

**Simulation Title:**

*Worldwide Greenhouse*

**Learning Goal:**

List the names of the greenhouse gasses.

List the contributors and removers of greenhouse gasses to/from the environment.

Explain what needs to be done on planet Earth in order to stop the increase in worldwide temperature.

**Mission Task:**

Adjust the amount of each planetary greenhouse gas produced and removed in order to slow the rise of worldwide average temperature.

**Cover Story:**

You are the President of the newly formed GAIA (Global Awareness In Action) Group which has been given final authority by the G8 world superpowers to stop global warming.

It is up to you to develop a policy for the planet to follow in order to stop the temperature rise.

Your trusted team of scientists have developed a 3D simulation that will allow you to make your conclusions and develop your policy for the world.

Sound easy? Guess again. Good Luck!

**Role:**

As the *President*, you have control over the simulation. Adjust the levels of:

1) Greenhouse Gases

Carbon Dioxide (CO<sub>2</sub>), Methane (CH<sub>4</sub>), Nitrous Oxide (N<sub>2</sub>O)

2) Greenhouse Gas Producers: vs Greenhouse Gas Removers:

Burning Gas, Coal, Oil (CO<sub>2</sub>)

Plants & Ocean Phytoplankton

Deforestation (CO<sub>2</sub>)

Wild Fires (CO<sub>2</sub>)

Livestock (CH<sub>4</sub>)

Fertilizer (N<sup>2</sup>O)

Since you are in charge of what is happening everywhere on the planet, you may use key commands to view any part of the Earth that you wish. You may zoom in for close ups on Biome areas, or pull back to view the entire planet.

**Scenario:**

1) The Earth's temperature is rising at a rate faster than it has since the earliest days of the planet's creation. What combination of levels should be increased or decreased in order to stop the world temperature rise the **quickest**?

Students who select to play in "advanced" mode need to identify the continents of the Earth producing more and less greenhouse gasses and explain why not all areas produce equal amounts.

**Resources:**

Since presidents have advisors, there will be a drop down menu with numerous people to solicit advice from. The list will include: Scientists, Congressional Members, Farmers, Business Executives, Environmental Activists, etc. At any point during the simulation, the president may seek advice from whomever she chooses.

A .pdf document may also be printed for hard copy reference with a table, in which a student may look up the statistics regarding each gas (i.e. individual effects), producer of each gas (i.e. which practices create the most/least), and remover of each gas (i.e. which plants remove the most/least).

**Feedback:**Holistic Visual:

Students will watch the opaque gas cloud around the Earth increase or decrease based upon their simulated decisions.

As the gas clouds increase in density, the planet will glow redder indicating an increase in temperature.

As the gas clouds decrease in density allowing a clearer view of the Earth's surface, the reddish hue will decrease until it disappears completely, indicating a decrease in temperature.

Graphic Visual:

A graph window will also show the increase/decrease of gasses and temperature over time.

Statistic Table:

A table window will track and record the adjustments and results of past trials.

Verbal:

If the simulation is performed virtually, the player may listen to real-time help from a partner (Vice President), the observing class (Congress), a field "expert" viewing simultaneously from another part of the globe (Scientist), or the course instructor (Activist).

**Developmental Needs:**

Since each greenhouse gas absorbs heat at a different rate, insert real data so that an increase of each selected gas absorbs the appropriate amount of heat within the simulation.

**Expansion:**

- 1) Have students adjust the planetary policy based upon regional differences of environmental conditions/resources.
- 2) Allow students to view the planet from a Solar System perspective over millennia, so that they may see how the Earth's greenhouse

levels have naturally fluctuated over time as the planet's orbit has made its natural variations.

Students may challenge themselves to balance greenhouse gasses in the distant past (like during past Ice Ages).