

Lab 3 Energy Audit

Name: _____

Lab Partner(s): _____

Driving Question

We all use energy to turn on lights, heat and cool our homes, get to school, and power our electronics. In the United States, energy consumption is broken down into four sectors: residential, commercial, industrial, and transportation.

- Residential includes energy used in places like houses and apartment buildings.
- Commercial accounts for energy used in public spaces such as office buildings, schools, and hospitals.
- Industrial includes energy to grow and make goods such as food, cars, and buildings.
- Transportation includes the gasoline and fuel used to drive cars and fly planes.

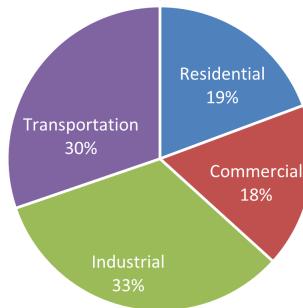


Figure 1: Share of total energy consumed by major sectors in the United States, 2024

Conducting an energy audit will allow you to better understand how much energy is used by the devices in your home and classroom. Based on this information, brainstorm ways to reduce the amount of energy you use.¹

Objectives

- Measure electricity usage by several devices in your classroom and at home.
- Make a plan for how you will conduct a home energy audit.
- Calculate energy usage per person in your home.
- Consider ways to conserve energy at home and school.
- Determine ways your classroom, school, or home could become more efficient.

Materials

- Data collection system
- Temperature sensor
- Multiple devices that use electricity

¹US Energy Information Administration, Monthly Energy Review www.eia.gov/totalenergy/data/monthly/

Consider

1. List as many devices in your classroom that are using electricity as you can.
 2. What is “phantom” power? What types of phantom power use are occurring in your classroom right now?
 3. What is the difference between energy efficiency and energy conservation?

Part I: Classroom Energy Audit

Investigate

1. Perform a general assessment of the classroom by answering the following questions.

- How many devices are plugged in?

- How many lights are on? What types of light bulbs are in use?

- How high are the ceilings?

- What source(s) of energy are used by the university?

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2. Examine several devices in your classroom to find their energy information. Record the voltage and current, and the power if available. Use this information to determine how much energy is consumed by these devices in a given amount of time.

3. Use a temperature sensor to measure the temperature in various parts of your classroom.

- Near the doors (front, back, and storage room)

- Near the windows

- Close to the ceiling

Processing Data

4. For three of the devices, calculate how much energy is consumed during the year. How could you conserve energy use for the devices?

5. How does the temperature compare in different places in your classroom? What are ways to reduce energy use for heating or cooling in your classroom?

6. What are ways your class could help conserve energy at the university?

Part II: Home Energy Audit

Investigate

1. Create a plan for conducting a home energy audit. Consider the following questions as you develop your plan.
 - How many rooms are in your home? What is the square footage? How many people live there?
 - How many lights are in your home? What types of light bulbs are in use?
 - What direction do the windows face? Are they single- or double-pane windows?
 - Is temperature controlled in each room or centrally? What temperature is the thermostat set to?
 - How high are the ceilings?
 - What source(s) of energy are used by your home?
2. Determine how much energy is used by the devices in your home each month (use the table/worksheet on Blackboard).
3. Use a temperature sensor to measure the temperature in various parts of your home. Record the values in a separate table.

Processing Data

4. Which devices in your home use the most energy? The least?
 5. Calculate energy usage/month/person in your home.
 6. Research to find the carbon emission values for the source of energy that is used to produce the electricity that is used in your home (e.g., natural gas or coal). Calculate the carbon footprint for the devices you measured.

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7. What are ways can you make your home more energy efficient?

Extend

1. Use a smart outlet to measure energy use over a 24-hour period for a single device. How does energy use change during the day? Estimate how energy use would change over the entire year due to varying factors such as temperature and amount of daylight.

Homework

1. Conduct research to compare your energy usage to people in other parts of the country. What role does climate play in affecting energy use in different regions?
2. Learn about ways that buildings can be designed to reduce energy consumption. Some factors to consider include: green roofs, insulation, vegetation, and paint color.
3. Imagine you are responsible for replacing a device in your home that uses electricity, such as a TV, water heater, or light bulb. Do research to find the most energy efficient product you could buy. Is it more expensive than less efficient options? How will you balance cost with energy savings?
4. Learn about how energy use in your country compares to energy use in other parts of the world.
5. Does it take more energy to charge something every day (such as a laptop) or to leave it plugged in overnight? Support your answer.