GRADES 6-8

ACTIVITY 2 **GLOBAL GREENHOUSE**

Part 1. In ***Planet Power***, we learn that since the beginning of the Industrial Revolution, human activities have drastically increased the levels of carbon dioxide (CO_2) present in the atmosphere, consequently raising the temperature of the Earth's surface. This is called the greenhouse effect; for an extreme illustration, think about how hot it gets inside a car in summer.

The chart below combines data from four climate-related agencies to illustrate how much the Earth's average temperature has changed over the past 135 years. Analyze the impact on our planet by using the chart to answer these questions. The temperature changes shown on the vertical axis are in Centigrade.

1. What was the average change in temperature from 1910 to 2010? Show your work:

   _____

   _____

2. The peaks and dips in this chart represent temperature variations caused by weather events in specific years. Sketch a smooth line that shows the overall trend represented by the graph.

3. Based on your trend drawing, which decade had the greatest change in temperature? _____ Which had the smallest change? _____

4. If this trend continues, what will the temperature change be by 2050?_____ Show your work: _____

   _____

5. What is your estimate for the year 2500? _____ Show your work:

   _____

Part 2. The flight of Solar Impulse 2 proves that we can achieve great things and protect the environment at the same time. Calculate just how much of an impact each one of us can have on the environment – and on saving money – by completing the following word problems.[1]

[1]Note that all values for CO_2 emissions and electricity produced are estimates. Actual values vary based on the specific technology used in each power plant, the type of coal, and many other factors.

A. Power plant X uses coal to fuel a steam generator. It emits 2.86 pounds of CO_2 and produces 1 kWh of electricity per pound of coal burned. Power plant Y uses natural gas; it emits .3 pounds of CO_2 and produces .36 kWh per cubic foot of gas burned.

1. If an average U.S. home uses 10,766 kWh of electricity per year, calculate the amount of fuel each power plant would need to burn and the amount of CO_2 it would emit as a result of supplying power to one average home. Show your work:

   • Power Plant X:
     a. Fuel burned: _____

     b. CO_2 emitted: _____

   • Power Plant Y:
     a. Fuel burned: _____

     b. CO_2 emitted: _____

2. If an average home can hold 20 solar panels, each producing 200 kWh of useable electricity per hour of direct sunlight, how many hours of sunlight would it take to produce that same amount of energy (10,766 kWh)? _____

B. A family of four consumes an average of 897 kWh of energy each month. Currently, they pay the electric company 19.284¢ per kWh for that electricity.

1. What if they convert just 15% of their energy usage to solar power? How much money will they save each month? _____ Each year? _____

2. What if they convert 85% of their energy usage to solar power? How much money will they save each month?_____ Each year? _____

3. There are approximately 125,820,000 households in the U.S. Using the energy costs provided above, how much money would be saved nationwide if each household converted just 15% of its energy usage to solar power?_____

Annual Temperature Anomaly (˚C)

— NASA Goddard Institute for Space Studies
— Met Office Hadley Centre/Climatic Research Unit
— NOAA National Climatic Data Center
— Japanese Meteorological Agency