

Please Don't Paint Our Planet Pink

Greenhouse Gases and Where They Come From

This plan was developed by Kathy Conway and SOCAN's Climate in the Classroom Project for SOREEL's August Institute 2016. (25min for the workshop). Can be adapted for K-5 students.

Overview: Participants will review which gases are greenhouse gases. We will read part of a story appropriate for elementary students on the sources of greenhouse gases. Participants will indicate the relative amounts of CO₂ released from different sources based on the storybook.

Objectives:

Students will:

1. Identify the greenhouse gasses.
2. Identify the relative amounts of CO₂ that are released from different sources.
3. Explain the reason for their choices of the amounts of CO₂ that are released from different sources

Grade Level: K-5

Standards:

Crosscutting Concepts

Cause and Effect

- 4-ESS3-1 Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.
- 5-ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Materials:

- Book: *Please Don't Paint Our Planet Pink!* By Gregg Kleiner, Illustrated by Laurel Thompson ISBN 978-0990637301
- Pink highlighters or pink markers
- Pictures of trains, cars, trucks, bikes, planes, people, trees, etc. for students to color Pink Puffs
- 3 – 3x5 cards

Scientific terms for students:

- Greenhouse gases = Atmospheric gases that absorb longwave (IR) radiation passing out from the earth's surface.
- Greenhouse gases include: Carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), chlorofluorocarbons (CFCs chlorinated organic compounds used as refrigerants), tropospheric ozone (O₃ found in the lower level of the atmosphere).

Introduction

- PPT (interactive) [5 minutes]
 - Identify greenhouse gases
 - Clarify that CO₂ is only one of the greenhouse gases
 - What are the sources of these greenhouse gases?

- Read the book Please Don't Paint Our Planet Pink! By Gregg Kleiner, Illustrated by Laurel Thompson to the class. [5 minutes]

Group Task: [8 minutes]

- For demonstration, have 3 people add Pink Puffs of CO₂ to 3x5 cards. To represent “small amount,” “medium amount,” and “large amount”. Ask the class if they agree that these are accurate representations
- Directions: you will receive several pictures of items that emit CO₂. Add Pink Puffs of CO₂ of the appropriate size to your picture. When you finish, discuss in your group why you selected the amount you did. Everyone in the group should be prepared to share why the amount was chosen.
- Pass out Pink markers and pictures to each group.

Wrap-Up: [2 minutes]

- Select different images from each group and ask a person in the group to explain why the size of Pink Puff of CO₂ was selected.
- There are a couple of caveats that are identified on the SOCAN website. Please read them if you use this activity.

Extension:

- Discuss with students the things that they could change to reduce the amount of CO₂ that they release.

Background for Educators:

1. There are 2 caveats about this book that we have sent to the author.
 - a. The process of warming is described as resulting from heat from the sun being trapped in our atmosphere and warming the gases. However, this isn't what is happening. The process is a little more complex: in fact visible and shortwave radiation passes through our atmosphere to reach the Earth's surface. Upon arrival, they are transformed into longer wave heat radiation which then radiates outwards. It is this outward radiation that is trapped by atmospheric gases and heats the planet.
 - b. Methane is identified as being a problem because it contains carbon. This isn't really the problem with methane. The problem is that methane is 34 times worse as a heating agent than carbon dioxide (on a 100 year basis) or 85 times worse (on a 20 year basis). The two values are given because methane exists for only a short period of time in the atmosphere before being broken down while carbon dioxide remains in the atmosphere for thousands of years. Unfortunately natural gas (which is largely methane) leaks. This leakage occurs throughout its life cycle, from where it is extracted (especially as a result of fracking shale), through its transmission, to where it is burned to generate energy. Thus, when methane reaches the atmosphere it is more of a problem than carbon dioxide. The evidence increasingly suggests that this leakage is sufficient to make natural gas worse than coal as a global warming agent. It is worth recognizing that methane (natural gas) is another (and even more serious) warming gas than carbon dioxide.
 - c. It is also worth noting that when humans breathe out, we emit a small amount of carbon dioxide, though not nearly as much as burning fossil fuels.