

Climate Science in a Nutshell

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TEACHER RESOURCE GUIDE

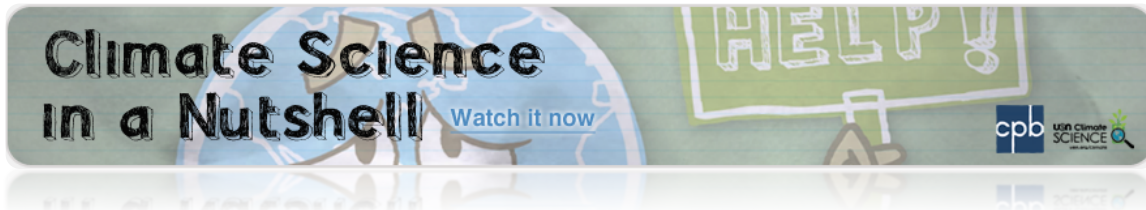
EPISODE 5: WHERE DOES CARBON DIOXIDE COME FROM?

Brief Description

Back in the 18th century, people started burning coal to power a new invention: steam engines. But here's something curious: Ever since steam engines were widely used, starting in about 1850, carbon dioxide in the atmosphere began to climb. Today it stands at 392 parts per million. Parts per million is a special measurement scientists use. 392 is WAY more carbon dioxide than we've had for many thousands of years, and the number continues to rise. So where does the extra carbon dioxide come from?

Keywords/Key Concepts

Atmosphere	The air that surrounds the Earth.
Carbon Dioxide	A gas that is produced by all animals and plants during respiration and used by plants during photosynthesis. Carbon dioxide is also the by-product of burning fossil fuels.
Carbon Cycle	The flow of carbon dioxide and oxygen through Earth's ecosystems.
Fossil Fuels	Coal, oil, natural gas.
Greenhouse Effect	Excess carbon dioxide and other gases in smaller amounts that are preventing heat from escaping the Earth's atmosphere thereby warming up the planet.
Oxygen	A colorless, odorless gas. Oxygen forms about 20 percent of the earth's atmosphere.



TEACHING IDEAS WHEN USING VIDEO IN THE CLASSROOM

While watching television is often seen as a passive viewing experience, there are ways to turn it into a springboard for student interaction. Here are some general teaching strategies that enhance the use of video materials in your classroom by targeting specific skill sets.

- **Predicting**
- **Viewing Comprehension**
- **Listening Practice**
- **Speaking Practice**
- **Discussion**

PREDICTING

With picture and audio on:

- Use the pause control to stop a scene and have students predict what will happen next.
- Use the pause control to stop after a particular line of dialogue and have students predict the next line.

With audio off:

- Have students predict the situation and characterizations based on viewing an entire scene without the sound.
- Have students predict lines of dialogue after viewing an entire scene without the sound.
- Have students predict individual lines of dialogue by using the pause button to stop the scene.

With picture off:

- Have students predict the situation and characterizations by listening to the soundtrack without watching the picture.

VIEWING COMPREHENSION. You can check students' understanding of the situation in the following ways:

Before watching:

- Give students specific things to look and listen for before they watch a scene.

While watching:

- Freeze-frame the scene by using the pause button and check students' understanding

While watching or after watching:

- Have students answer comprehension questions you devise.

After watching:

- Give students cloze scripts and have them fill in missing words in dialog lines.

LISTENING PRACTICE. Have students focus on the dialogue contained in a scene by listening for particular vocabulary words, structures, or functional expressions:

TV Dictation:

- Have students write dialogue lines as they view them, using the pause control to stop the scene after each line.

Cloze Scripts:

- As students view a scene, have them fill in missing words in a cloze script you have created.

SPEAKING PRACTICE

Role Plays:

- Have students role play a scene, practicing the lines of dialogue for correct intonation and emphasis.

On-Location Interviews:

- Have students circulate around the classroom and interview each other using questions contained in the video segment. Students can then report to the class about their interviews.

Information Gap:

- Have half the class see a segment without audio and the other half hear it without the picture. Students from each half of the class then pair up, talk about the situation and characters, and act out the scene.

Strip Dialogue Scenes:

- Write dialogue lines on separate strips of paper, distribute them randomly, and have students recreate the scene by putting the lines together.

DISCUSSION

- Have students discuss the scene, plot and characters' actions, thoughts, and feelings.
- Have students think about what the characters in the scene are thinking but not saying. Students can create these interior monologues, present them to the class, and discuss any varying opinions about characters' inner thoughts during the scene.
- Have students tell which characters they identify with and explain why.

Adapted from *Side by Side TV Reference Guide*.



Episode 5: Where Does Carbon Dioxide Come From?

Back in the 18th century, people started burning coal to power a new invention: steam engines. But here's something curious: Ever since steam engines were widely used, starting in about 1850, carbon dioxide in the atmosphere began to climb.

Today it stands at 392 parts per million. Parts per million is a special measurement scientists use. 392 is WAY more carbon dioxide than we've had for many thousands of years, and the number continues to rise.

So where does the extra carbon dioxide come from?

You might say it comes from our success, and steam engines were just the start. It comes from our bustling cities and towns, filled with things like cars, planes, factories, office buildings, homes, computers, TVs, air conditioners, and refrigerators.

All those inventions were good – and we've accomplished some amazing things because of them – but they all require one thing: Energy. Lots of energy. And it's our thirst for energy that has some unintended consequences for the planet.

Where does energy come from? We get most of it from burning things like coal, oil, and natural gas. These are called fossil fuels because they were formed deep in the ground over millions of years by ancient decaying organisms, or fossils.

Chances are, most of the things you do that take energy in a given day are powered by burning coal in a power plant. And of course, you burn gasoline, which comes from oil, when you ride in a car. Meanwhile, many homes and buildings are heated by natural gas.

Fossil fuels are full of energy and they have been useful to us. But there's a problem: burning them releases carbon dioxide into the atmosphere. In 2009, each person in the United States used enough fossil fuel energy to release an average of 17 tons of carbon dioxide. That's about the equivalent of four African elephants.

Over time, all of that carbon dioxide really starts to add up, and because of the thickening blanket that causes the Greenhouse Effect, the more carbon dioxide there is, the higher Earth's average temperature goes.

Scientists and the governments of many nations now agree that we're releasing too much carbon dioxide, and to prevent the worst effects of Rapid Climate Change, we're going to have to reduce that 392 parts per million number to about 350.

Fortunately, by making good choices now, we *can* tackle the problem of too much carbon dioxide. And in case you didn't know, you can be part of the solution, too.

**EPISODE 5: WHERE DOES CARBON DIOXIDE
COME FROM?**

