

## S'more Heat [ME]

\*Adapted from Climate Kids\*

**Grades:** K-2

**Time:** 45 minutes to 1 hour

**Goals:** To understand how solar energy works and how heat is being trapped in our atmosphere.

**Objectives:**

Students will be able to: define solar heat; explain how the atmosphere is trapping heat; correlate the trapped heat to changes in coastal ecosystems; and use a solar oven to demonstrate solar energy.

**Key Words:**

Solar energy  
Heat

Climate change

Atmosphere

**Background Information:**

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If you've ever been inside a greenhouse, you would notice that it is a bit warmer and more humid than outside its glass walls. This is because the glass acts as an insulator for heat. As the sun shines through the glass, the room heats up. As the heat and energy from the sun bounces off of the ground and plants, it is reflected back up. The glass keeps the heat trapped inside. This keeps the inside of the greenhouse warmer even when the sun isn't shining bright.

Our atmosphere acts in a similar way to the greenhouse. It is made up of gases, such as nitrogen, oxygen, and carbon dioxide, and these all allow heat and energy to come through during the day. When this happens, the surface of the earth heats up, making things like sand, concrete, and asphalt very hot because they are absorbing the heat instead of reflecting it. In the evening, without the sun's direct light, the surface of the earth can cool down and reflect the heat back up into the atmosphere. The gases act like the glass of the greenhouse, keeping the heat from being released into space.

This is what is known as the greenhouse effect. When the gases prevent sunlight, heat, and energy from reflecting out into the universe, they are trapped on earth's surface, making it warmer than it should be. This is being exacerbated by excess gases and compounds being emitted into the atmosphere by human waste. When we burn fossil fuels, use aerosol cans, pump petroleum from wells, etc., we are emitting waste in the form of gases into the atmosphere, creating a greenhouse around the earth. When we cut trees down to build homes and shops and factories, we are losing the plants that could turn the excess carbon dioxide into oxygen.

For marine species, the effect also changes the chemistry of the water. When carbon dioxide is mixed with saltwater, it decreases the amount of carbonate ion in the water and creates carbonic acid. This changes the pH of the water. Most life in marine ecosystems cannot survive in acidic water, so the increase in carbon dioxide also makes marine ecosystems unhealthy and uninhabitable.

**Directions:** Draw a line leading to the greenhouse for all the items you and your family use every day. These are the things you contribute to climate change.

