 1	Variable 2

Data Tables

Weight (grams)			
Date	Control:	Variable 1	Variable 2

Lesson 15: Planning an Investigation - Edible Insect Prep

How to care for mealworms



- Their bedding serves as both bedding and food. Options include wheat bran, rolled oats.

- Moisture is required. Place pieces of carrots or potatoes or other fresh produce every few days. Remove uneaten as it will grow moldy. Be careful with very watery produce as it will tend to mold quickly.

Lesson 17: Edible Insects

Article: Can Eating Bugs Save the Planet?

Questions

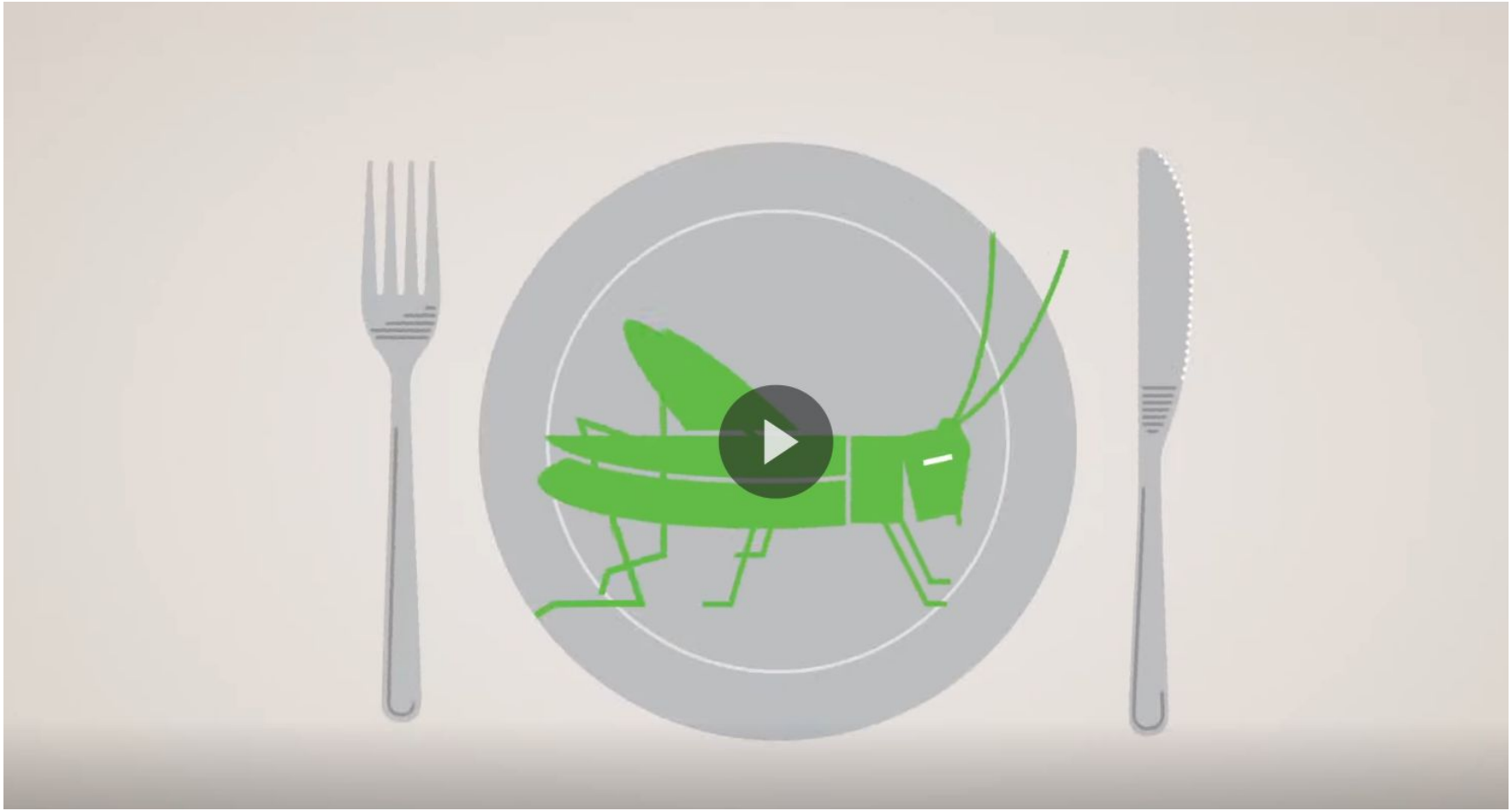
1) **What nutritional value do some insects have?**

2) **How can eating insects help save water?**

3) **Explain one reason scientists think eating insects instead of animals like cows or pigs could help the environment?**

4) **Would you eat insects? Why or why not?**

National Geographic

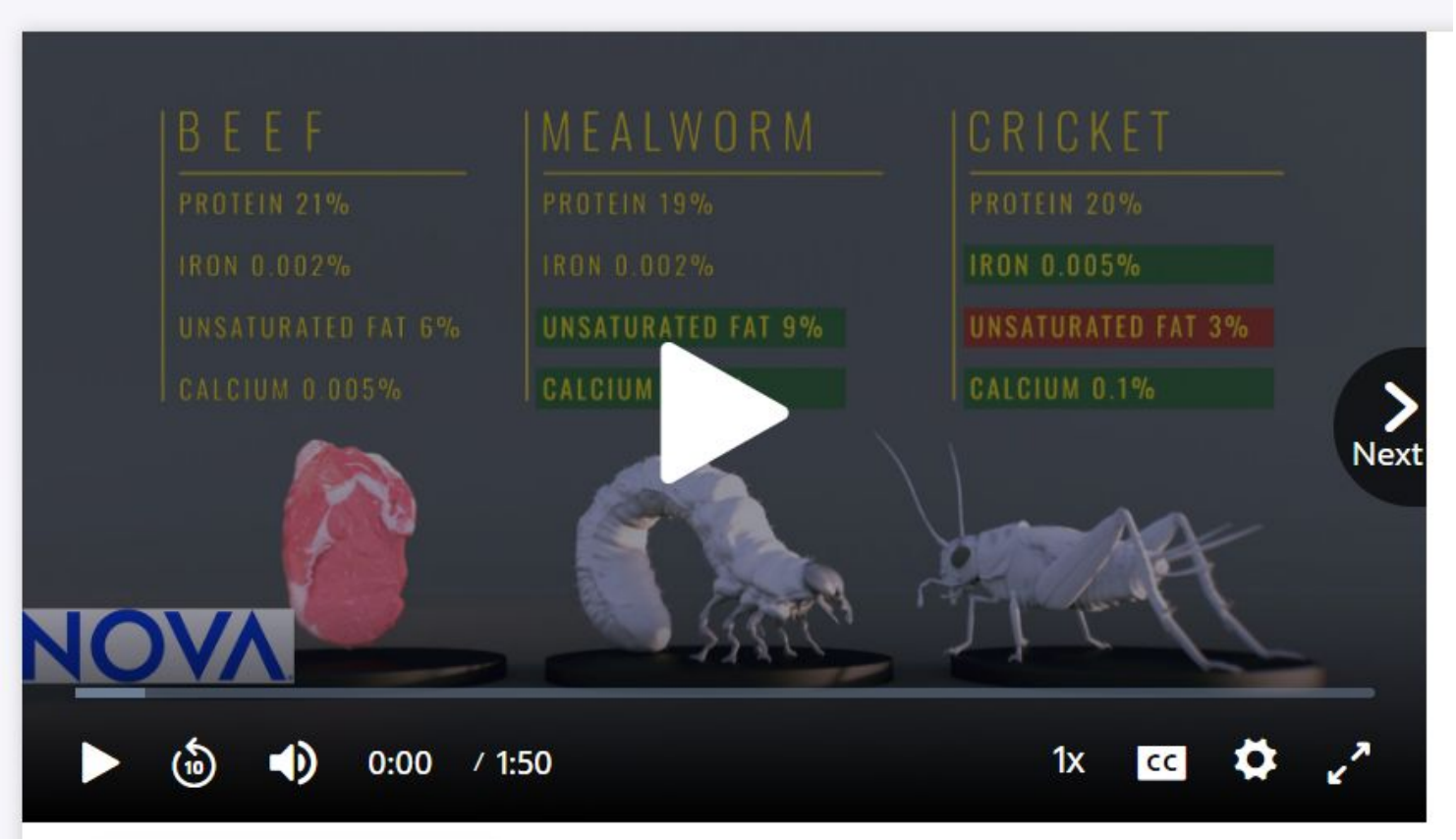


TEDEd

ASAP Science

CA Academy of Sciences: Bugs for Breakfast

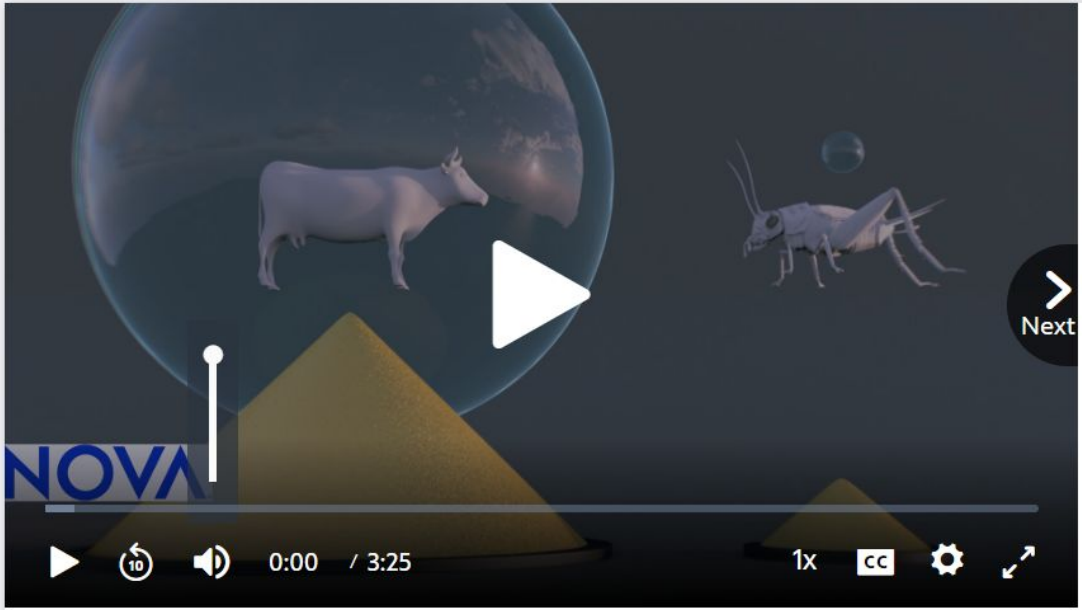
PBS: Why Eat Insects?



PBS

Environmental Benefits of Eating Insects | Edible Insects

Media Gallery Grades: 6-8 Collection: **NOVA Collection**



Resource 1 of 2

Eating Insects to Feed the World | Edible Insects

Learn how insects need fewer resources to produce the equivalent amount of meat compared to cattle raised for beef.

Transcript

Lesson 19: Analyzing and Interpreting Data

Results: (what was your evidence?)

Conclusion: (what did your evidence tell you?)

Helpful Questions:

1. Did our experiment agree or disagree with your hypothesis?
2. Did we get the results we expected? If not-how were the results different?
3. Where there any unexpected problems that may have affected our experiment results?
4. Do you think you collected sufficient data?

What questions do you still have?

References/ Literature Cited: (articles, websites, lectures, etc.)

Article:

Author(s). "Title of Article." *Title of Periodical*, Day Month Year, pages.

References/ Literature Cited: (articles, websites, lectures, etc.)

Website:

The most basic entry for a website consists of the author name(s), page title, website title, sponsoring institution/publisher, date published, medium, and date accessed.

Last Name, First Name. "Page Title." *Website Title*.Sponsoring Institution/Publisher. Publication Date: Page Numbers. Medium.

Smith, John. "Obama inaugurated as President." *CNN.com*. Cable News Network, 21 Jan. 2009. Web. 1 Feb. 2009.

References/ Literature Cited: (articles, websites, lectures, etc.)

Lecture:

Last, First M. “Presentation Title.” Event Name. Location, City. Date Month Year Presented. Lecture.

Acknowledgments (who helped you with this project?)