

Energy Efficiency

Activity 1: What's a Watt?

Before talking about energy efficiency, it is helpful to have an understanding of units of power and energy like watts, kilowatts, and kilowatt-hours. If you have access to a hand-crank generator, this can be a very helpful tool to demonstrate how electricity is generated and the concept of a watt.

Power tells us the quantity of energy that changed during a certain period of time. For example: one Watt is equal to one Joule per second. A 60 watt light bulb converts 60 Joules of electrical energy into thermal energy (heat) and radiant energy (light) each second.

Make a list on the board of devices and activities that require power. Challenge your students to try to rank these activities from least to highest power consumption. Next ask the students to estimate how much power (in watts) each activity consumes. After they have made their estimates, write the actual amounts on the board. See the examples below:

Activity	Estimated Power Draw	Actual Power Draw
Freight Train		3,730,000 Watts
Hand-Held Flashlight		1 Watt
Incandescent Lamp Bulb		60 – 100 Watts
Human Sitting Calmly		75 Watts
Human Walking		383 Watts
Human Running		745 Watts
CFL Light Bulb		13-25 Watts
Average Car		89,520 Watts
Space Shuttle Takeoff		11,000,000,000 Watts

The list above shows typical power consumption of various activities, but to know how much energy is consumed we have to add in the time factor. For example: A light bulb drawing 100 Watts of power left on for 10 hours consumes 1,000 watt-hours (or 1 kilowatt-hour) of energy. In other words, Watts (power) tell us how hungry a device is for power. Watt-hours (energy) is the quantity of electrical energy the device used over a period of time.

Activity 2: How Much Power Does Your Classroom Use?

Now that students are familiar with the concept of watts you can do a classroom energy audit! It can be very helpful to have a Kill-A-Watt meter or other watt meter to measure actual power draw of classroom appliances. These are relatively cheap, and many utility companies and libraries offer loan programs for these devices.

If you do not have access to a watt meter, you can find charts showing average power consumption from various electrical appliances at these websites:

http://www.energysavers.gov/your_home/appliances/index.cfm/mytopic=10040

<http://www.absak.com/library/power-consumption-table>

Materials

- Chart showing average power consumption of electrical appliances
- Kill-a-watt meter (optional)

1. Ask students to estimate how many watts the classroom uses on average. Look around the classroom and think about all the power being used.
2. Use watt meters or the power consumption chart to tally up the total power being used in your classroom.
3. Discuss the results with students. Which appliances use the most power? Which use the least? What steps could students and teachers take to reduce the power used in a classroom? How many watt-hours of energy are used to power this classroom for 1 hour? How many watt-hours of energy are used to power this classroom for a full school day (8 hours)? How many kilowatt-hours is this (divide previous answer by 1,000.)? If electricity costs 12 cents per kilowatt-hour, how much money does it cost to power this classroom for a full school day?