



BRIGHT KIDS

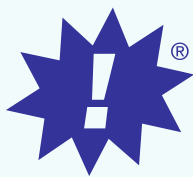
Teacher Guide



Think!



Talk!



Take Action!



PPL Electric Utilities



PPL Electric Utilities

Dear Teacher:

PPL Electric Utilities is proud to sponsor Think! Energy Bright Kids. Taught by energy experts, your students will participate in an interactive program intended to spark interest in the crucial subject of energy efficiency. Armed with that knowledge, your students will be able to become better stewards of the limited natural resources used to make energy.

Through this program, your students will receive up-to-date information on sources of energy, better understand the limits to the amount of energy we have and learn how to become energy efficient.

A vital component of this program is the take-home energy efficiency kit, which brings these lessons alive and supports classroom instruction with interactive, educational home activities. Students will be able to easily transfer what they have learned in school to the home and teach the entire family essential lessons about energy efficiency and conservation. Together with an adult, they will install measures from the kit that will help their family save both energy and money.

Thank you for choosing to participate in Think! Energy. I hope you find the program beneficial to the hard work you do every day educating your students.

Sincerely,

A handwritten signature in black ink that reads "Mary Ann Merenda". The signature is written in a cursive, flowing style.

Mary Ann Merenda
Program Manager - Residential Programs



TEACHER GUIDE

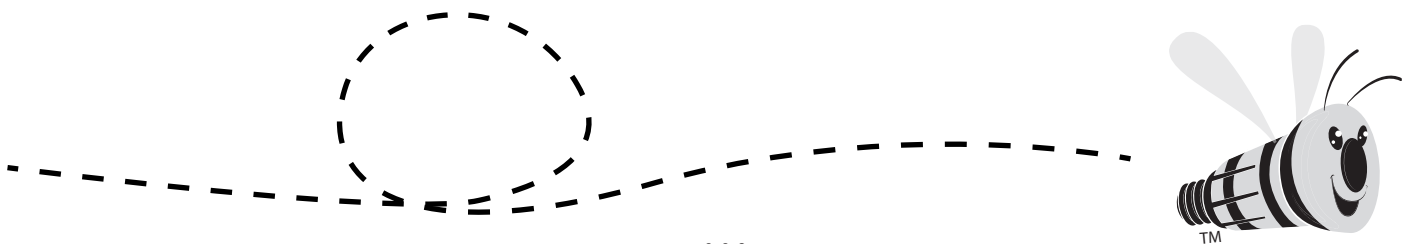
Welcome to Bright Kids!

This unique, hands-on program teaches the importance of energy, natural resources and caring for our environment.

The program includes a *Bright Kids Kit* of energy saving products, packaged with installation instructions for each student in your class. With this kit, students will learn that changing habits and installing products can be the easiest way to be energy efficient.

The guide is designed to facilitate program instruction. Please review the materials before beginning. A variety of tools have been provided to allow you to format Bright Kids to meet your instructional needs. These tools include:

- a program *Welcome Flier* providing a step-by-step guide to completion of Bright Kids, including detailed instructions for the *Home Energy Worksheets* (HEWs),
- general guidelines, as well as vocabulary and
- classroom discussion and activity suggestions, including fun and interesting worksheets and puzzles for students.



Prior to beginning the program, please be sure you have read all of the information on the *Welcome Flier*, found in your *Teacher Materials Folder*.

In an effort to meet today's educational standards, these materials have been developed for this custom program. The lessons are correlated to the National Science Standards and National Social Studies Standards, as well as your state standards.

In the event that a student is not able to install products found in the *Bright Kids Kit*, please encourage them to give the products to someone who will benefit from using them. Extra kits may be given to someone who will utilize the technologies and complete the HEW.

For questions, comments or information regarding this program or materials found in the kits, go online to thinkenergy.org/ppl-bright-kids.

Thank you for your participation in Bright Kids.

Enjoy!

 **IMPORTANT NOTE**

Please be sure each person receiving a *Bright Kids Kit* completes the HEW. Students may submit the answers online at thinkenergy.org/ppl-bright-kids, or you may print and mail the paper copies in the postage paid envelope from your *Teacher Folder*.

Objective:

Participate in discussions and activities to formulate a basic understanding of energy, natural resources and energy efficiency.

Home Energy Worksheet (HEW):

HEWs can be completed online at thinkenergy.org/ppl-bright-kids. If students fill out paper forms, please return them to the National Energy Foundation (NEF) in the postage paid envelope included in the teacher materials.

Vocabulary:

Bright Kid: A student who uses energy and resources wisely. You!

Conserve: To save and not be wasteful.

Electricity: A secondary source of energy. Electricity normally travels in the form of electrons moving along a wire.

Energy: The ability to do work.

Energy efficiency: Managing the consumption of energy through the use of efficient technologies and wise behaviors.

Fossil fuels: Fuel formed from the remains of plants and animals that lived a long time ago.

Generate: To produce something; for example, to produce electricity.

LED: Light-emitting diode, a type of bulb which can last up to 25,000 hours.

Mineral: A solid inorganic substance, such as gold, which is taken from the earth.

Natural resource: A material from the earth which is useful to people, such as water, wood and minerals. The sun is also a natural resource.

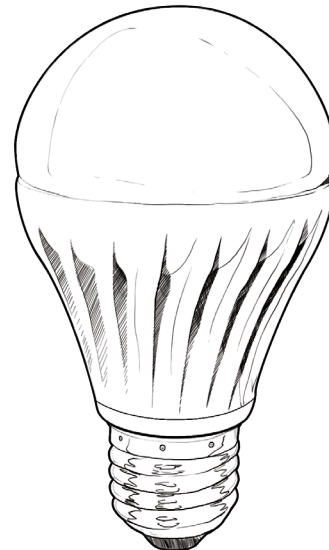
Nonrenewable resource: A resource that will be all used up someday.

Renewable resource: A resource that is replaced by nature.

Scarcity: Not having enough of a resource.

Star: A gigantic ball of hot, glowing gases.

Sun: Our closest star, 93 million miles from the earth, that provides us with heat, light and energy.



Energy comes from the earth's natural resources. Natural resources are anything we use that comes from the earth or our sun. All of the things we use every day to meet our needs and wants are provided through the use of natural resources, which are either renewable or nonrenewable.

Renewable resources are materials that are replaced naturally within a fairly short period of time. Renewable resources include the sun, wind, water, plants and animals. Nonrenewable resources exist in fixed amounts within the earth. Once they are used up, they are gone. Nonrenewable resources include minerals and fossil fuels (coal, oil and natural gas).

Energy, derived from natural resources, lights, heats and cools our homes, schools and factories. It powers the machines of industry and transportation. The clothing we wear, the food we eat, the buildings in which we live and work and even the systems we use to communicate, are all dependent on energy.

Stated simply, energy is the ability to do work or produce a change. We tend to take energy for granted. However, its importance should not be overlooked because nothing happens without energy.

Electricity is a secondary energy source that is generated from primary resources, some renewable (e.g., solar power) and some nonrenewable (e.g., coal). Electricity is unique as it is energy in transit.

Look at how electricity is generated using coal as the primary energy resource.

- The coal is burned to heat water in a boiler and convert it to steam.
- The steam goes through a turbine, turning its blades. The shaft of the turbine is connected to a generator which makes electricity.
- Voltage is increased at substations to boost the electrical flow as it travels miles through transmission lines, then the electricity is transmitted to homes, schools and communities.
- The electricity goes through a transformer to decrease voltage before the electrical current enters a building.

Our homes have wires throughout, which are located behind the walls, that connect electrical switches and outlets. An electrical circuit is a complete path on which an electric current travels. When you flip a switch or plug something into an outlet, you complete a circuit and electricity flows through the wires. A switch is used to complete the electrical circuit. The light bulb consumes the electricity from a circuit and converts it into work, heat and light.

We can all make a difference by using **energy-efficient** technologies and making wise choices. Ways we can make a difference to conserve our natural resources include:

- Replace incandescent light bulbs with LEDs immediately; do not wait until the incandescent bulbs burn out. Add additional LEDs as you are able to do so.
- Turn off lights when they are not needed.
- Turn off TVs, video games and computers when not in use.

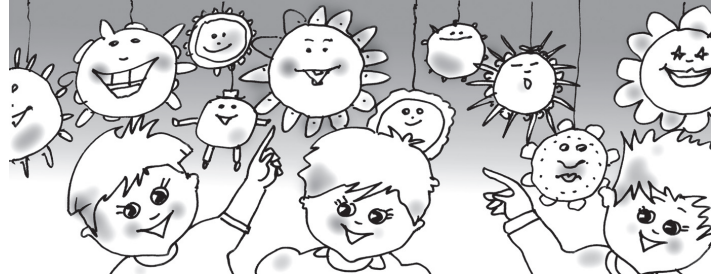
Stuffed Suns

Objective:

Students will identify several ways the sun's energy is of benefit to us.

Materials Needed:

- 18" x 36" pieces of butcher paper or newsprint
- Crayons, poster paint or markers
- Staples and stapler
- Old newspaper
- String



Pre-activity Discussion:

Discuss the sources of energy that we receive directly or indirectly from the sun. (You may want to write these on chart paper or the whiteboard as students mention them.) Examples include: coal, oil (gasoline), water cycle, wind, natural gas, food and wood. Explain that fossil fuels (coal, oil, and natural gas) come from plants and marine animals that have been buried for millions of years. The weight from the layers of mud and sand created pressure and heat that changed the plants and marine animals into fossil fuels.

Procedure:

1. Give each student an 18" x 36" piece of butcher paper or newsprint. (You can construct smaller suns if desired.)
2. Instruct students to fold the paper in half and paint or color a large sun on both front and back of the fold. Encourage students to be creative! To provide students with math practice, instruct some to make suns with eight points, some with 10 points and some with 12 or 15 points. Suggest to them that they make half of their points long and half of them short.
3. Direct students to print some of the different ways we get energy from the sun on the points.
4. Cut out the suns and staple around two-thirds of the edge.
5. Stuff with old newspapers and finish stapling the edges.
6. Decorate the room with the stuffed suns.

Check for Understanding:

Let students share their suns in small groups and discuss the ways we get energy from the sun that they printed on the points.

To Know and Do More:

After you have decorated the room with your beautiful suns, encourage the students to sing about them to the tune of Row, Row, Row Your Boat. Try a round or add a second verse.

Oh, we love the sun
With all its shining rays.
It gives us light and energy
In many different ways.

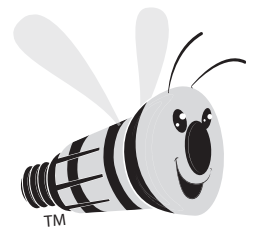
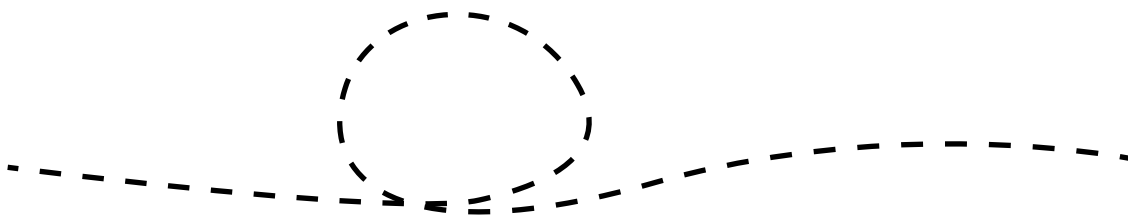
Sun Fun Words Activity Sheet

The sun is our ultimate energy source! Finish the sentences with these "Sun Fun Words."

1. The light of the sun is called sun _ _ _ _ _.
2. The first day of the week is Sun _ _ _.
3. A tall plant with a big yellow flower is a sun _ _ _ _ _.
4. When your skin is red and hurts, you have a sun _ _ _ _ _.
5. A beautiful red and orange sky in the evening is called a sun _ _ _.
6. A ray of sunlight is called a sun _ _ _ _ _.
7. A clock that tells time with shadows is a sun _ _ _ _ _.
8. When the sun peaks over the horizon in the morning it is called sun _ _ _ _ _.
9. Lotion you put on to prevent a sunburn is called sun _ _ _ _ _.

Word Bank:

sundial	sunflower	sunshine
sunrise	sunscreen	Sunday
sunset	sunbeam	sunburn



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Renewable and Nonrenewable Resources

Objective:

Students will learn the difference between renewable and nonrenewable resources.

Materials Needed:

- "Energy Resources" activity page per student

Pre-activity Discussion:

Discuss the needs of all people: air, water, food and shelter. Our environment provides for our needs through natural resources. Discuss what a natural resource is and list various natural resources. (A natural resource is the sun and anything that comes from the earth.)

Make a large T-chart on chart paper or the whiteboard listing renewable on one side and nonrenewable on the other side. Review with students what renewable means (naturally replaced). Review what nonrenewable means (not naturally replaced). As students name a natural resource, discuss if it would be renewable or nonrenewable and put it on the correct side of T-chart.

renewable	nonrenewable
sun	coal
wind	oil
water	natural gas
plants/animals	minerals

Discuss the concept of scarcity. How can resources become scarce? (overuse, natural changes such as drought) How can we avoid scarcity? (finding new ways to do things, using resources more efficiently)

Procedure:

1. Tell students they are going to discover a message that is written in secret code.
2. Direct students to look carefully at the math problems, some are addition and some are subtraction. After they solve the problem, they should look at the code key to find out which letter to use to solve the puzzle.
3. Give students time to solve the puzzle.

Check for Understanding:

When students have finished, discuss the message they discovered.

To Know and Do More:

Instruct students to work in pairs or groups to create a message written in secret code.

Career Awareness Activity:

Invite an employee from a power plant, power company or mine to discuss the energy they provide and the various careers offered by their company.

Energy Resources

Below is a message that is written in a secret code. Solve the addition and subtraction problems and then use the Code Key to discover which fossil fuels provide us with energy. The first one is done for you.

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Code Key						
1 = A	5 = E	9 = I	13 = M	17 = Q	21 = U	25 = Y
2 = B	6 = F	10 = J	14 = N	18 = R	22 = V	26 = Z
3 = C	7 = G	11 = K	15 = O	19 = S	23 = W	
4 = D	8 = H	12 = L	16 = P	20 = T	24 = X	

I Can Make a Difference

Objective:

Students will understand that when we all make small changes, they add up to gigantic changes.

Materials Needed:

- One empty plastic bottle
- "A Garbage Survey" (Save garbage in classroom for one day to complete garbage survey.)

Pre-activity Discussion:

Ask students to name some human made products we use everyday that are made using our natural resources. These might include paper, plastic, aluminum, metal, fabrics, cardboard, etc. Tell students we are going to talk about the 3 Rs: reduce, reuse, recycle.

- Reduce: To use less of something.
Examples of things to reduce: electricity, water
- Reuse: To use something again.
Examples of things to reuse: bags, water bottles, clothing
- Recycle: To make something into another new thing.
Examples of things to recycle: paper, glass, plastic, aluminum cans

When we reduce, reuse and recycle, we save the energy that is needed to make new things.

Procedure:

1. Show students the empty plastic bottle. Tell them the energy saved by recycling 10 plastic bottles could power a laptop for more than 25 hours.
(Source: [epa.gov/recycle/frequent-questions-recycling#recycling101](https://www.epa.gov/recycle/frequent-questions-recycling#recycling101), accessed April 2022)
2. Ask students if they recycle at home. Discuss recycling at school. If your school does not recycle, see what your class could do to get it started.

Check for Understanding:

Students should understand they can make a difference! Direct students to write down one way they can make a small change. Remind them that the small changes add up to gigantic changes. When we take care of our environment, we are helping our community.

A Garbage Survey

List the items that can be reduced, reused or recycled from a day's worth of garbage.

Food _____

Paper _____

Aluminum _____

Glass _____

Plastic _____

Other _____

Activity Page Answers

Sun Fun Words Activity

1. sunshine
2. Sunday
3. sunflower
4. sunburn
5. sunset
6. sunbeam
7. sundial
8. sunrise
9. sunscreen

Energy Resources

3 15 1 12 15 9 12 1 14 4
c o a l o i l a n d

14 1 20 21 18 1 12 7 1 19
n a t u r a l g a s

1 18 5 14 15 14 18 5 14 5 23 1 2 12 5
a r e n o n r e n e w a b l e

18 5 19 15 21 18 3 5 19
r e s o u r c e s

If students cannot use any item from their kit, please encourage them to give the device to a neighbor, friend or relative who lives nearby. The HEW should reflect use of all items in the kit, whether installed in the student's or another's home.

Students may complete the HEW online at thinkenergy.org/ppl-bright-kids. Paper copies can be printed from your program emails and returned in the postage paid envelope provided.

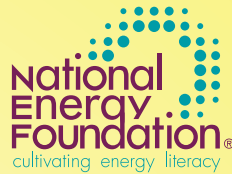
When completing the HEW online, students will need your unique teacher ID to make sure you receive credit for their submissions.



PPL Electric Utilities

THINK! ENERGY®

Program Partners:



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1-855-494-2942

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