



ENERGY EFFICIENCY

LESSON SUMMARY

After an introduction to energy, this lesson uses math (calculating electricity usage and costs) to give students a better understanding of energy costs, energy conservation, and energy efficiency, and how these things apply to the students' daily lives.

ACADEMIC STANDARDS

(Will populate with specifics for state)

OBJECTIVES

The student will be able to

- Define energy
- Estimate how much electricity (in kWh) they use each month
- Calculate how much money that electricity costs
- Identify ways to be more energy efficient at home and at school

VOCABULARY

Energy – usable power (as heat or electricity); the resources for producing such power

Energy Efficiency – the concept of doing the same amount of work while using less energy

Energy Conservation – the reduction in the amount of energy consumed in a process or system, or by an organization or society, through economy, elimination of waste, and rational use

Kilowatt hour – a measure of electrical energy equivalent to a power consumption of 1,000 watts for 1 hour

Consumer – a person who purchases goods and services for personal use

BACKGROUND INFORMATION

Almost everything we use today requires some kind of electrical **energy** to power it, but we can cut down on the amount of electricity we use if we learn to practice better efficiency and conservation.

Electricity is measured in **kilowatt hours** (kWh). The kilowatt is named after James Watt, who invented the modern steam engine. Because the unit measure uses his name, the W is capitalized in the abbreviation kWh.

Every month, **consumers** pay for electricity to be delivered to their homes and businesses, and they are charged based on the number of kWh's used. This lesson will allow students to calculate an estimate of their electricity usage. They will then discuss ways to conserve electricity and calculate how much money they could potentially save. One form of conservation is to buy products that are **energy efficient**.

According to the [U.S. Energy Information Administration](#), in 2013 your state (residential, commercial, industrial, and transportation) used just over 243,542 mWh (which is 243,542,000 kWh). The residential portion of that was over 51,287 mWh (51,287,000 kWh). If we make wise choices when we purchase appliances and we continue to make wise choices about how we use them, we can conserve energy.



LESSON ACTIVITY

Using a multiple choice game (attached power point), the teacher will engage students in a short class discussion about how much energy it takes to power each device/appliance shown. It will probably be a guessing game since they don't have any idea what a kWh is and how devices are powered. Students will then do a worksheet solving multiplication problems to calculate actual energy used.

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- Power Point game
- Computer and projector
- Calculations sheet

Procedure

1. Allow students to get in teams of 3-4 students.
2. Project power point game on the board, and have the teams answer the questions while you (or a student) record(s) a tally of the answers on the board. You will use this information later in the lesson. (See the student calculations sheet for the correct answers.)

Suggested tally form

Questions	Answer A	Answer B	Answer C	Answer D
1				
2				

If you write their actual answers on the board in dollar amounts, they can then keep a tally of the amount of money. This may change the way they answer the questions if they see the money adding up.

3. After Pass out **Student Electricity Calculations sheet**, and have the students work individually or in groups to solve the problems.
4. Go over the problems together and calculate correct answers; have the students come to the board to do this in front of the class, or have them compare answers with the rest of the group, or have them switch papers with another student to grade.
5. Watch [this video](#) (begin at 14:50 for info about energy conservation, or start at the beginning for more about Earth's sources of energy and how they can be used responsibly)

Homework option: Have the students go home and make a list of the energy efficient appliances they have in their homes. Go to [Energy.gov's site](#) and let the students use the energy calculator to discover how much electricity their appliances use.

ASSESSMENT

Electricity Calculations worksheet

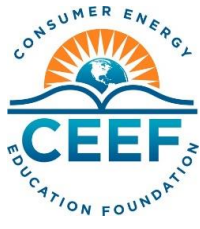
Class discussion:

What are some of the positive results that come from energy efficiency and conservation? (What happens when we use less energy?) Think about the entire process of energy production and usage.

LESSON EXTENSION

Have the students research who their electric provider is and what source(s) of energy it uses to provide that electricity. Go to Energy.gov's site to compare your state's energy usage with the US average and other states'.

Plug in to Rocky Mountain Power to have them give info on their savings programs, etc.



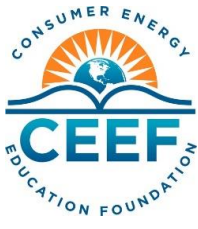
Apps that teachers can use as additional ways to teach:

General (all forms of energy): <http://www.kidsdiscover.com/apps-for-kids/energy-app-for-ipad/>

Natural gas and electricity safety app (iPad): <https://itunes.apple.com/us/app/empowered-kids-by-consumers/id849096388?mt=8>

Bill Nye the Science Guy (iPad): <https://itunes.apple.com/us/app/bill-nye-the-science-guy/id652548755?mt=8>

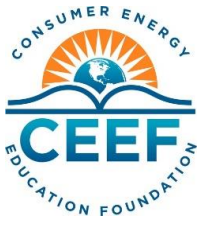
SAMPLE



Electricity Calculations

Calculate the following:

Device/Appliance	Amount in house	Cost per month	Total cost
Smart Phone (charging for 10 hours)		\$0.15	
Incandescent 60 Watt light bulb (5 hours/day)		\$0.90	
CFL light bulb (5 hours/day)		\$0.23	
Refrigerator (24 hours/day)		\$14.46	
Air Conditioner (24 hours/day)		\$281.08	
Air Conditioner (4 hours/day) (AC units run an average of 4 hours per day all year long)		\$50.00	
Washing Machine (1 hour/day)		\$0.92	
Dryer (1 hour/day)		\$10.00	
Dishwasher (2 hours/day)		\$2.38	
Gaming system (4 hours/day)		\$0.52	
Desktop Computer (8 hours/day)		\$3.37	
Television (4 hours/day)		\$2.16	
Ceiling Fan (24 hours/day)		\$3.02	



Energy Worksheet

1. What is energy?
2. Where does energy come from?
3. How do we use energy on a daily basis?
4. List at least 15 things in your home that you use that require energy?
5. Define primary energy source and secondary energy source.
6. Name 4 primary sources of energy in your state. You may have to research this with an adult.

SAMPLE