

MONITORING THE SCHOOL'S ENERGY USE

*Lesson from the Green School's Tool Kit Manual for use in conjunction with the tool kit

Objective: The students will learn how to read an electric meter, as well as how to organize and analyze electrical energy usage in the school, home, or other facility.

Suggested Grade Level: Can be modified for grades 5 – 12

BACKGROUND INFORMATION

You may need to adjust this investigation depending on your school's electric power meter. A typical electric meter is a clock-like device driven by the electricity moving through it, with the dials indicating the number of cumulative kilowatt hours. Some newer electric meters use digital displays instead of dials. Still others may require a mathematical adjustment to find the actual kilowatt hours, using a multiplier on the reading. Some meters also show the facility's peak kilowatt usage. Talk with your school's custodian or your local utility company if you need information about reading your school's meter. See also the lesson entitled "Meter Readers."

If your meter is the dial type, read as follows.

- Write down the numbers as shown on the dials.
- Start with the dial on your extreme right first and the rest as you come to them.
- Every other dial moves counterclockwise.
- When the pointer is between two numbers, you should record the lower of the two numbers. When the pointer is directly on a number, look at the dial to the immediate right.
- If the pointer on the right-side dial has passed 0, then write down the number the pointer is on. If the pointer on the right-side dial has not passed 0, write down the next lowest number on the dial you are recording.

EQUIPMENT

- The school's electric meter
- Temperature and relative humidity meter*

* From Green Schools Tool Kit

ADVANCED PREPARATION

Find out where the school's electric meter is and learn how to read it (see Background Information section). If it is in a locked area, find out whether students could have access to read it once a day.

LEADING THE INVESTIGATION

1. Show students where the meter is and give them practice in reading it.

2. Explain that students will be reading the meter on a daily basis to look for patterns in the school's energy use. Students will also use the temperature and relative humidity meter to measure the outside air temperature. Discuss the importance of reading the meter at approximately the same time every day. Ask students what factors might affect the school's electricity use (whether the school is open and whether the air conditioning is being used will probably be the biggest factors).
3. Plan how the project will be carried out. For example, the class may be organized into teams on a rotating schedule to read the meter. Discuss how to handle the weekend. Students may volunteer to come to school on Saturday and Sunday to read it, or the difference between Monday's and Friday's reading could be split equally over the three days.
4. After students read the meter each day, they should record the reading on a master data sheet or on each student's data sheet. Keep track of any factors that could have a major impact on electricity consumption and check the usage on those days. For example, students may find that electricity usage decreases when the shop class does not operate equipment.

FOLLOW UP

- At the end of the month, students calculate what the electrical bill will be for the school using the local utility rates for kilowatt hours (kWh).
- Discuss what the impact would be to the school, teachers, and students if the school's energy usage was reduced by 10 percent.
- Students calculate the emissions generated by the school's electrical usage. National average figures for emissions are:
 - 1.23 pounds carbon dioxide (CO₂) per kWh
 - 0.016 pounds sulfur dioxide (SO₂) per kWh
 - 0.007 pounds nitrous oxide (NO_x) per kWh
 - 0.043 milligrams mercury (Hg) per kWh

Your state office of energy or environmental services may be able to provide you with specific numbers for your state.

- Students could monitor and analyze electricity usage at home.

Student Page

Monitoring the School's Energy Use

Month of: _____

Date	Time	Meter Reading (in kWh)	Change Since Last Reading	Outside Air Temp.	School Open or Closed?	A/C On or Off?
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31

Total kWh Used: _____

ENERGY SAVING SUGGESTIONS

Name _____ Date _____ Period _____

1. Don't leave lights during or electric heaters operating in unoccupied rooms.
2. Turn out yard lights during the day.
3. Don't leave water running while brushing your teeth or washing dishes.
4. In the winter, open the blinds or curtains during the day so the sun's rays can shine through the windows and heat the rooms. The sun's heat will help cut down on the amount of gas, oil, or electric heat used in your house.
5. At night, when the sun has set, close the blinds and curtains to keep heat inside the rooms.
6. Close the door tightly when you enter or leave the house. Remind others in your house to do this too. In the winter, this will keep heat in the house. This will also keep an air conditioned house cool during the summer.
7. Before you open the refrigerator door, decide which food and drink you will take out. Try to open the door only once to get what you need. Why does closing the refrigerator and freezer doors tightly and quickly save energy?
8. Check the bathroom and kitchen hot water faucets to be sure they are not dripping. It takes a great deal of energy to heat water. A single dripping hot water faucet can waste 212 gallons of water a month!
9. Take a short shower instead of a tub bath because it uses less water. By using less water, you use less energy to heat the water.
10. Don't leave appliances running when they're not in use.
11. Insulate the hot water heater. Do laundry using a cold wash followed by a cold rinse.
12. Turn the thermostat on the water heater down to 120°F (48.8°C) or if your home has an electric dishwasher to 140°F (60C).
13. Turn your house thermostat to 65°F or lower in the winter and 78°F or higher in summer. This will affect the meter reading more noticeably if a house is heated electrically. Three to 5 percent more energy is used for each degree the furnace is set above 65°F and for each degree the air conditioner is set below 78°F.
14. Do only full loads when using your clothes washer and dryer. Clean the dryer's lint trap after each use. On sunny days, hang the clothes out to dry.
15. If your home has an electric dishwasher, open the door and air dry the dishes instead of using the drying cycle. Also, wash only full loads and use the shortest cycle that will get the dishes clean.
16. Replace high wattage light bulbs with bulbs of lower wattage.
17. If your house has a furnace with a fan or blower, keep the air filter clean and adjust the fan belt regularly to eliminate slippage.

When purchasing new appliances, check Energy Efficiency Rating and buy Energy Star Appliances.