



## Are you an energy efficient consumer?

Concerns about global warming have made energy use a major issue around the world. Simply put, the more energy people use to drive their cars, heat their homes, or run their appliances, the more carbon dioxide (CO<sub>2</sub>) is emitted into the atmosphere. Scientists are researching how these CO<sub>2</sub> emissions affect climate change. They are concerned that as the world continues to get warmer, problems like sea level rise or increased, prolonged droughts may occur.

As a result, people want to know what steps they can take to use less energy. The more energy each person uses, the more CO<sub>2</sub> is released into the atmosphere. With billions of energy consumers around the world, you can imagine just how much CO<sub>2</sub> is given off globally.

In this activity, you will gain a better understanding of how several countries use energy by observing how much light they give off at night. You will see firsthand how personal, national, and global decisions can impact the future of climate change. Finally, you will observe the consequences of choices you make every day as you trace the carbon footprint of an average American family.

### Part I: How do different countries use energy?

One way to gain an understanding of how much energy a country uses is observing how much light it emits at night. Watch the short video that talks about lights at night around the world and then answer the questions below using the visualization software ([http://koshlandscience.org/exhib\\_lightsatnight/index.jsp](http://koshlandscience.org/exhib_lightsatnight/index.jsp)).

1. What continent is the brightest in 1993? 1997? 2003?

|      |  |
|------|--|
| 1993 |  |
| 1997 |  |
| 2003 |  |

2. What continent is dimmest in 1993? 1997? 2003?

|      |  |
|------|--|
| 1993 |  |
| 1997 |  |
| 2003 |  |



3. Locate the United States, China, India, and Europe on the map. Have these regions become dimmer or brighter between 1993 and 2003? Explain your answer.
  
4. Compare the Lights at Night information from 1997 to the world population map at <http://apod.nasa.gov/apod/ap030305.html>. Is there a relationship between some of the more populated areas in the world and those with the highest light intensity? Support your answer with details.
  
5. The data indicate changes over time in the amount of light different countries emit. These variations can reflect differing patterns in energy use. Take a closer look at India and China. How do you predict each of these countries will change over the next few years? Will they get dimmer or brighter based on the evidence provided in the interactive?
  
6. Look at the *Global CO2 Emissions Calculator* on the museum's website (<http://koshlandscience.org/exhibitgcc/responses03.jsp>). Compare the overall brightness of different regions in 2003 to the CO2 emissions in 2000. Is there a relationship between the brighter areas and regions with higher CO2 emissions? Explain your answer.



## **Part II: How are different regions around the world addressing energy efficiency?**

There are many factors that influence how efficiently regions use energy and how much CO<sub>2</sub> they produce as a result. As you have learned, scientists can study this by observing light intensity. There are other ways to examine the problem.

Choose one of the regions listed below and explain how it is addressing CO<sub>2</sub> emissions. Use the stories in the websites below to help in your research. Remember, although these stories are only a part of the bigger picture, they can help scientists begin to understand how regions are responding to the issue. Be sure to support your answers with facts about how these regions use and produce energy. You may find it helpful to list both problems and solutions for each region.

**Costa Rica:**

<http://www.npr.org/templates/story/story.php?storyId=19141333>

**China:**

<http://www.npr.org/templates/story/story.php?storyId=89668099>

<http://www.npr.org/templates/story/story.php?storyId=89575832>

**Atlanta:**

<http://www.npr.org/templates/story/story.php?storyId=89231809>

<http://www.npr.org/templates/story/story.php?storyId=89250244>

**North Carolina:**

<http://www.npr.org/templates/story/story.php?storyId=9979875>

**England:**

<http://www.npr.org/templates/story/story.php?storyId=9972613>

**Region selected:**

**How is the country approaching the problem of increased CO<sub>2</sub> emissions?**



### **Part III: How can you be more energy efficient?**

Go to <http://bie.berkeley.edu/calculator.html> and complete a carbon footprint for an average U.S. household of four people in your state. Use the default values assigned by the calculator, but make sure to take note as you complete the exercise. After discovering how much carbon is produced and why, answer the following questions for your state.

**Your State:**

- 1. How much CO<sub>2</sub> does an average family in your state produce in one year?**
- 2. What percent of global average CO<sub>2</sub> emissions does an average family produce in your state?**
- 3. In what area does the average family in your state produce the most CO<sub>2</sub> emissions: transportation, housing, food, or goods and services?**
- 4. What surprised you the most about the carbon footprint?**
- 5. What does a carbon footprint tell you about how efficiently you consume energy? Explain your answer.**
- 6. Does the average U.S. family use public transportation or their own cars more frequently? Reverse the numbers to see if this choice affects your carbon footprint. Describe what happens below.**





9. Think of ways that you personally can be more energy efficient and write them down below. Write a reflective essay below that examines how one person's energy use impacts total carbon emissions. How would the impact would be different by considering a family's choices? A community's? The nation's? The world's?