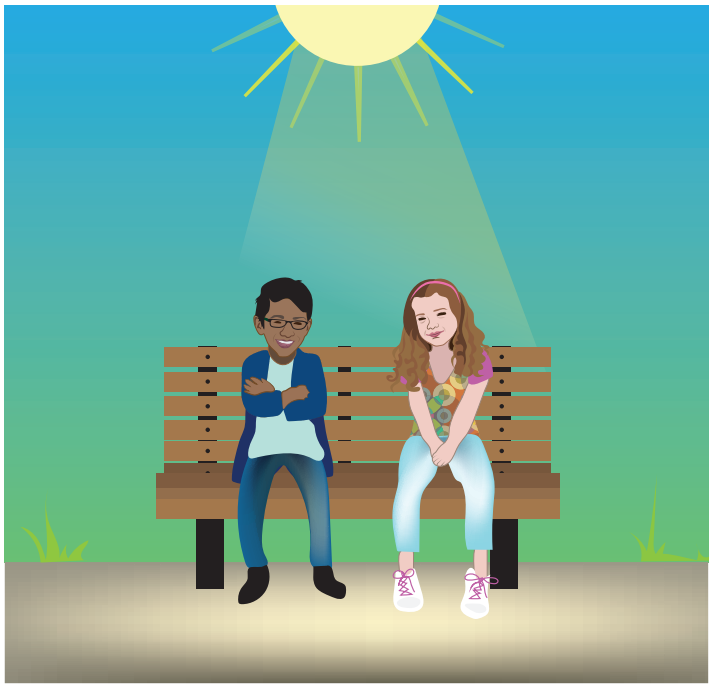
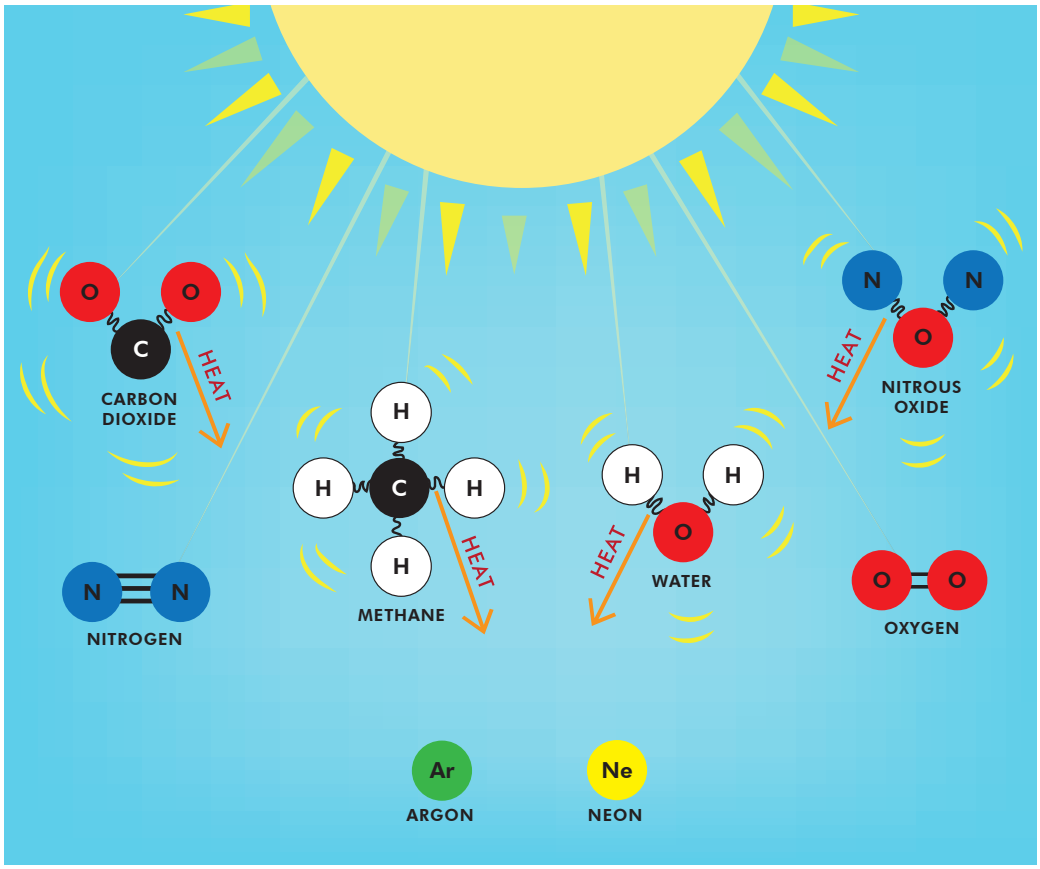
Molecules Can Absorb The Sun's Energy

Have you ever stood outside on a sunny day and felt the heat from the sun on your skin? Heat is the form that energy takes when the sun's energy hits your skin. The sun's energy travels through space and heats Earth and the things on it.



Some molecules absorb energy from the sun and some do not.

When a molecule absorbs the sun's energy, the bonds holding the molecule together vibrate. When molecules absorb the sun's energy and vibrate they radiate, release, heat into the air. In effect, these molecules transfer the sun's energy into the air in the form of heat. This heats the air.



Carbon dioxide, methane, water, and nitrous oxide absorb energy from the sun and release that energy into the air in the form of heat. Nitrogen, argon, neon, and oxygen do not absorb energy from the sun and do not heat the air.

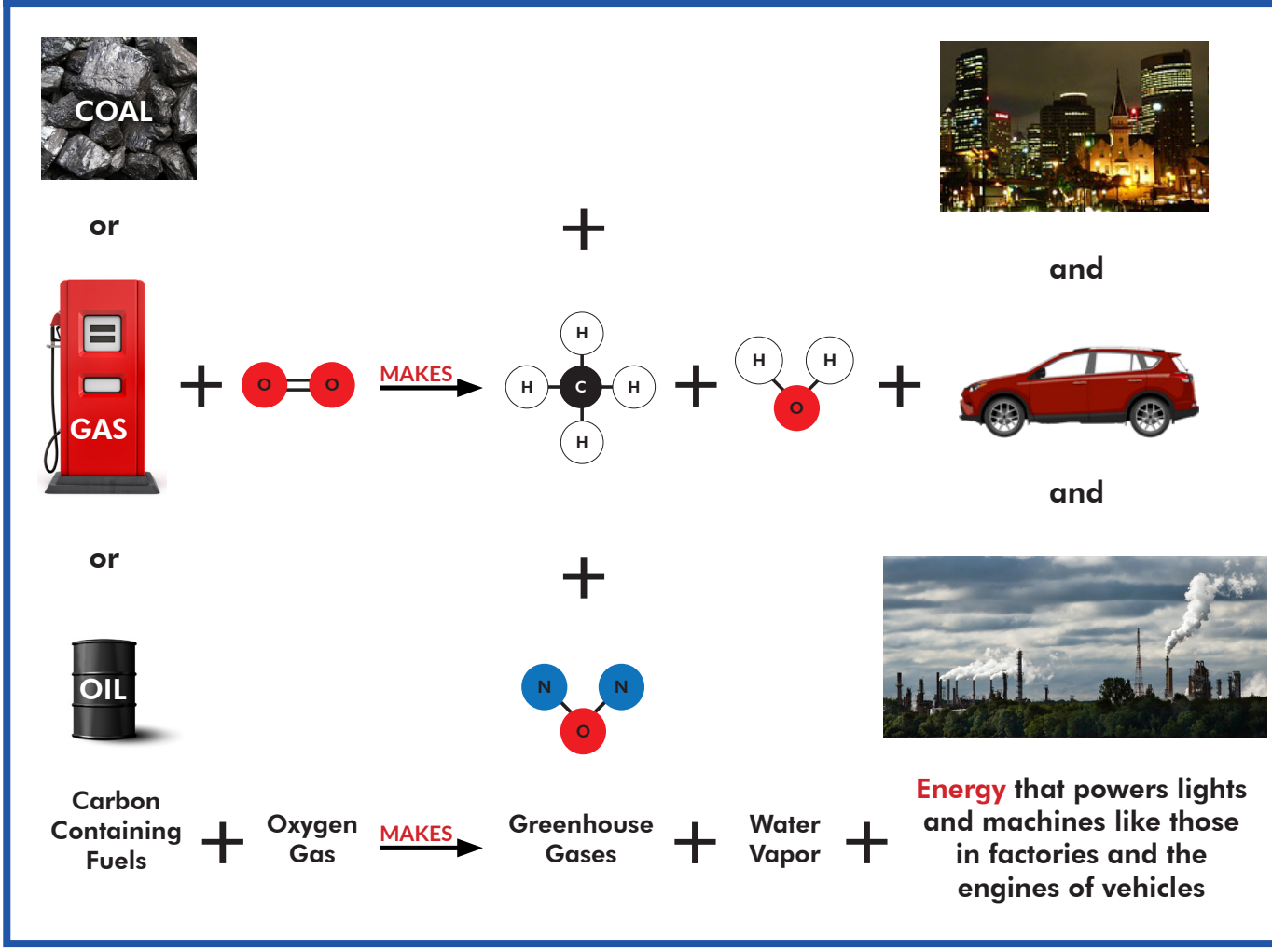
Making Energy: The Combustion Reaction

Chemical reactions occur when the atoms in molecules combine, separate, or rearrange to make new and different molecules. Some chemical reactions release energy when these new molecules are made. **Machines get energy from a chemical reaction called the combustion reaction**.

The burning of wood is one example of the combustion reaction. Wood is made from molecules that contain carbon, oxygen, hydrogen, and nitrogen atoms. When wood burns in the presence of oxygen, the hydrogen, carbon, oxygen, and nitrogen molecules that made the molecules in wood rearrange and make the new molecules: carbon dioxide, methane, nitrous oxide, and water. There is also a large release of energy.

Most machines, including cars, get energy from materials, like coal, oil, and gasoline, which contain carbon, oxygen, nitrogen, and hydrogen. When these materials burn, they release the greenhouse gases—carbon dioxide, methane, and nitrous oxide—into the air.

Combustion Reactions Produce Energy

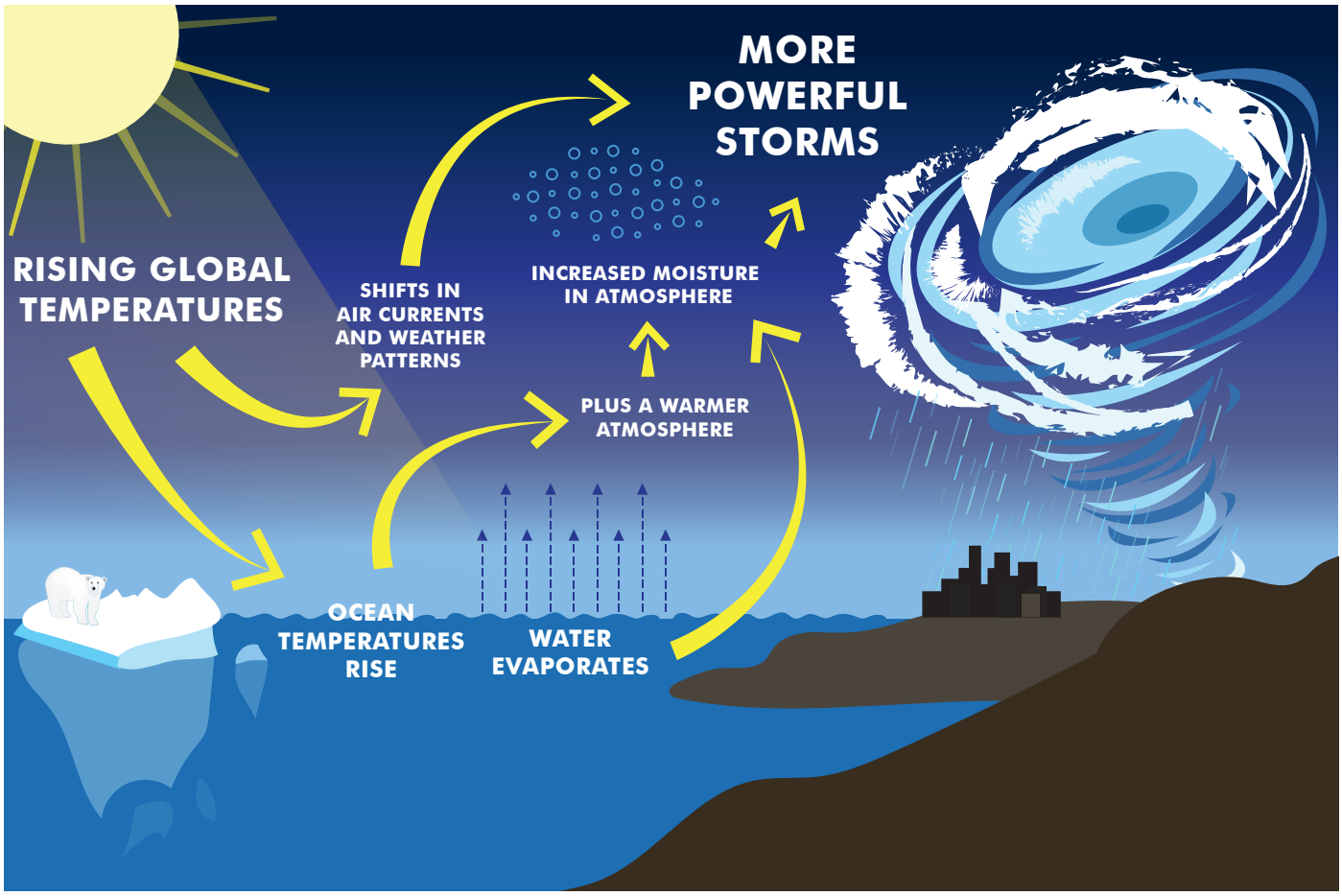


Data and Observations

Data shows that the concentration of greenhouse gases in the air has increased because of the burning of coal, gasoline, and oil as people have come to rely more on machines and machine-made materials. The data show that the average global temperature rose 0.94°C (1.69°F) from 1880 to 2015. This data combined with observations from experiments shows that the increase in greenhouse gases is responsible for the increase in temperature.

In addition to the increase in the average global temperature, researchers have observed other changes occurring because of global warming and climate change.

Scientists have observed the occurrence of more powerful storms. The three key measurements for weather are temperature, precipitation, and wind speed. An increase in the global temperature of the air and ocean waters affects precipitation patterns and wind speed globally. An increase in water vapor in the **atmosphere**, air surrounding the planets, causes changes in the amount of precipitation. Wind is air that is moving. The temperature of the ocean and air has a direct effect on wind patterns and wind speeds.

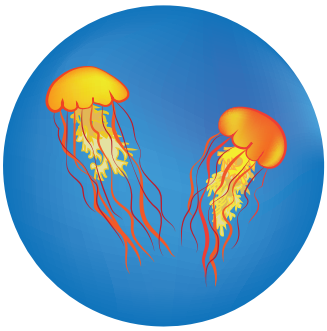


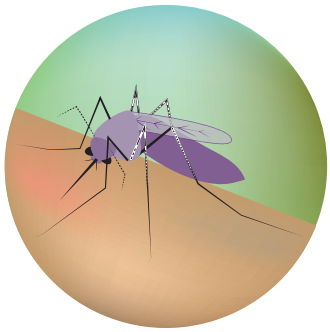
There has been more extreme weather such as droughts, increased wind speeds, and hurricanes during the past 30 years.

What Does it Matter if the Temperature Rises a Little?

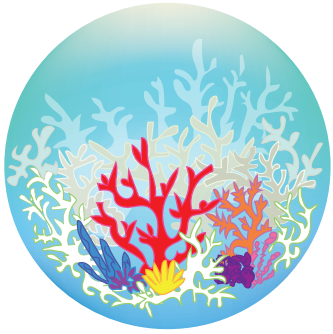
Earth is 4,500,000,000 years old. The climate has changed many times during that time. You might be wondering what the problem is. So what if the temperature is hotter, it rains a little more or less, the sea level rises, or the ice sheets are thinner and smaller? All of these have happened in the past. What is the problem if they happen again?

The problem with the climate change that is happening now is the **rate** or speed that it is happening. Many plants and animals will not have time to **adapt**, adjust, to the new conditions.

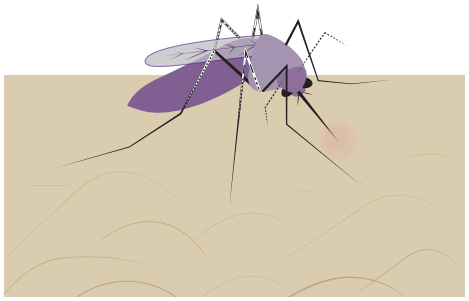




For some animals such as jelly fish, albatross, mosquitos, bark beetles, and many other insects, it isn't a problem.



The changing climate is a big problem for many organisms such as polar bears, pine trees that the bark beetles infest, and coral reefs.



People are feeling some effects, too. Worldwide supplies of food and water are being affected. Coastal areas where people live are being swamped or flooded as the sea level rises. Infectious diseases such as malaria, West Nile virus, and Lyme Disease, are transmitted to people by mosquitos and ticks, respectively. These diseases are increasingly common as mosquito and tick populations thrive as the planet warms.

Many organisms, including humans, are sensitive to temperature. Did you know that humans are temperature sensitive? It's easy to forget, because humans live inside, and can turn on the heat, air conditioner, or a fan if it gets too cold or too warm. Humans can also take off and put on layers of clothes. Heat sensitivity is one of the reasons some organisms are struggling to adapt at the rate the climate is changing.

These do not sound like things a kid can do to help fix this problem, do they? The good news is, there are things kids can do to help.

Your Carbon Footprint and How You Can Reduce It

How big are your feet? Even if they are really big, they don't make a footprint as large as your carbon footprint. Your **carbon footprint** is the amount of carbon dioxide and other carbon compounds emitted into the air because of your energy consumption. The more energy you use the larger your carbon footprint is, and the less energy you use the smaller your carbon footprint is. Some things that contribute to your carbon footprint are obvious. Driving, flying in a plane, cooking, and turning on lights all obviously use energy and add to the size of your carbon footprint.

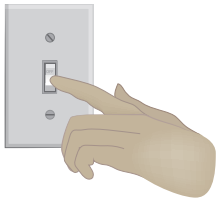
Some contributions to your carbon footprint are not as obvious. Anything you use and consume that requires energy to make is also a part of your carbon footprint. Cookies from the grocery store, a new outfit, and a new toy all require energy to make and therefore are a part of your carbon footprint. The heat needed to warm water for your showers and wash your clothes is also part of your carbon footprint. Everything you use that is made by a machine, requires the use of a machine, or transported by a machine is a part of your carbon footprint.

To reduce your carbon footprint you need to use fewer things that required the burning of coal, gasoline, and oil.

Stop Drinking Bottled Water

Bottled water has a big carbon footprint. Plastic bottles take energy to make. It takes energy to get the water from its source into the bottle. Energy is also required to transport the bottles of water. A much better solution is to drink from reusable containers.

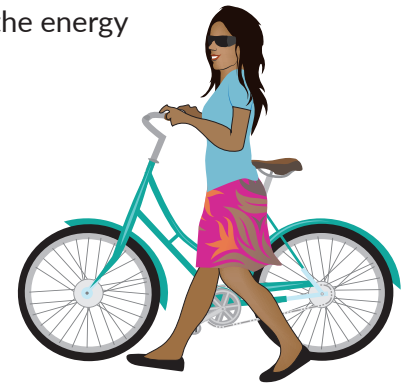
Turn Off the Lights



It turns out your parents are right. You should turn off the lights. It might seem like a little thing to remember. If over 7.125 billion people worked together to remember to turn off the lights, it would make a big difference.

Change to New Energy Efficient Light Bulbs

CFL and LED light bulbs use only 20 to 25% of the energy that traditional, incandescent, bulbs use.



Walk More, Drive Less

Cars emit greenhouse gases. Instead of driving, walk or ride your bike or skateboard to get places. It is great exercise and good for the planet.