

CO₂: Too Much of a Good Thing?

A Lesson Presented by the Scientists at the Gulf Coast Carbon Center

PART 1: Lesson (20 minutes) – details subject to change

Each of the following six topics will be presented by a different undergraduate or graduate student researcher in our lab. These presenters will discuss the topic at hand, as well as briefly describe their educational background and how their current research relates to the subject at hand. By having our presenters tell their own stories, we hope to show students that they are more than capable of becoming scientists themselves. To prepare students for part two, our presenters will ask students trivia questions throughout each portion of the presentation and tell them to write down an answer. During the trivia portion, we will reword the same questions and have students volunteer to answer the questions.

1. What are the greenhouse gases and how do they form?
 - a. Describe the variety of greenhouse gases (CO₂, CH₄, N₂O, Ozone, water vapor)
 - b. Discuss where greenhouse gases can be found in the atmosphere
2. When and why are greenhouse gases important? When and why are they a problem?
 - a. Mention the benefits of greenhouse gases to keep the Earth warm
 - b. Explain how light energy becomes heat energy within the atmosphere
 - c. Ask students what they think happens if too many greenhouse gases are in the atmosphere; explain how this is happening now
3. How does CO₂ play into things? Where does it come from? What is CO₂ doing in the atmosphere?
 - a. Talk about fire and burning. What is the chemical reaction that happens when something burns?
 - b. Ask students if they can see CO₂, if they can smell it, in what situations they know that it is there
 - i. Show students videos how dry ice can demonstrate that CO₂ is there but we cannot see it
4. What can we do about too much CO₂ and greenhouse gases? How can we reduce the amount of emissions and greenhouse gases in the atmosphere?

- a. Ask students what ways they know of to reduce emissions, both personally (such as carpooling) and for the public (such as green energy)
 - b. Ask students what they think we can do about the CO₂ going into the air now?
How can we deal with the CO₂ being created as transition to green energy?
 - i. Most students will mention planting more trees; we want to guide them towards talking about carbon capture
5. How does carbon capture and storage work?
- a. Discuss in simple terms how water and gas can be stored in the pore spaces of rocks
 - b. Talk about how we can filter CO₂ from exhaust and put it underground in these porous rocks
 - i. Use the interactive whiteboard tool to have kids pick what they think are the best places to put CO₂ in a geologic structure
6. What is the Gulf Coast Carbon Center doing to help reduce emissions?
- a. One of our presenters will talk about what we do as scientists at the Gulf Coast Carbon Center to show students how they can get involved helping with climate change in the future

PART 2: Trivia Game (20 minutes)

After students get a better idea about the greenhouse gases and the role of CO₂ in the atmosphere, we want to engage them in a short trivia game to quiz them on their knowledge.

Some types of questions we might ask are:

1. Name all five greenhouse gases (partial credit for partial responses)
2. More greenhouse gas in the atmosphere does what to the average global temperature?
3. Give three examples of human activities contributing to the greenhouse effect?
4. What advantage does carbon capture have over other green energy solutions (wind, solar, etc.)?
5. Without CCS, will the cost of mitigating climate change increase/decrease?

PART 3: Conclusion (5 minutes)

Announce winners to the trivia game, review the sheet we gave them, and tell them they can

complete it at home and share with each other. If time allows, this can also be done during the final minutes of the presentation.