



Climate Change Red Rover (Full Version)

Purpose:

To explore how the greenhouse effect moderates the Earth's temperature.

To understand how adding or subtracting carbon dioxide and methane from the Earth's atmosphere changes the greenhouse effect.

To explore the human element of climate change, specifically different actions that contribute to and can prevent the emission of gases that cause climate change.

Objective:

To have students play one or more rounds of Climate Change Red Rover. During the game students will explore how the greenhouse effect works, and what role humans play in increasing or helping to avoid emissions that impact the greenhouse effect and lead to climate change.

Time: 20+ minutes

Materials:

- Instruction Sheet
- Poster of the Sun
- Poster of the Earth
- Four small cones
- 40 x Climate Change Cards (Energy, Water, Transportation and Everything Else categories.)

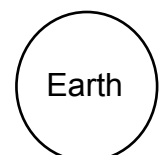
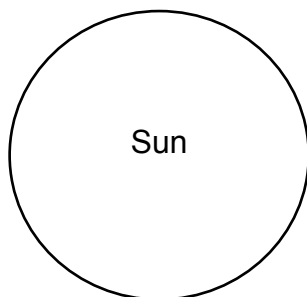
Preparation:

Note: adjust the size of the space for this activity relative to the size of group playing the game.

1. Read through the game instructions in preparation for playing the game.
2. In a large empty room (gym or other) place the Sun poster on one wall and the Earth poster on the other.
3. In between, slightly closer to the Earth, place the cones in two lines, about 1.5 metres apart to represent the Earth's atmosphere. Make the "atmosphere" just large enough so all the participants in the group could stand between the lines with their arms out and just barely touch each other.

Procedure:

See the Instructions Sheet.



Extension:

1. Try playing this game at your school. If you have more time, draw one card at a time and play out the game. This way you get to run more!
2. Have the students write their own Climate Change Game cards from things that either emit greenhouse gases, avoid producing these gases, or help to store the gases. You may want to have different groups investigate different parts of the Climate Change issue as background information.
3. Have the students write down one thing they can do to reduce their greenhouse gas emissions. Encourage them to set a realistic goal that they will try to achieve. Put these up somewhere in your school (perhaps as leaves on a green tree display) and check back a few weeks later to see how each of the students is doing with their commitment.
4. Read through the Carbon Cycle Story with your group to better understand how Carbon cycles through the environment and the important role it plays for all living things on the Earth.

Climate Change Red Rover Instruction Sheet

Game 1: A Healthy Climate and the Greenhouse Effect

1. Ask the group if they have ever heard about global warming or climate change and to share what they know.
2. Explain that the concept of global warming/climate change can be difficult to understand, so we will be exploring it using a game similar to "Red Rover".
3. One end of the room is the Sun, the other the Earth's surface. The cones in the centre represent the Earth's atmosphere. The lines on either side mean you've fallen off the edge of our Earth.
4. There are **four main roles**, ask for volunteers as you describe them:
 - **The Sun (1 person)**
 - **Methane gas (1 person)**
 - **Carbon Dioxide (2 people)**
 - **Solar energy (remaining people)**

If you have a large area, you can add additional methane and CO₂ at a 1:2 ratio.

Aim of game: For the solar energy (students) released by the Sun to touch the Earth and warm it up and then bounce back out into space. If we do this right, we get the perfect amount of energy to keep the Earth warm, but not overheat.

The Sun - releases solar energy (students). They will release one 'solar ray' every few seconds. *Tip: the sun controls the speed of the game, choose an adult or older student.*

Carbon Dioxide (CO₂) - is a very common gas we breathe out. Trees absorb CO₂ from the atmosphere and use it to grow. In this game, CO₂ **kneel facing the Earth** in the atmosphere. Solar rays (students) will run to the Earth to warm it up. If the solar rays touch a CO₂ on the way out they have to bounce back to the Earth and then try to leave again. CO₂ wants to block sunlight from escaping, they can bend and twist, but they CANNOT move their legs!

Show the CO₂ and methane where you want them in the atmosphere. - have adults help

Methane gas - is a much less common gas than CO₂. Methane is 4 times more reactive as a greenhouse gas than CO₂. This means they are 4 times better at catching solar rays. Methane gases **stand facing the Earth** and can lean out, bend, twist - anything but move their feet.

Solar energy - Remaining students should line up single file along the wall by the Sun. When the Sun taps a solar ray on the shoulder, they are released! At first they have a LOT of energy so they can't be stopped by CO₂ or methane. When they touch the Earth they give away a lot of energy so they can no longer run - **have to walk**. The longer they are stuck, the more energy they lose and the slower they move. If they make it out of the atmosphere without getting touched, they can get back in line to be a new solar ray.

Demonstrate to the group how a solar ray should act.

5. **Play one round.** When you hear “freeze” the game is stopped and you need to freeze where you are. We are going to play several rounds of the game.
6. **Debrief: You have just demonstrated how the Greenhouse effect works!** The Earth needs solar energy to be warm. The students bouncing around between the Earth and the atmosphere represent heat energy. If Earth didn’t have an atmosphere, like the moon, there would be no way to trap heat from the Sun and the Earth would be as cold as outer space. If the Earth had too thick of an atmosphere, like Venus, it would be too hot and nothing would be able to live. You have just demonstrated how a healthy atmosphere works to heat the Earth and keep it not too hot and not too cold.

Game 2 - Climate Change

1. Ask everyone to gather around. There are natural processes that can affect the atmosphere, forest fires release carbon dioxide, volcanoes send up ash that can block out sunlight. These are normal events that the Earth can adapt to.
2. **Hand out 5 climate change cards.** Huge amounts of energy is stored in coal, oil and natural gas. By burning them, we are releasing carbon that has been stored underground for millions of years into the atmosphere - these are called **carbon sources**. By cutting down trees or polluting the oceans we are also affecting the Earth’s ability to clean carbon out of the atmosphere - the things that collect carbon dioxide and store it are called **carbon sinks**. These climate change cards represent some of the things humans are doing to change the atmosphere and by doing so, changing the temperature of the Earth.

If you have more time, you can select more cards, or play multiple games.

You want to add enough cards to make it difficult for the Solar energy to escape the atmosphere.
3. **Reset the game.** Have each person that has drawn a climate change card read it out and add or subtract CO₂ and methane as indicated.
4. **Play a second round of the game.** When all the “Sun energy” has been released, ask the students if they noticed anything different about the game that time.

Most if not all the solar energy will be trapped in the atmosphere showing that the Earth is hotter - on AVERAGE.
5. **Debrief:** This version of the game is similar to what is happening to the Earth right now, humans are changing the atmosphere and causing the Earth to become warmer. This is called climate change sometimes, incorrectly, called global warming.

The changes in the atmosphere are causing the average temperature on Earth to increase, which causes weather patterns to change. Some places will be colder and cloudier, others will get more rain, still others may get hotter and experience drought. This is why it is called climate change. The Earth’s overall temperature only needs to increase 1 or 2 degrees before we will experience climate change. In the short term, climate change means more extreme weather events. In the long term a hotter planet means melting glaciers, sea level rise and flooding. The hotter the Earth gets, the more extreme these changes will be.

Game 3 - Stopping Climate Change (Time permitting)

1. Explain that the good news is, there is a **lot we can do to reduce the CO₂ and methane** we are producing.
2. Ask the students for **suggestions** to reduce the amount of energy, water or transportation we use or to change our habits to buy less stuff and produce less waste. Some examples:
 - a) Planting a tree will reduce the CO₂, but only until it is harvested or decomposes.
 - b) Walking to school instead of driving reduces CO₂ emissions.
 - c) Eating one less meat meal (esp. beef or lamb) reduces methane emissions.
 - d) Installing solar hot water when building a new house instead of natural gas heaters.
 - e) Turning off lights, computers and video games when they aren't being used.
 - f) Preventing water pollution protects Phytoplankton in the ocean - one of the largest "carbon sinks".
 - g) Buying local and only what you need.
2. On your own, **think of one thing you can do** this week to reduce CO₂ or methane emissions. When your ready, share your idea with another person in the group.
3. **Time permitting, play a new round of the game**, with the improved atmosphere.

For every suggestion, remove some of the "gases" from the atmosphere.

Bright Idea!

You replace your regular incandescent (pic) hallway night light with an energy saving LED nightlight.

Subtract 1 CO₂ and 1 methane



Climate Δ Card

Ready, Set, Action!

Instead of watching another re-run of your favorite cartoon, you decide to call some friends and play some ball hockey.

Subtract 1 CO₂ and 1 methane



Climate Δ Card

Losing your Cool

It's a hot sunny day and instead of closing the blinds during the sunniest part of the day you decide to turn on the air conditioning in your house.

Add 3 CO₂ and 2 methane



Climate Δ Card

Cold Snap!

It's really cold outside, and instead of putting on a sweater over your t-shirt you ask your parents to turn up the thermostat.

Add 2 CO₂



Climate Δ Card

Fright Night

You watch a spooky movie and get scared! So you decide to leave all the lights on in the house... all night!

Add 1 CO₂ and 1 methane



Climate Δ Card

Vampire!

You love your ipod and you need to charge it every night because you use it so much. Instead of unplugging the charger when you're not using it, you leave it plugged in all the time and it is constantly using energy!

Add 1 CO₂ and 1 methane



Climate Δ Card

Climate Change Card

ENERGY

Climate Change Card

ENERGY

Climate Change Card

ENERGY

Climate Change Card

ENERGY

Climate Change Card

ENERGY

Climate Change Card

ENERGY

I'll be Back

You're playing on the computer when you get called down to diner and decide to leave the computer on – you'll only be an hour or so – but you forget and it's on all night!

**Add 1 CO₂
and 1 methane**

So Hungry!

You've got a bad case of the munchies and you want a snack, but it's hard to decide. While your deciding what to snack on you stand with your head in the fridge and the door wide open!

Add 2 CO₂

Who's There?

Your aunt comes by to drop off something for your dad, while your chatting at the front door you leave the door wide open and let all the heat escape!

Add 2 CO₂



Climate Δ Card



Climate Δ Card



Climate Δ Card

Keeping it Cool

It's a hot day and the room is stuffy, so instead of opening a window you turn the fan on full blast and point it right at you!

**Add 1 CO₂
and 1 methane**

Hot Water Hug

You talk with your parents about saving energy and decide to buy a blanket for your hot water heater. This saves energy by keeping the water warmer and you might even be able to turn down the thermostat on the heater saving even more energy!

Subtract 2 CO₂

Toilette Teamwork

You talk with your family and decide that at home you will have the "If it is yellow let it mellow, if it's brown flush it down" rule. Using less water means less water has to be treated and cleaned; saving energy!

Subtract 2 CO₂



Climate Δ Card



Climate Δ Card



Climate Δ Card

Climate Change Card

ENERGY

Climate Change Card

ENERGY

Climate Change Card

ENERGY

Climate Change Card

WATER

Climate Change Card

ENERGY

Climate Change Card

WATER

Pants Problem

Your favorite jeans are dirty and you really want to wear them tomorrow so you decide to do a load of laundry with just your jeans.

**Add 1 CO₂
and 1 methane**



Climate Δ Card

So Thirsty!

Your thirsty and you want a glass of water so you turn on the tap and run the water until it gets cold enough to drink. Too bad you didn't remember to leave a jug of water in the fridge!

Add 2 CO₂



Climate Δ Card

More Bubbles!

You love baths. In fact you love them so much you have one every night with the water filled right up to the top of the tub! When the water gets cold you just drain some and run the hot water again – you really love baths!

**Add 2 CO₂
and 1 methane**



Climate Δ Card

Un-flushables

You flush everything. Use a Kleenex – flush it down. Floss your teeth – flush it down. All that wasted water!

**Add 1 CO₂
and 1 methane**



Climate Δ Card

Clean not Green

It's your job this week to clean the driveway, and instead of pulling out the broom, you decide to use the hose and power wash the driveway and the sidewalk.

Add 2 CO₂



Climate Δ Card

Soaking Wet

Your in charge of watering the lawn, so you turn the sprinklers on and leave them running for 2 hours right in the middle of the day instead of running them early in the morning when the water has a chance to soak in instead of evaporating in the hot sun.

Add 2 CO₂



Climate Δ Card

Climate Change Card

WATER

Climate Change Card

WATER

Climate Change Card

WATER

Climate Change Card

WATER

Climate Change Card

WATER

Climate Change Card

WATER

Big Smile!

Your brushing your teeth and you leave the tap running so that you can rinse and brush... rinse and brush over and over!

Add 2 CO₂

At the Car Wash

The car is dirty from your family camping trip and you've been asked to clean it. Instead of using a bucket and soap, you pull out the hose and leave it running for the whole hour it takes you to clean the car!

Add 2 CO₂

Carpool Master!

There are 3 people on your hockey team that live very close. You decide it would be a great idea to carpool to practices and games. So you organize a schedule for each family to take turns driving.

Subtract 3 CO₂ and 1 methane



Climate Δ Card



Climate Δ Card



Climate Δ Card

Field Trip Hero!

Your class is going on a field trip and plans to rent a school bus for your class of 25! You know there is a city bus that goes right past where your going because you take it all the time. You suggest your class takes the city bus and your teacher thinks it's a great idea!

Subtract 2 CO₂

Lazy Days

You only live a 10min walk to school but ask your parents to drive you everyday because you always seem to be running late!

Add 3 CO₂

Ground or Air?

Your family wants to go on a vacation to this amazing National Park. You were going to take the train but all of the sudden a cheap flight comes up and you jump on the airplane instead.

Add 4 CO₂ and 1 methane



Climate Δ Card



Climate Δ Card



Climate Δ Card

Climate Change Card

WATER

Climate Change Card

TRANSPORTATION

Climate Change Card

WATER

Climate Change Card

TRANSPORTATION

Climate Change Card

TRANSPORTATION

Climate Change Card

TRANSPORTATION

Totally Bananas!

Your at the grocery store and your mom asks if you would like an apple or a banana for a snack. You chose bananas even though you know the apples are grown locally but the Bananas were flown in from Ecuador!

Add 2 CO₂



Climate Δ Card

Near or Far?

Your family is moving and has to decide on a house. One is small, close to school and has a lot of buses. The other house is HUGE! Your bedroom would be big, but you would have to drive to school (it is too far to bike and there are no buses). You convince your parents the big house is better.

Add 4 CO₂



Climate Δ Card

Falling Flat

You stop at the gas station and the attendant tells you your tire pressure is low and you should add some air. Your mom wants to do it but you insist you are in too much of a hurry and leave with out filling them up.

Add 2 CO₂



Climate Δ Card

Too Idle

You are waiting to pick up your friend to go to see a movie and your older sister wants to turn the car off while you are waiting for your friends to come out of the house but you ask her to leave the car running so the back seat doesn't get chilled. She agrees.

Add 2 CO₂



Climate Δ Card

Share More

Your family has an old car that they will have to get rid of soon. They are thinking of joining a car co-op, where they can share a car with others and only use it when they need it, but you convince them to get the new SUV you like instead.

Add 4 CO₂



Climate Δ Card

Planning Problem

Your friend's birthday is coming up and you want to get them a present from a store across town. You know you have to go over there on the weekend for your tuba lesson, but you really want to pick up the gift today. You decide to make a special trip instead of waiting a few days.

Add 2 CO₂



Climate Δ Card

Climate Change Card

TRANSPORTATION

Climate Change Card

TRANSPORTATION

Climate Change Card

TRANSPORTATION

Climate Change Card

TRANSPORTATION

Climate Change Card

TRANSPORTATION

Climate Change Card

TRANSPORTATION

Garden Treats

You and your family decided to plant a garden in your backyard and now you don't have to buy as many things at the grocery store.

You have your own tomatoes, zucchini and even some fresh herbs!

Subtract 2 CO₂ and 2 methane



Climate Δ Card

Making Change

You are really upset because your local government is going to destroy an environmentally sensitive area in your community.

So you write a letter to your local politician voicing your concerns.

Subtract 2 CO₂ and 1 methane



Climate Δ Card

Tub Scrub

The last time you helped clean house you noticed the products you use have hazard symbols on them. You remember reading that you can make safe, non-toxic substitutes, but you really like that hospital clean smell so decide to stick with the ones you have.

Add 2 methane



Climate Δ Card

Buy Buy!

You went to the store looking for a new pair of shoes, but there were so many exciting sales that you came home with 3 t-shirts, a jacket, a new hat and 2 pairs of jeans.

Oops you forgot the shoes, now you will have to drive back to the store again next weekend!!!!

Add 1 CO₂ and 1 methane



Climate Δ Card

Golf Green

Your mom loves golf, and you keep the lawn golf club perfect for her.

You add fertilizer and pesticides for a super green sheen with super short grass. You know fertilizers and pesticides aren't good for the environment, but you love the look on Mom's face when she sees it!

Add 2 methane



Climate Δ Card

Meaty Challenge

You go out to a restaurant for dinner and you have the choice between two delicious meals, one with beef and one vegetarian, you know that cattle emit methane gas amongst other environmental problems, but you decide to get the giant plate anyway!

Add 3 methane



Climate Δ Card

Climate Change Card

EVERYTHING ELSE

Climate Change Card

EVERYTHING ELSE

Climate Change Card

EVERYTHING ELSE

Climate Change Card

EVERYTHING ELSE

Climate Change Card

EVERYTHING ELSE

Climate Change Card

EVERYTHING ELSE

Composting Crime

Your family has a backyard compost bin. You are on garbage duty this week and it is winter outside. You decide it is too cold make the trip and put the compost in the regular garbage!

**Add
2 methane**



Climate Δ Card

In the Bag

You are always forgetting your reusable cloth bags at home and instead of getting no bag at all, have a huge collection of plastic bags that you know you will throw out anyway!

Add 2 CO₂



Climate Δ Card

Paper Problems

You're working on a project and decide to print your research. You only print on one side of the paper, highlight a few bits of information and throw it out when you could have used the other side! In fact you could have just read that article without printing it!

Add 2 CO₂



Climate Δ Card

Thinking Ahead

You don't know what to get your brother for his birthday, so at the mall you find a rubber chicken and some other gag gifts. He's hard to buy for! He likes the gifts, but they end up hidden in the closet. All he wanted was a night at the movies with you!

**Add 1 CO₂
and 1 methane**



Climate Δ Card



Climate Δ Card



Climate Δ Card

Climate Change Card

EVERYTHING ELSE

Climate Change Card

EVERYTHING ELSE

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Background Information - Climate Change Red Rover - Under Development