## LESSON

Introduction to Energy Conservation & Efficiency

## BIG IDEA(S)

Energy conservation is the decision and practice of using less energy. Energy efficiency is using technology that uses less energy to perform the same function.

## OBJECTIVES

Students will:

- List at least five ways to conserve energy in general (human body, school community, home, etc).
- Identify major sources of energy use in the home.
- Describe three practices that could be implemented in their own homes to conserve energy and save money.
- Differentiate between energy conservation and energy efficiency
- Create an argument that demonstrates why conserving energy is good for the health of the planet.

BRIGHT SOLAR FUTURES

WEATHERIZATION

TOPIC OF STUDY

**Energy Efficiency and Conservation**

90 MINUTES

## TASK LIST SUBCATEGORY

| | |
|---|---|
| **102** | Describe how energy is fundamental to our everyday lives |
| **104** | Describe sources and uses of energy |
| **810** | Use energy efficiency industry vocabulary |

## KEY TERMS

Energy Conservation - the decision and practice of using less energy

Energy Efficiency - using technology that uses less energy to perform the same function

## OVERVIEW

Everyone uses energy. Typical energy usages include, transportation, cooking, heating and cooling, lighting, entertainment, and more. Energy conservation is the decision and practice of using less energy. Two reasons people may conserve energy is to:

1) reduce the amount of money spent on their energy bill and

2) to reduce the demand on the earth's natural resources. Energy conservation involves changing behaviors and habits.

Energy efficiency is using technology that uses less energy to perform the same function. (See Energy Efficiency statement in the References.)

## STANDARDS

### PA/SDP

**3.2.10.B6.** Explain how behavior of matter and energy follow predictable patterns that are defined by laws.

## INSTRUCTIONAL

### TEXT/REFERENCES

Training Handbook, p. 7-11

### MATERIALS NEEDED

**Content:** Year 1 Lesson 2 Worksheet

**Technology:** Device with internet to review websites

## IMPLEMENTATION (LESSON PLAN)

### ENGAGE

Using the think-pair-share method ask the class to brainstorm examples of energy uses in our society. Teacher can list student responses on the board or a shared Google doc. Responses might include: transportation, cooking, human activities such as exercise, heating, cooling, lighting.

### EXPLORE

1. Part 1 - Using the list of examples of energy usage created in the engage section above, ask pairs of students to identify how you might cut down on the energy used for each of the items listed above.
2. Part 2 – Using the Energy Star website (https://www.energystar.gov/products), have pairs of students pick a product from the list and research the item. Students should gather the following information:
    - Product description
    - Description of energy saving features
    - Costs per year to use the product

### EXPLAIN

Review students' results from the questions as a whole class. Students can report out on the product that they researched.

### EXTEND/EVALUATE

As an exit ticket, have students complete the following task in 2-3 sentences, "Create an argument that demonstrates why conserving energy is good for the health of the planet."

## HOMEWORK

1. Identify what type of energy your home uses for heating (electricity, natural gas, oil).
2. Identify what type of energy your home's hot water heater uses: electricity or natural gas.
3. Identify one or more energy star products in your home.
4. Identify at 2 possible ways that your home could be more energy efficient.

## RESOURCES/LINKS

Constellation Energy Company
https://www.constellation.com/energy-101/what-is-energy-conservation.html

Energy Star products
https://www.energystar.gov/products

U.S. Energy Information Administration
https://www.eia.gov/energyexplained/use-of-energy/efficiency-and-conservation.php

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## FURTHER BACKGROUND

**Energy Efficiency: Why both Solar PV Installation and Weatherization Must Go Together**

Energy Efficiency refers to the renovations and retrofits we do to a building to reduce the energy usage and the cost to the home or property owner. For example, incandescent light bulbs are cheaper than LED light bulbs, but LEDs are 90% more energy efficient and LED's last longer. The amount you will save on electricity by using LED's will more than make up the cost difference.

In the energy efficiency portion of the Solar PV Installer program, we demonstrate to the student how energy is used in a building – conditioning of space (heating and cooling), baseload (electrical appliances, microwaves, refrigerators, space heaters etc.), heating of water, other (TV's, computers, stereo equipment etc.). By using a kill-o-watt meter students can determine the amount of electricity that is being used. We then determine the amount of time each appliance is used over the course of a year. We then take the amount of electricity that is being used over the course of a year and multiply it by the PECO rate per kilowatt hour and we will see the cost per year to use that item.

Students will learn to use a Blower Door which is an instrument that depressurizes a house to determine where there is air leakage. Air leakage will cause your HVAC system to work overtime to compensate for the leakage. By insulating and air sealing we can make your HVAC system operate more efficiently and reducing the cost you pay for energy usage.

The goal is to demonstrate how energy efficiency effects the installation of a Solar PV System. The size of the system and the design is determined by the amount of electricity used. If the appliances and the condition of the building is inefficient you will be paying more for a solar installation than if the building is energy efficient. If someone is thinking of installing a solar PV system on their house, the basic rule is to first determine the energy efficiency of the building and the appliances.

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