XIII. Over/Under-recovery of Energy Efficiency Program Costs

TNMP had an over-recovery of ~~$351,525~~410,082[13] for the 2015 program year, including its rate case expenses of $44,920 for processing Docket No. 44778 and the EM&V cost allocation of $58,170. TNMP will true-up this amount, by rate class, in the 2016 EECRF filing.

XIV. Performance Incentive Calculation

As directed by the PUCT Staff, the total program costs to be used in the performance bonus calculation should include the EM&V cost allocation of $58,170 provided by the EM&V team for the program year, instead of the actual EM&V expenditures of $77,649, as well as all rate case expenses. As a result, the total program expenditures for the bonus calculation will not match the actual total program expenditures exhibited in the applicable tables above.

For the purposes of the performance bonus calculation, TNMP's 2015 total program costs equaled $4,~~070,184~~069,797.

Accordingly, for the purposes of calculating the cost caps, TNMP's 2015 total program costs equaled $4,~~006,009~~005,622, exclusive of EM&V costs and municipal rate case expenses.

Because TNMP exceeded the 2015 goals by 150% for kW and 173% for kWh savings, TNMP will request a performance incentive of ~~$821,635~~817,425 as part of the 2017 EECRF filing.

[13] Over-recovery amount includes a true-up to the EM&V projected costs collected through rates as approved in Docket No. 44480.

Table 12: Performance Incentive Calculation

	kW	kWh
Demand and Energy Goals	5,770	10,109,000
Demand and Energy Savings	8,~~675~~662	17,~~519,823~~451,872
Reported/Verified Total (including HTR, measures with 10yr EUL, and measures with EULs < or > 10 years)		
Reported/Verified Hard-to-Reach	689	
Avoided Cost		
per kW	$80	
per kWh	$0.05321	
Inflation Rate	2.00%	
Discount Rate	9.90225%	
Total Avoided Cost		$12,~~286,524~~244,048
2015 Program Costs		$4,~~078,484~~069,797
Net Benefits		$8,~~216,961~~174,757
Performance Incentive		$~~324,615~~817,425

Acronyms

C&I	Commercial and Industrial
CCET	Center for the Commercialization of Electric Technologies
DR	Demand Response
DSM	Demand Side Management
EEP	Energy Efficiency Plan, which was filed as a separate document prior to April 2009
EEPR	Energy Efficiency Plan and Report
EER	Energy Efficiency Report, which was filed as a separate document prior to April 2009
EE Rule	Energy Efficiency Rule, PUCT Substantive Rules § 25.181 and § 25.183
ERCOT	Electric Reliability Council of Texas
HTR	Hard-To-Reach
M&V	Measurement and Verification
MTP	Market Transformation Program
PUCT	Public Utility Commission of Texas
REP	Retail Electrical Provider
RES	Residential
SCORE	Schools Conserving Resources
SOP	Standard Offer Program

Glossary

Please refer to 16 TAC § 25.181(c) for a full list of definitions.

Appendix

Reported Demand and Energy Reduction by County 2015

Open for Small Business MTP			
County	Participants	kW	kWh
Bosque	103	25.59	138,824
Collin	13	1.52	7,789
Coryell	55	22.08	107,037
Denton	758	273.25	1,426,958
Fannin	7	1.51	7,884
Galveston	25	4.70	22,582
Grayson	126	16.28	58,235
Hill	46	20.48	107,394
Hood	17	2.88	15,119
Lamar	14	2.75	16,184
Montague	17	5.66	21,986
Red River	19	11.36	61,203
Somervell	176	45.49	197,376
TOTAL	**1,376**	**433.55**	**2,188,571**

Commercial Solutions MTP			
County	Participants	kW	kWh
Brazoria	1	4.86	31,848
Collin	1	1.75	11,449
Coryell	5	90.32	692,309
Denton	44	~~236.13~~235.01	1,~~228,301~~221,697
Fannin	2	8.58	30,678
Galveston	31	~~293.74~~282.19	1,~~734,541~~679,885
Grayson	4	9.45	33,131
Reeves	4	14.08	84,514
Somervell	2	1.49	4,914
TOTAL	**94**	**~~660.40~~647.73**	**3,~~851,685~~790,425**

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SCORE/CitySmart MTP			
County	Participants	kW	kWh
Bosque	2	7.51	33,168
Brazoria	15	182.~~36~~01	~~768,754~~767,046
Clay	4	2.~~65~~52	10,~~538~~328
Collin	6	99.27	220,726
Comanche	1	1.14	1,421
Coryell	5	~~61.36~~60.49	~~192,360~~187,586
Denton	20	20.34	91,768
Fannin	1	10.43	58,813
Galveston	14	163.96	402,974
Grayson	5	16.16	98,906
Montague	5	10.77	36,931
Pecos	1	84.00	36,112
Reeves	31	252.24	1,257,534
Young	2	11.69	21,646
TOTAL	**112**	**~~923.79~~922.54**	**~~3231,650~~3,224,958**

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Load Management SOP			
County	Participants	kW	kWh
Bosque	1	0	0
Brazoria	23	2675	2675
Collin	2	2	2
Coryell	1	0	0
Denton	7	332	332
Fannin	1	3	3
Galveston	19	395	395
Hamilton	3	14	14
Hunt	1	10	10
Johnson	1	0	0
Lamar	1	0	0
Montague	1	0	0
Pecos	4	118	118
Rains	1	0	0
Red River	1	0	0
Reeves	2	1	1
Somervell	1	0	0
TX Texas	1	16	16
Valley Mills	1	1	1
Whitewright	1	1	1
TOTAL	**81**	**3,742**	**3,742**

High-Performance Homes MTP			
County	Customers	kW	kWh
Archer	5	7.77	19,532
Brazoria	63	69.12	180,966
Denton	3	4.90	12,119
Franklin	1	0.63	1,595
Galveston	513	699.19	1,623,~~853.67~~854
Grayson	1	0.97	2,392
TOTAL	**586**	**782.58**	**1,840,457.~~67~~**

Residential SOP			
County	Customers	kW	kWh
Archer	2	3.54254	7,944
Bosque	3	8.78779	19,707
Brazoria	446	398.96997	1,457,924
Collin	4	3.07307	21,055
Cooke	1	3.35435	17,371
Coryell	5	18.01702	41,030
Denton	171	324.78278	957,615
Fannin	133	446.54454	1,292,099
Galveston	408	202.59660	748,309
Grayson	3	10.37938	43,715
Hunt	7	23.34334	79,646
Reeves	1	1.28228	1,523
TOTAL	**1,184**	**1,444.68869**	**4,687,938**

Hard-to-Reach SOP			
County	Customers	kW	kWh
Archer	1	2.43844	5,469
Bosque	2	8.54555	19,164
Brazoria	59	98.18619	270,498
Coryell	8	18.79079	41,504
Denton	116	263.72573	767,132
Fannin	7	19.25225	57.888
Galveston	17	13.72	46,595
Reeves	1	6.18719	13,876
TOTAL	**211**	**430.84384**	**1,164,296**

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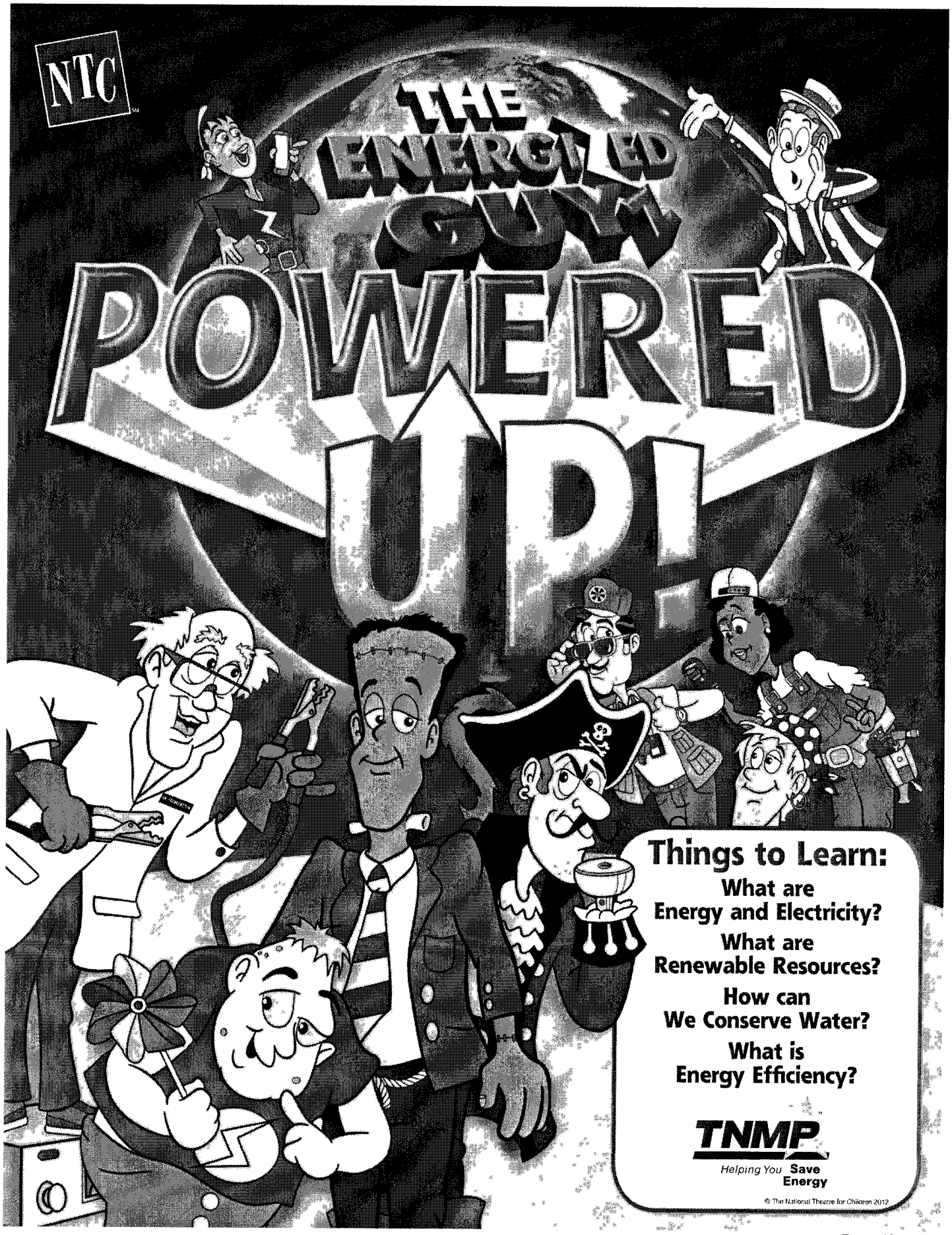
Low Income Weatherization			
County	Participants	kW	kWh
Bosque	12	9.95	15,608
Coryell	22	3.49	7,428
Fannin	6	1.86	2,213
Galveston	88	35.52	55,599
Hamilton	20	9.96	21,123
Hunt	37	4.35	19,611
Red River	86	13.93	33,997
Reeves	63	166.10	307,650
Titus	73	12.52	30,425
TOTAL	**407**	**257.67**	**493,654**


NTC
THE ENERGIZED GUY
POWERED UP!
Things to Learn:
What are Energy and Electricity?
What are Renewable Resources?
How can We Conserve Water?
What is Energy Efficiency?
TNMP
Helping You Save Energy
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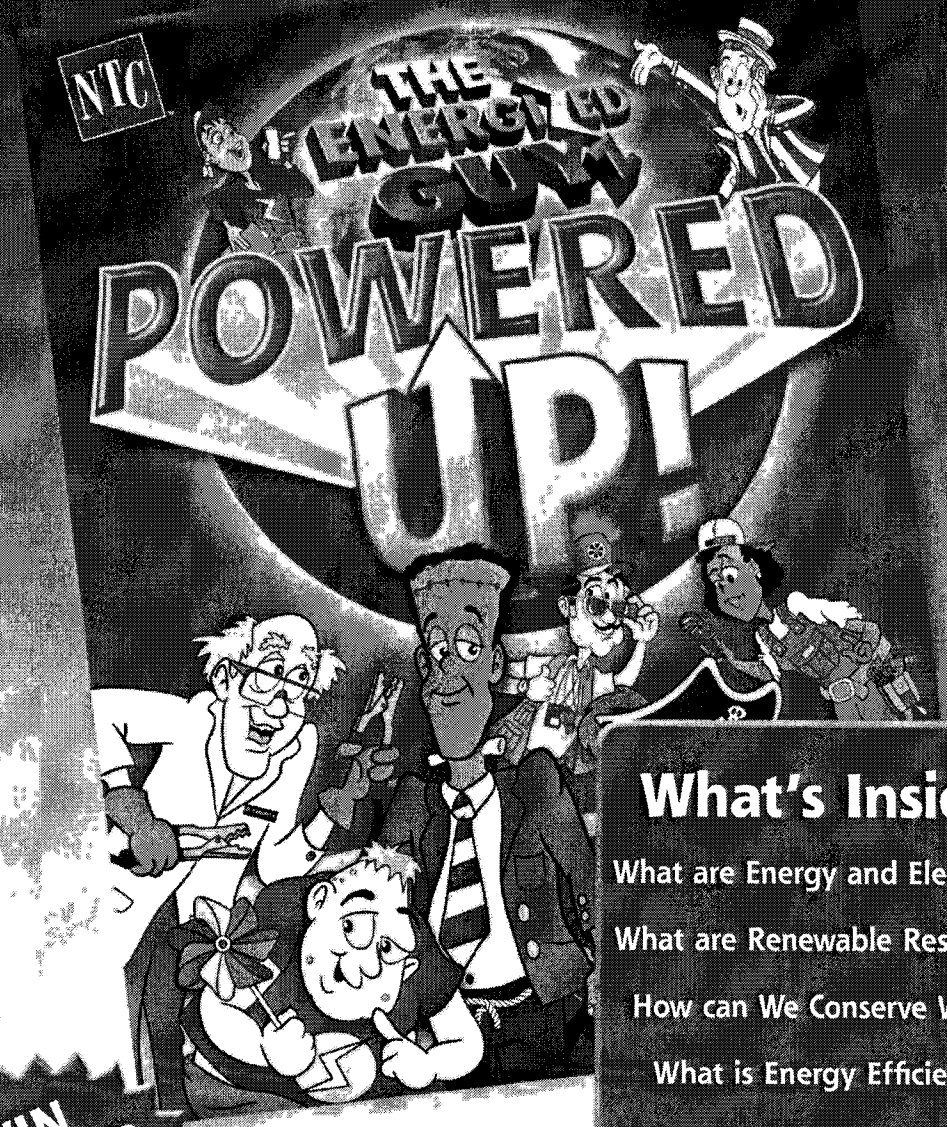
Teacher Guide



What's Inside:

What are Energy and Electricity?

What are Renewable Resources?

How can We Conserve Water?

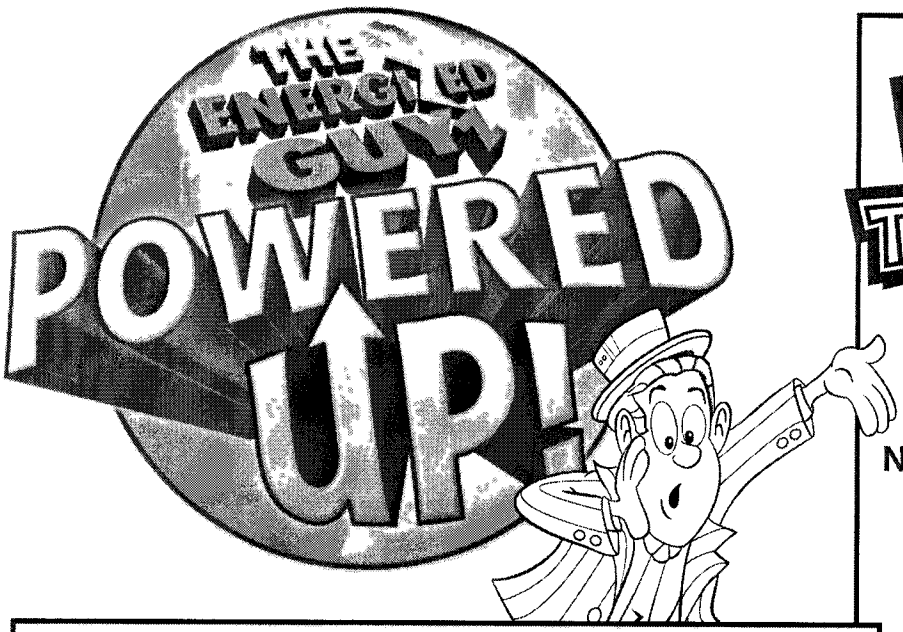
What is Energy Efficiency?

Additional Resources

WIN $250 FOR YOUR CLASS! Details inside!

TNMP

Helping You Save Energy



Dear Educator:

Thank you for your interest in electricity and energy efficiency. On behalf of The National Theatre for Children, we welcome you to *The Energized Guyz: Powered Up!*

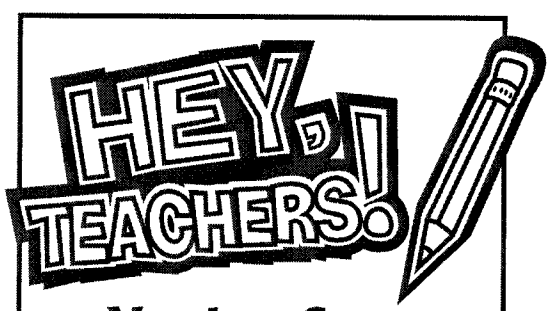
During the performance, your students can learn about electricity, energy efficiency and water conservation. By using the classroom workbooks that have already been delivered to your school, you can help reinforce these messages presented in *The Energized Guyz: Powered Up!*

This Teacher Guide contains sample lesson plans, quick "how to" steps and energy vocabulary words. The guide is best used with the classroom workbooks after *The Energized Guyz: Powered Up* production.

The National Theatre for Children values your feedback and wants to provide you and your students with excellent materials and performances. After the show, please evaluate *The Energized Guyz: Powered Up!* production and classroom workbooks. Your comments will help improve future productions and materials.

Thanks and enjoy the show!

The National Theatre for Children
2733 Park Avenue
Minneapolis, MN 55407
1-800-858-3999
www.nationaltheatre.com



You've Seen The Show!

Now evaluate the program! You could win $250 for your school!

To evaluate the production and classroom materials:

1. Log on to: **www.playworks.com**
2. Enter the code from the hand-out you received from the actors
3. Fill out the evaluation

Thanks and good luck!

Online Resources:

www.tnmpefficiency.com

www.eere.energy.gov

www.ase.org/section/_audience/consumers/kids

Academic Standards

In an effort to assist educators, NTC takes the time to make sure our programs align with educational standards. These are some of the national educational standards with which *The Energized Guyz: Powered Up* program aligns:

Mid-continent Research for Education and Learning (McREL)

Science Standard 1 Understands atmospheric processes and the water cycle

Science Standard 9 Understands the sources and properties of energy

Science Standard 10 Understands forces and motion

Geography Standard 14 Understands how human actions modify the physical environment

Geography Standard 16 Understands the changes that occur in the meaning, use, distribution and importance of resources

Geography Standard 18 Understands global development and environmental issues

National Science Teachers Association (NASTA)

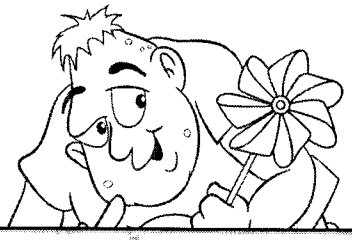
National Science Education Content Standard B Physical Science: Light, heat, electricity and magnetism

National Science Education Content Standard C Life Science: Organisms and their environments

National Science Education Content Standard D Earth and Space Science: Properties of Earth materials

National Science Education Content Standard F Science in Personal and Social Perspectives: Types of resources

National Science Education Content Standard F Science in Personal and Social Perspectives: Changes in environments



Vocabulary Words:

Compact Fluorescent Light Bulb (CFL)	A type of energy-saving light bulb.
Conservation	Using resources wisely.
Efficient	Performing with very little waste.
Electricity	Energy that is made at a power plant.
Energy	The ability to do work or make things happen.
Hydro Power	Using the force of water to spin a turbine to create electricity.
Non-Renewable Resource	A natural resource that cannot be remade. Once it is used, it is gone forever. Coal, oil and natural gas are examples.
Power Plant	A building where electricity gets made by using resources.
Renewable Resource	A resource that can be used again and again. The sun, the wind and water are examples.
Resource	Something used to create energy. Some examples are: coal, natural gas, water, wind and the sun.
Solar Power	Using the sun's energy to create electricity.
Turbine	A fan-like device used to create electricity in a power plant.
Wind Power	Using the wind to spin a turbine to make electricity.

What are Energy and Electricity?

Harnessing Thermal Energy

Students will use body heat to move a coin on the lip of a bottle.

Objectives

1. Students will understand that thermal energy comes from renewable energy sources.
2. Students will use their own thermal energy to make an object move.

Subjects

Science

Skills

Observation, Inference

Duration

One class period

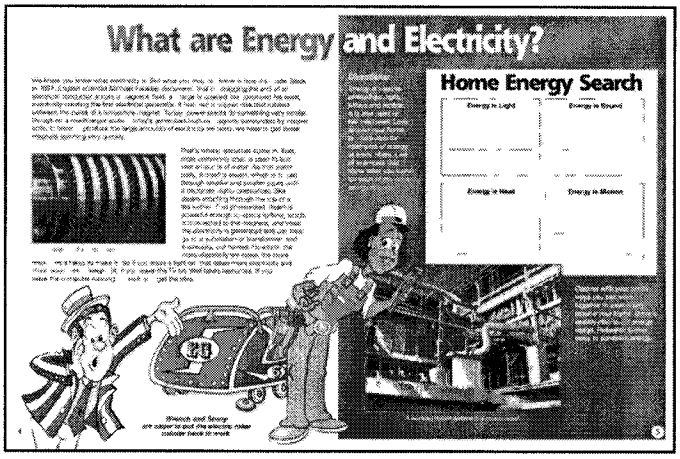
Materials

- Empty soft drink bottle (glass bottles work best)
- Pennies, dimes, nickels
- A few drops of water or cooking oil

Directions for Students

Note: Chilling the bottle for several minutes before presenting the demonstration will increase the effect, but is not necessary.

1. Lay the coin flat over the opening of the bottle.
2. Place a few drops of water or cooking oil at the edge of the coin to form a seal between the coin and the lip of the bottle.
3. Wrap both hands around the body of the bottle.
4. Focus attention on the coin.
5. The coin will begin to tap on the lip of the bottle. If the coin does not tap, warmed air may be escaping between the coin and the lip of the bottle. Add a few more drops of water.



Discussion

What is happening? Why?

What can be done to make the coin move again once it has stopped?

Explanation

Thermal heat from your hands causes the air inside the bottle to expand. Since the only place for air to escape is through the opening of the bottle, it does so, moving the coin in the process.

In a closed container of any gas, there is a direct relationship between temperature and pressure; as temperature increases, so does the pressure. The pressure increase is caused by the increase in motion of the gas molecules as they become warmer. The added energy (provided by the warm hands) increases the motion of the gas molecules until they lift the coin. As some of the gas escapes, the coin drops.

Thermal Energy

Thermal energy is generated and measured by heat of any kind. It is caused by the increased movement of molecules in a substance, which in turn cause the temperature to rise accordingly. There are many renewable sources of thermal energy on Earth such as geothermal and solar thermal.

Thermal energy can be converted into mechanical energy which can in turn create electricity.

Thermal Energy Fun Facts

- Scientists have heated gas molecules to millions of degrees.
- They have also cooled gas molecules to near absolute zero, which is the temperature at which molecules slow down until they have no motion.
- Absolute zero is -459°F. There is no colder temperature.

What are Renewable Resources?

Harnessing Hydro Power

Objectives

Students will understand that water is a renewable resource and can be used to produce mechanical energy and electricity.

Subjects

Science

Skills

Observation, Discussion

Duration

One class period

Materials (per group)

- Cork
- 2 pins
- 6 thin cardboard strips – approximately the length of the cork x 1 inch
- 1 thick cardboard strip 8-10 inches long
- Scissors
- Tape

Preparation

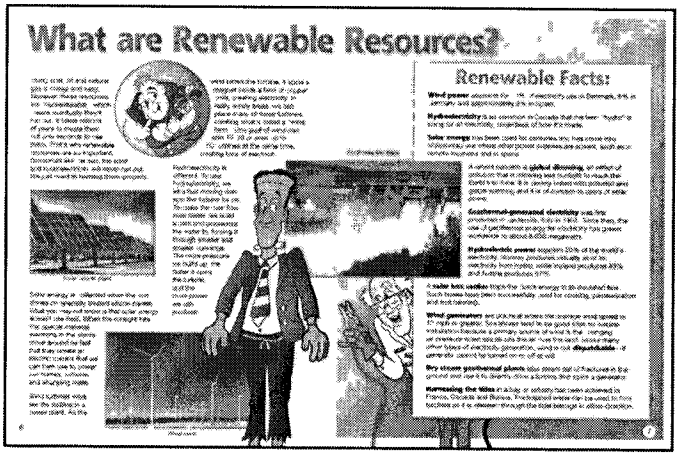
Divide the class into groups of 3 or 4.

Discuss and define the following terms. Give examples for each:

Potential Energy

Kinetic Energy

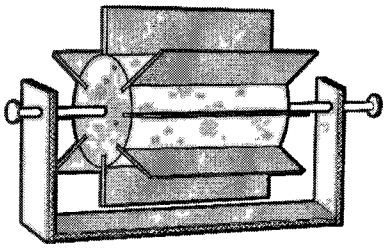
Hydro Power (also called *hydroelectricity*)



Directions for Students

1. Cut 6 small rectangular strips from the cardboard. Make the length of the strips the same length as the cork.
2. Tape the cardboard strips onto the cork and space them as evenly apart as possible.

   Note: This step works well if slits are cut into the cork and the strips placed into the slits.
3. Make a U-shaped holder out of the thick cardboard strip (see diagram).
4. Pin the wheel in place by placing one pin through each end of the cardboard and into the cork.
5. Go to the sink to try out the water turbine. Place the turbine directly in the stream of water coming from the faucet.



6. Vary the speed of the water. What changes occur? Is there a point at which the water is too fast? Too slow? What happens if one of the cardboard strips is removed?
7. Change the location of the water turbine under the flow of water. What changes occur?
8. As a group, discuss the results.

Follow Up Activities

Discuss other ways water can be harnessed to produce energy.

Tour your local power plant to learn if water is used to make electricity in your area.

Have students research other renewable types of energy.

Identify other renewable energy sources used in your community.

When water flows or falls, energy can be generated. The generation of energy through water is usually carried out in large hydroelectric power plants. The moving water is used to turn large turbines. These turbines are attached to generators which then produce electricity.

How can We Save Water?

Bath or Shower?

Students will calculate and compare the amount of water used when taking a bath versus taking a shower.

Objectives

Students will learn ways to conserve water in a shower or bath.

Subjects

Science, Math, Social Studies

Skills

Prediction, Estimation, Multiplication

Duration

The lesson can be explained at the end of a class period on a Friday so that students will have the weekend to do the experiment. Follow up with one class period on Monday.

Materials Needed

- A one gallon container
- Ruler
- Paper and pencil
- Bathtub and/or shower
- Copy of the directions for each student

Preparation

On Friday:

- Discuss with students why it might be important to conserve water in their community.
- Discuss how to conserve water at home.
- Ask students to predict the number of gallons of water they use when taking a bath.
- Ask students to predict the number of gallons of water they use when taking a shower.
- Discuss the different answers.

Directions for Students

1. Fill your bathtub with the amount of water you would use if you were taking a bath.
2. Using your ruler, measure the depth of the water at four different locations in the bathtub.

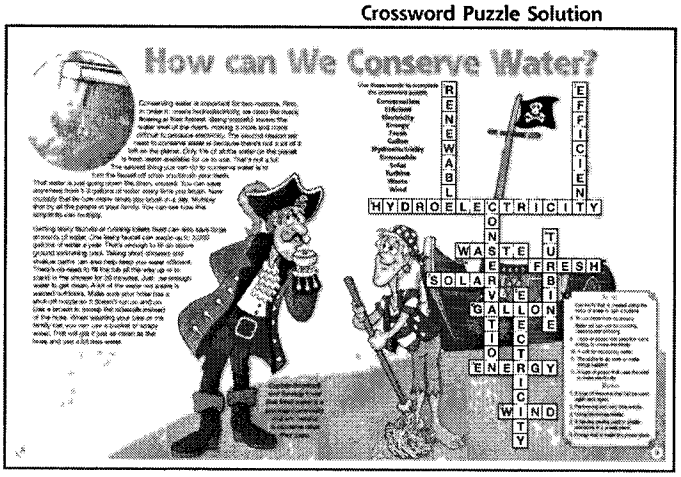
Since water and energy bills are separate, many people forget how important it is to conserve water at home.

Any water used, hot or cold, has gone through an extensive and energy intensive filtration process.

Once the water goes down the drain it has to be filtered yet again before it can be reused. Getting water to the different rooms in a house takes energy as well.

In addition to saving money on utility bills, conserving water in a home helps prevent water pollution in nearby lakes, rivers and local watersheds.

Crossword Puzzle Solution



3. Record the four measurements.
4. Add the four measurements together. Divide the total by four to find the average depth of the water.
5. Record the average depth.
6. Multiply the average depth of the water by 4.5 for an estimate of the amount of water used to take a bath (every inch of water in a bathtub represents about 4.5 gallons of water).
7. Be sure to take a bath afterward so this water doesn't go to waste!

Continue with your data collection the next day. Only this time, you will take a shower.

Close the drain in the bathtub and take a shower. Be sure that the drain is closed so the water stays in the tub.

To keep your measurements accurate, do all the things you typically do when you take a shower (soap up, shampoo, sing into your hairbrush).

After showering, follow the same steps for measuring and calculating that you did in the bath activity.

Discussion

On Monday:

- Discuss students' results as a group. How many students were close to their original predictions?
- Identify ways to save water while bathing or showering.
- What other ways can water be conserved in their homes?

How Much Water Does an Average Person Use a Day?

Bath: 50 gallons
Shower: 2 gallons per minute
Teeth brushing: 1 gallon
Hands/face washing: 1 gallon
Shaving: 1 gallon
Dishwasher: 20 gallons/load
Dishwashing by hand: 5 gallons/load
Washing machine: 10 gallons load
Toilet flush: 3 gallons for a standard toilet (1.6 for a low-flow toilet)
Drinking: 8 oz. per glass (1/16th of a gallon)

What is Energy Efficiency?

Energy Efficiency Research Activity

Students will research renewable resources and present their research to the class.

Objectives

1. Students will learn about renewable resources.
2. Students will be able to identify how a renewable energy source can help with energy efficiency.
3. Students will identify the positive and negative impacts their renewable energy source has on the environment.
4. Students will communicate their findings to the class.
5. Students will learn about the different sources of energy from their peers.

Subjects

Science, Social Studies, Language Arts

Skills

Research, Communication, Comprehension, Analysis, Synthesis

Duration

One week

Materials

- Access to computer and/or library
- Note taking materials
- Poster board
- Magazines and art materials for displays

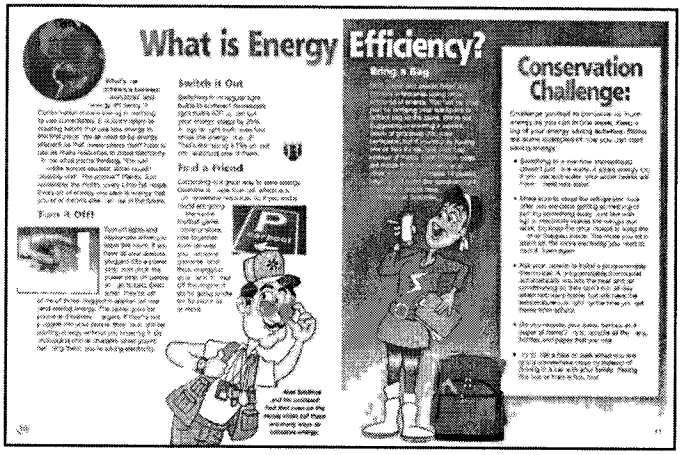
Preparation

Break the students into pairs or small groups.

Assign or have them choose one type of renewable energy to research.

Allow one week to research and create a poster board displaying information and pictures.

Encourage students to put key information on note cards to use during their presentations.



Directions for Students

1. Research the renewable resource using the library or the internet. Information should be gathered from a variety of sources.
2. Explain why the energy source is renewable.
3. Identify different ways in which the energy can be harnessed.
4. What are the limitations to this type of energy?
5. What effects do harnessing and using this type of energy have on the environment?

When the research is complete, create a poster board and oral presentation to teach the rest of the class about the renewable resource.

Renewable Energy Sources

- Hydro Power
- Biomass
- Ethanol
- Biodiesel
- Wind
- Geothermal
- Solar

Discussion

Allow one class period for student presentations.

Encourage the class to ask questions about each of the different types of renewable energy.

Follow Up Activities

Identify what energy sources are currently being harnessed in the community and surrounding region.

Take a field trip to a local power plant or other producer of energy to learn more about energy.


Saving energy is
always a bright idea.
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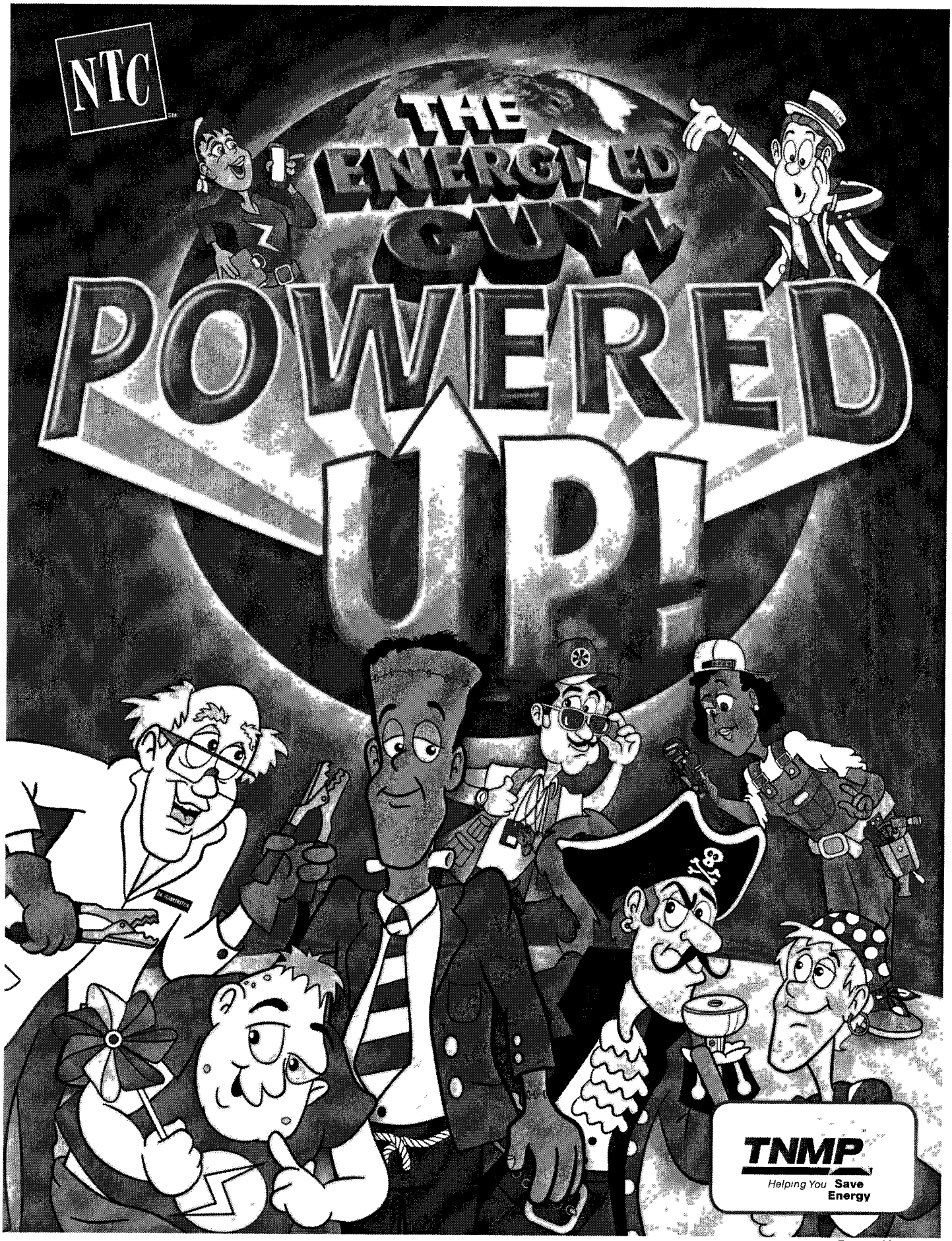
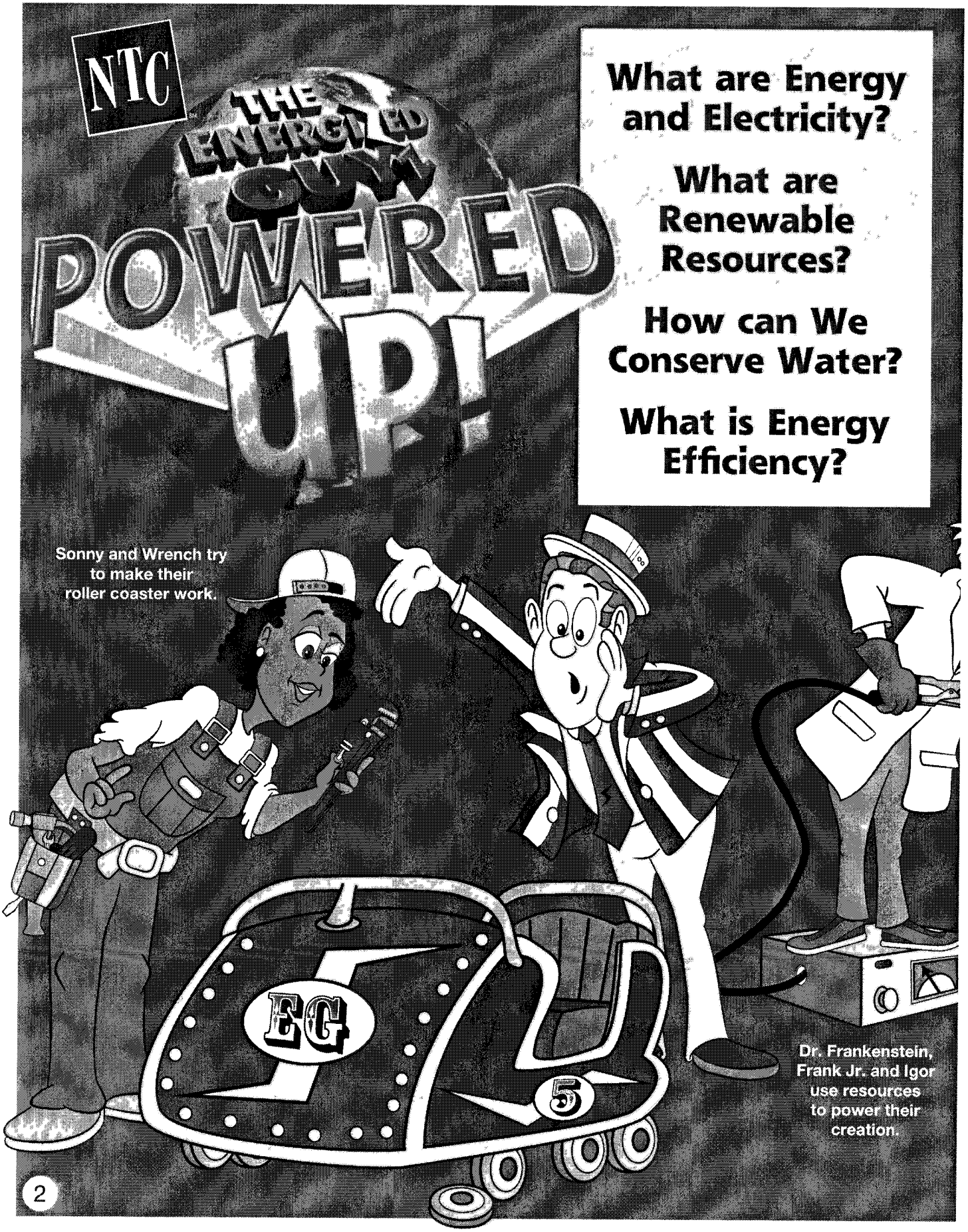
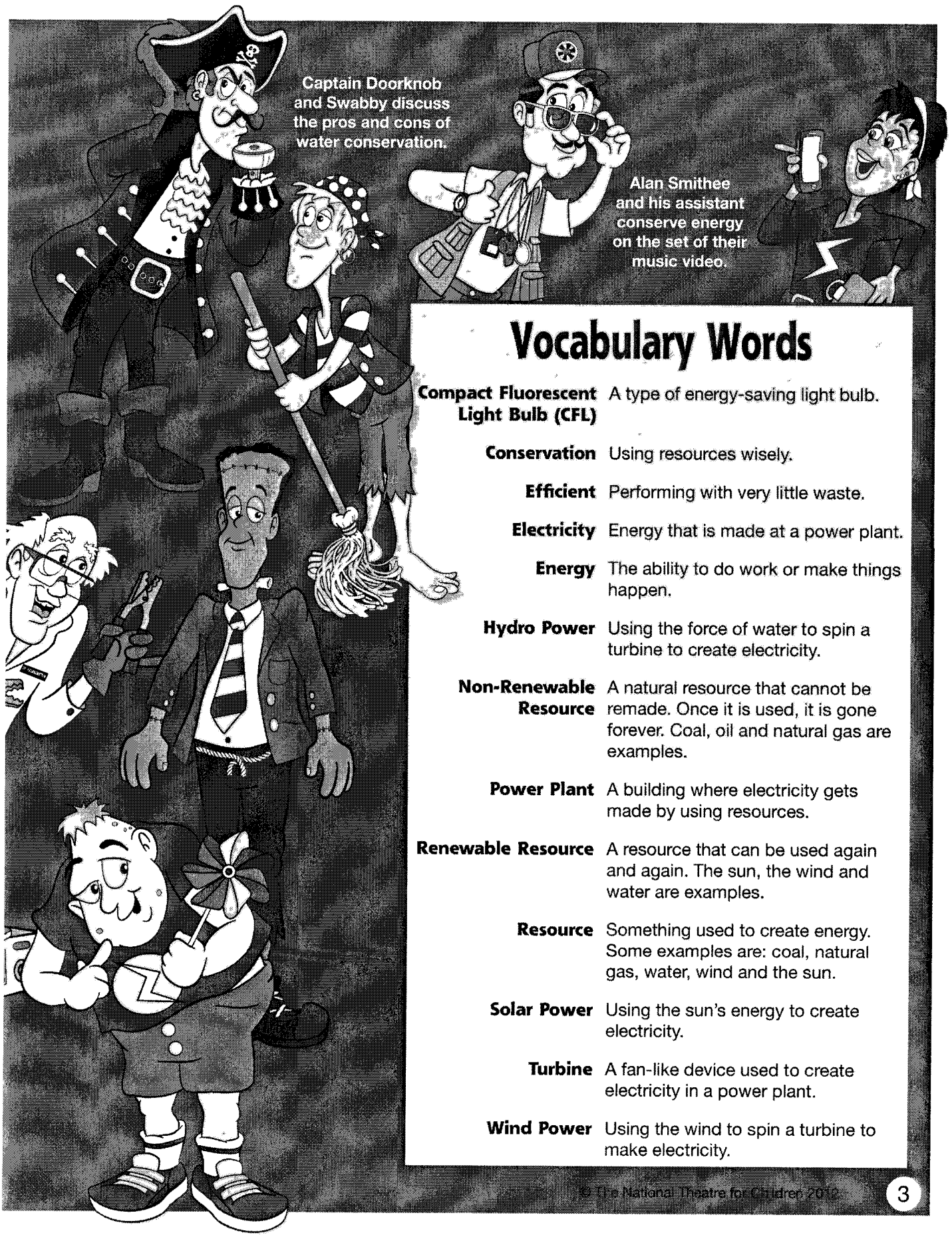

NTC
THE ENERGIZED GUM
POWERED UP!
TNMP
Helping You Save Energy


NTC
THE ENERGIZED CLUB
POWERED UP!
What are Energy and Electricity?
What are Renewable Resources?
How can We Conserve Water?
What is Energy Efficiency?
Sonny and Wrench try to make their roller coaster work.
Dr. Frankenstein, Frank Jr. and Igor use resources to power their creation.
EG
5
2



Vocabulary Words

Compact Fluorescent Light Bulb (CFL) A type of energy-saving light bulb.

Conservation Using resources wisely.

Efficient Performing with very little waste.

Electricity Energy that is made at a power plant.

Energy The ability to do work or make things happen.

Hydro Power Using the force of water to spin a turbine to create electricity.

Non-Renewable Resource A natural resource that cannot be remade. Once it is used, it is gone forever. Coal, oil and natural gas are examples.

Power Plant A building where electricity gets made by using resources.

Renewable Resource A resource that can be used again and again. The sun, the wind and water are examples.

Resource Something used to create energy. Some examples are: coal, natural gas, water, wind and the sun.

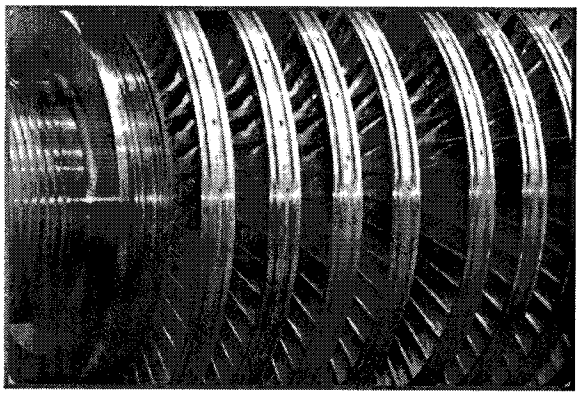
Solar Power Using the sun's energy to create electricity.

Turbine A fan-like device used to create electricity in a power plant.

Wind Power Using the wind to spin a turbine to make electricity.

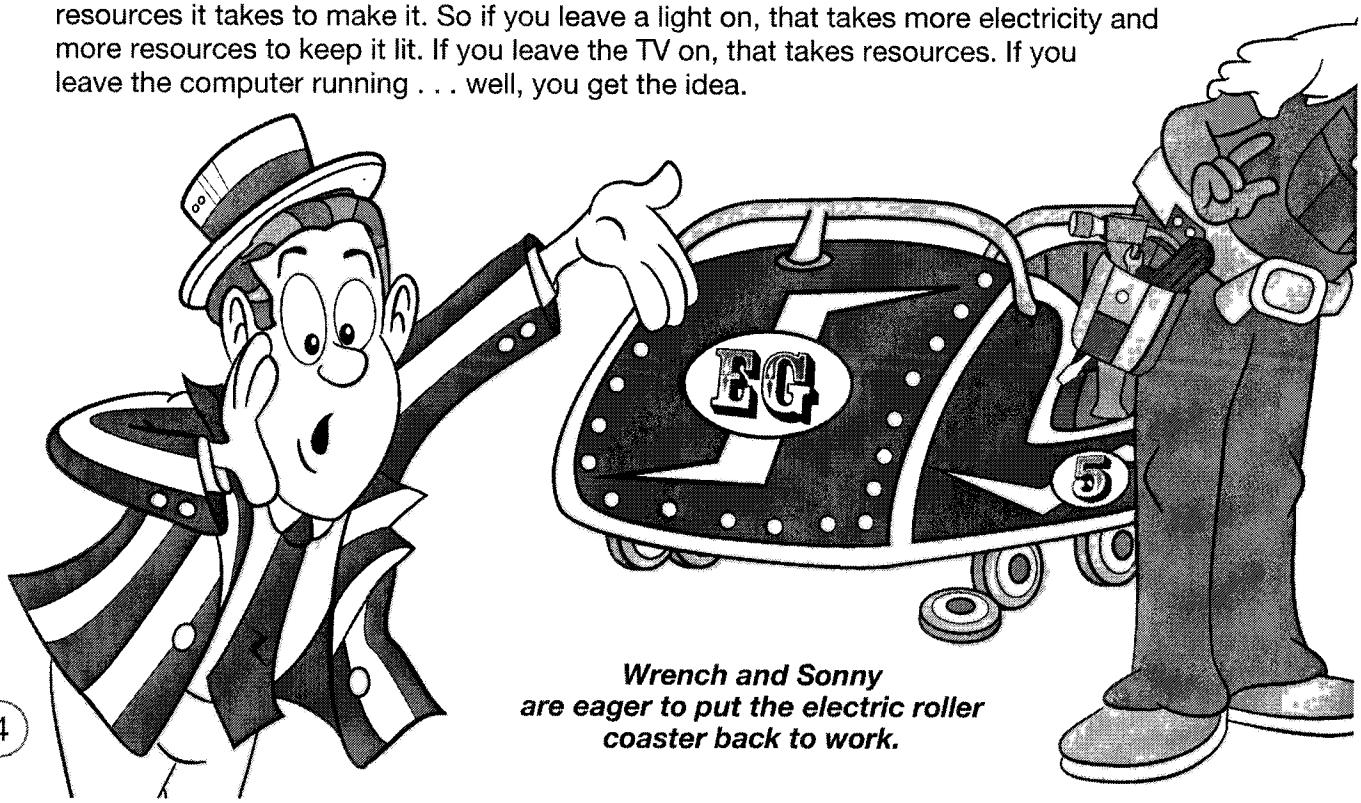
What are Energy

We know you know what electricity is. But what you may not know is how it's made. Back in 1831, English scientist Michael Faraday discovered that by dragging the end of an electrical conductor across a magnetic field, a charge is created. He continued his work, eventually creating the first electrical generator. It featured a copper disk that rotated between the poles of a horseshoe magnet. Today, power plants do something very similar, though on a much larger scale. Today's generators feature magnets surrounded by copper coils. In order to produce the large amounts of electricity we need, we have to get those magnets spinning very quickly.



A close-up of a rotor steam turbine.

That's where resources come in. Fuel, most commonly coal, is used to boil vast amounts of water. As that water boils, it creates steam, which is forced through smaller and smaller pipes until it becomes highly pressurized (like steam shooting through the top of a tea kettle). That pressurized steam is powerful enough to spin a turbine, which is connected to the magnets, and voilá!—the electricity is generated and can now go to a substation or transformer, and eventually, our homes. However, the more electricity we make, the more resources it takes to make it. So if you leave a light on, that takes more electricity and more resources to keep it lit. If you leave the TV on, that takes resources. If you leave the computer running . . . well, you get the idea.



Wrench and Sonny are eager to put the electric roller coaster back to work.

and Electricity?

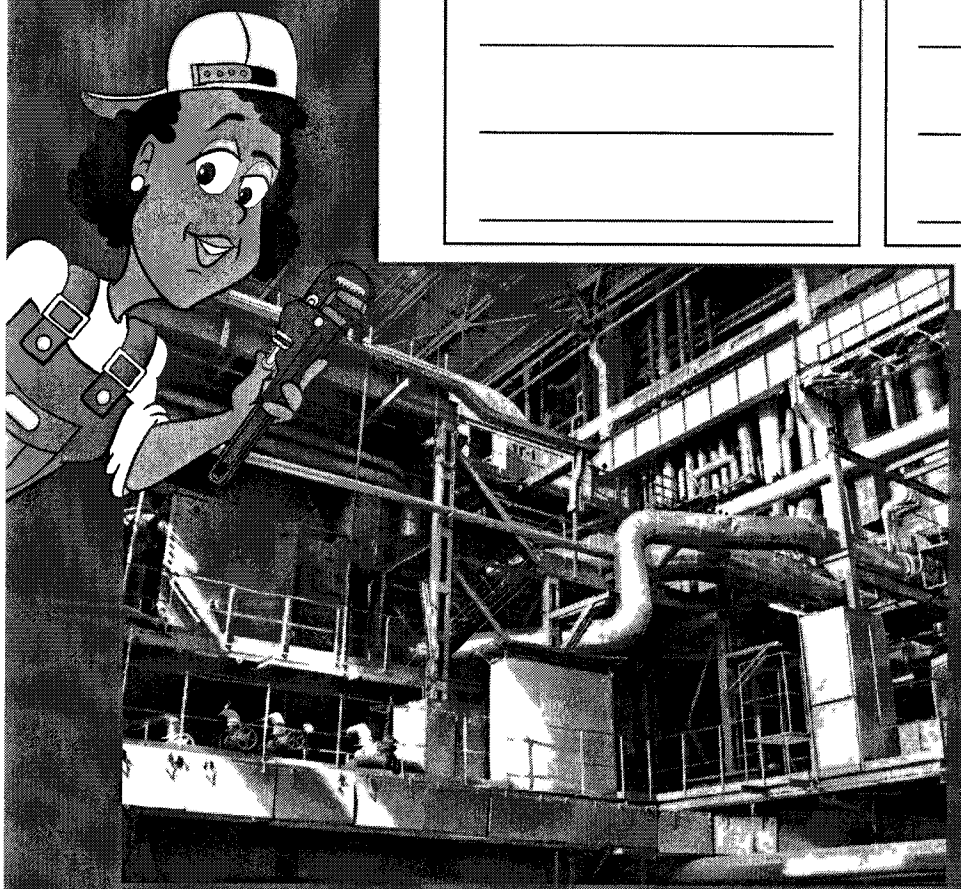
Directions:

Energy is used to create heat, light, sound and motion. It is also used to run machines. Look around your home or classroom for examples of energy at work. Make a list of examples that show what you found for each of the ways energy is used.

Home Energy Search

Energy is Light	Energy is Sound
_____	_____
_____	_____
_____	_____

Energy is Heat	Energy is Motion
_____	_____
_____	_____
_____	_____

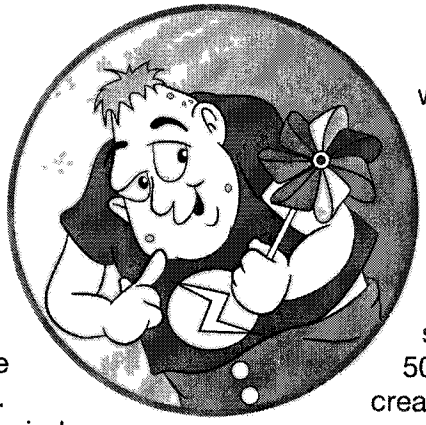


A working steam turbine in a power plant.

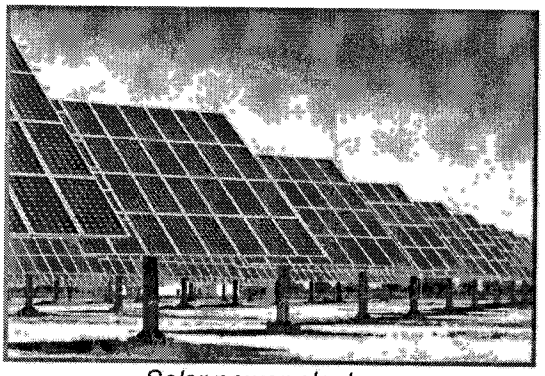
Discuss with your family ways you can work together to save energy around your home. Make a weekly plan to cut energy usage. Research further ways to conserve energy.

5

What are Renewable



Using coal, oil and natural gas is cheap and easy. However, these resources are "nonrenewable," which means eventually they'll run out. It takes millions of years to create them, but only seconds to use them. That's why renewable resources are so important. Resources like the sun, the wind and hydroelectricity will never run out. We just need to harness them properly.

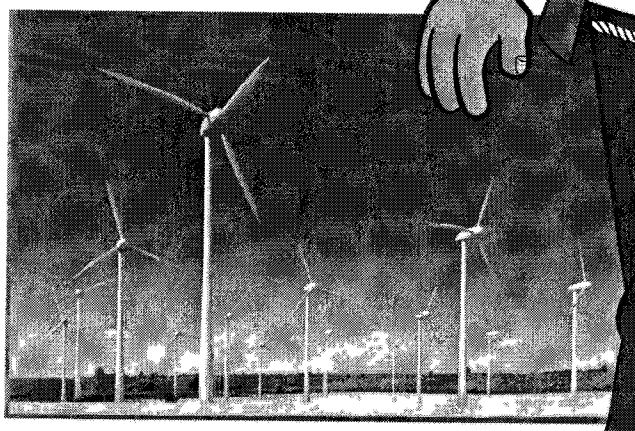


Solar power plant

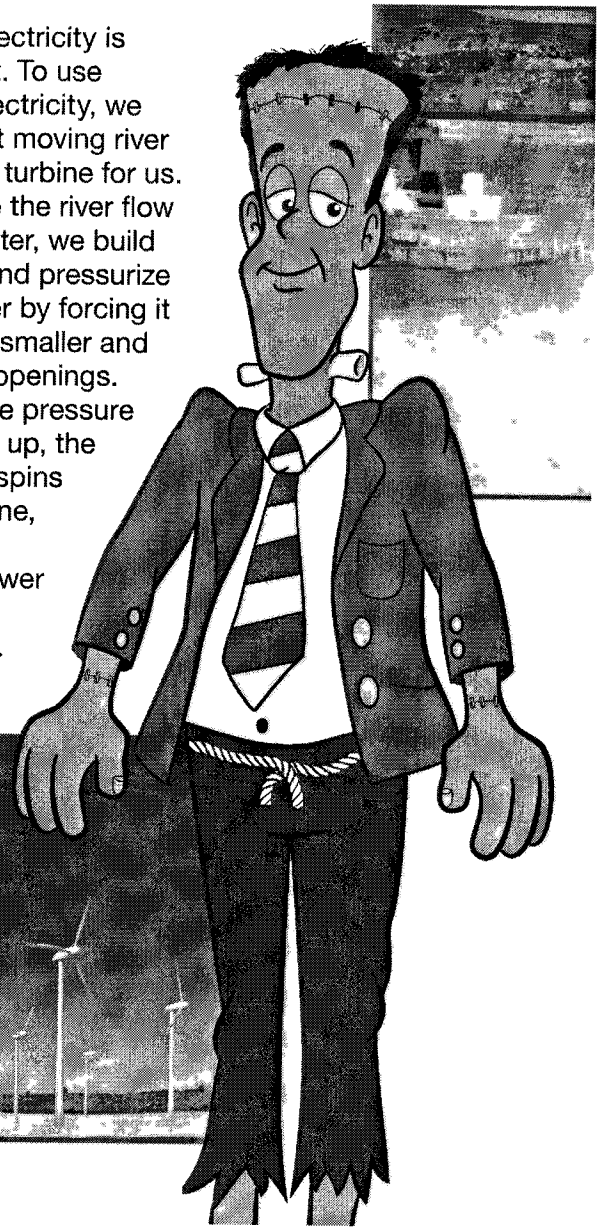
Solar energy is collected when the sun shines on specially treated silicon panels. What you may not know is that solar energy doesn't use heat. When the sunlight hits this special material, electrons in the atoms move around so fast that they create an electric current that we can then use to power our homes, schools and shopping malls.

Wind turbines work like the turbine in a power plant. As the wind blows the turbine, it spins a magnet inside a field of copper coils, creating electricity. In really windy areas, we can place many of these turbines, creating what's called a "wind farm." One gust of wind can spin 10, 20 or even up to 50 turbines at the same time, creating tons of electricity.

Hydroelectricity is different. To use hydroelectricity, we let a fast moving river spin the turbine for us. To make the river flow even faster, we build a dam and pressurize the water by forcing it through smaller and smaller openings. The more pressure we build up, the faster it spins the turbine, and the more power we can produce.



Wind farm



Resources?

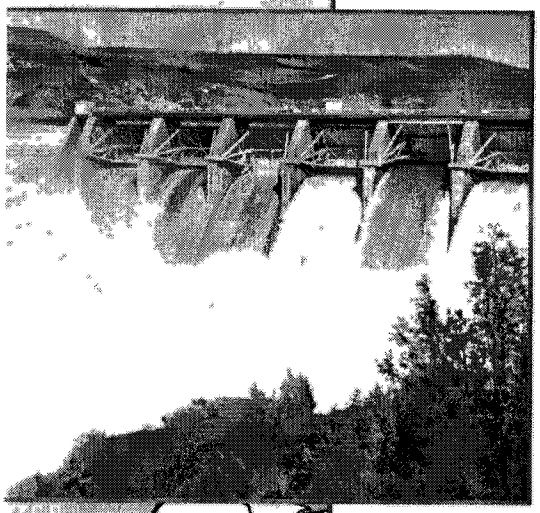
Renewable Facts:

Wind power accounts for 23% of electricity use in Denmark, 6% in Germany and approximately 8% in Spain.

Hydroelectricity is so common in Canada that the term "hydro" is slang for all electricity, regardless of how it's made.

Solar energy has been used for centuries and has come into widespread use where other power supplies are absent, such as in remote locations and in space.

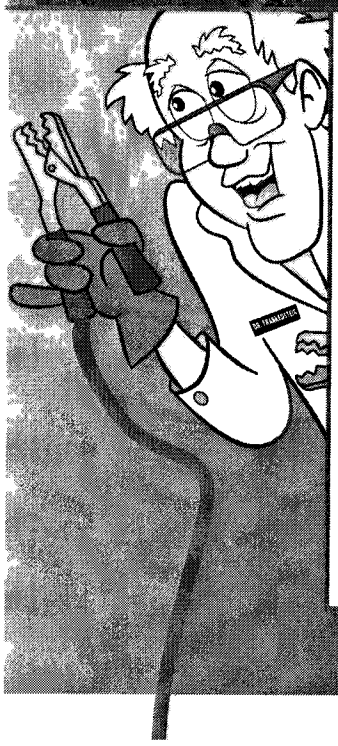
Hydroelectric dam



A recent concern is **global dimming**, an effect of pollution that is allowing less sunlight to reach the Earth's surface. It is closely linked with pollution and global warming and it is of concern to users of solar power.

Geothermal-generated electricity was first produced in Larderello, Italy in 1903. Since then, the use of geothermal energy for electricity has grown worldwide to about 8,000 megawatts.

Hydroelectric power supplies 20% of the world's electricity. Norway produces virtually all of its electricity from hydro, while Iceland produces 83% and Austria produces 67%.



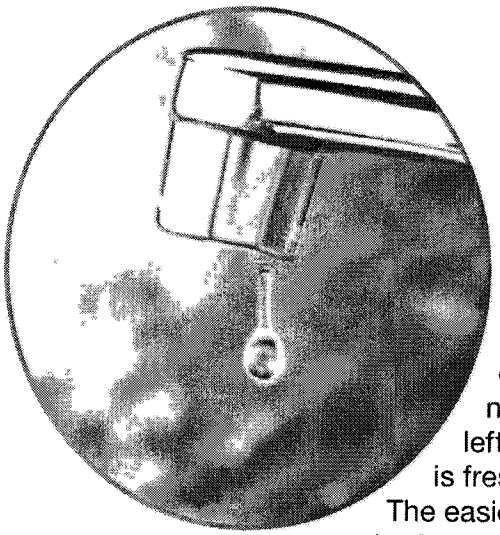
A **solar box cooker** traps the Sun's energy in an insulated box. Such boxes have been successfully used for cooking, pasteurization and fruit canning.

Wind generators are practical where the average wind speed is 10 mph or greater. Sea shores tend to be good sites for turbine installation because a primary source of wind is the changing air pressure when sea air hits the air over the land. Unlike many other types of electricity generation, wind is not **dispatchable**—it generally cannot be turned on or off at will.

Dry steam geothermal plants take steam out of fractures in the ground and use it to directly drive a turbine that spins a generator.

Harnessing the tides in a bay or estuary has been achieved in France, Canada and Russia. The trapped water can be used to turn turbines as it is released through the tidal barrage in either direction.

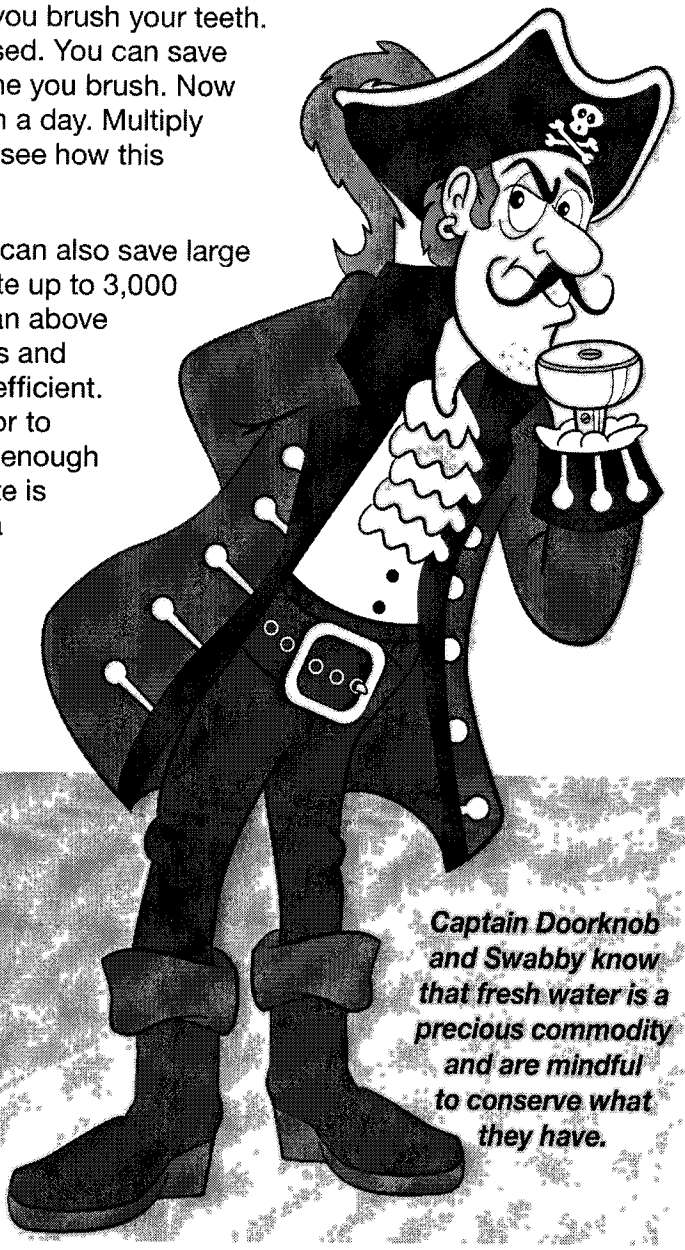
How can We



Conserving water is important for two reasons. First, in order to create hydroelectricity, we need the rivers flowing at their fastest. Being wasteful lowers the water level of the rivers, making it more and more difficult to produce electricity. The second reason we need to conserve water is because there's not a lot of it left on the planet. Only 1% of all the water on the planet is fresh water available for us to use. That's not a lot.

The easiest thing you can do to conserve water is to turn the faucet off when you brush your teeth. That water is just going down the drain, unused. You can save anywhere from 1-3 gallons of water every time you brush. Now multiply that by how many times you brush in a day. Multiply that by all the people in your family. You can see how this simple tip can multiply.

Getting leaky faucets or running toilets fixed can also save large amounts of water. One leaky faucet can waste up to 3,000 gallons of water a year. That's enough to fill an above ground swimming pool. Taking short showers and shallow baths can also help keep you water efficient. There's no need to fill the tub all the way up or to stand in the shower for 20 minutes. Just use enough water to get clean. A lot of the water we waste is wasted outdoors. Make sure your hose has a shut-off nozzle so it doesn't run on and on. Use a broom to sweep the sidewalk instead of the hose. When washing your bike or the family car, you can use a bucket of soapy water. That will get it just as clean as the hose and use a lot less water.

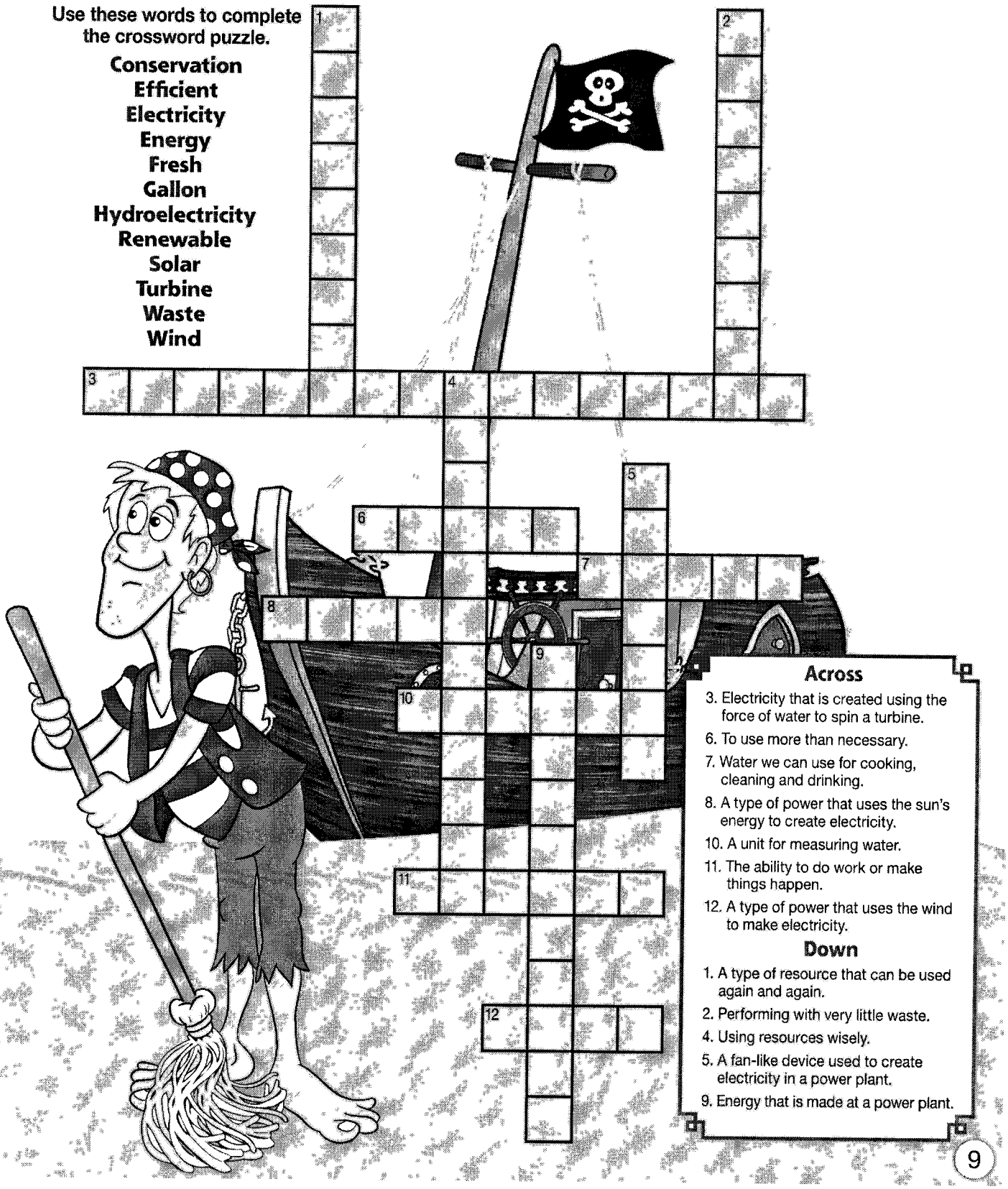


Captain Doorknob and Swabby know that fresh water is a precious commodity and are mindful to conserve what they have.

Conserve Water?

Use these words to complete the crossword puzzle.

Conservation
Efficient
Electricity
Energy
Fresh
Gallon
Hydroelectricity
Renewable
Solar
Turbine
Waste
Wind

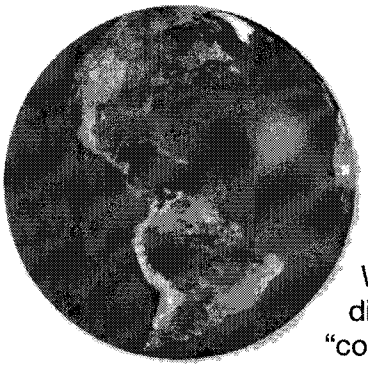


Across

3. Electricity that is created using the force of water to spin a turbine.
6. To use more than necessary.
7. Water we can use for cooking, cleaning and drinking.
8. A type of power that uses the sun's energy to create electricity.
10. A unit for measuring water.
11. The ability to do work or make things happen.
12. A type of power that uses the wind to make electricity.

Down

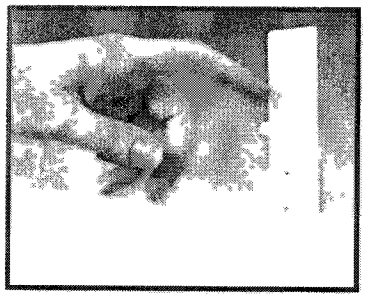
1. A type of resource that can be used again and again.
2. Performing with very little waste.
4. Using resources wisely.
5. A fan-like device used to create electricity in a power plant.
9. Energy that is made at a power plant.



What is Energy

What's the difference between "conservation" and "energy efficiency"? Conservation means saving something to use immediately. Efficiency refers to creating habits that use less energy in the first place. We all need to be energy efficient so that power plants don't have to use as many resources to make electricity. I know what you're thinking. "I'm just a middle school student. What could I possibly do?" The answer? Plenty. Just remember the motto, Every Little Bit Helps. Every bit of energy you save is energy that you or someone else can use in the future.

Turn it Off!



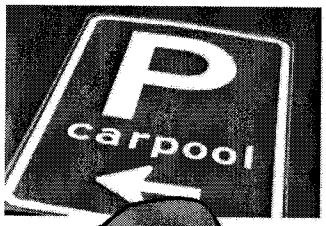
Turn off lights and appliances when you leave the room. If you have all your devices plugged into a power strip, just click the power strip off before you go to bed. Even when they're off, some of those plugged in appliances use (and waste) energy. The same goes for phone and battery chargers. If they're not plugged into your phone, they could still be wasting energy without you knowing it. By unplugging phone chargers when you're not using them, you're saving electricity.

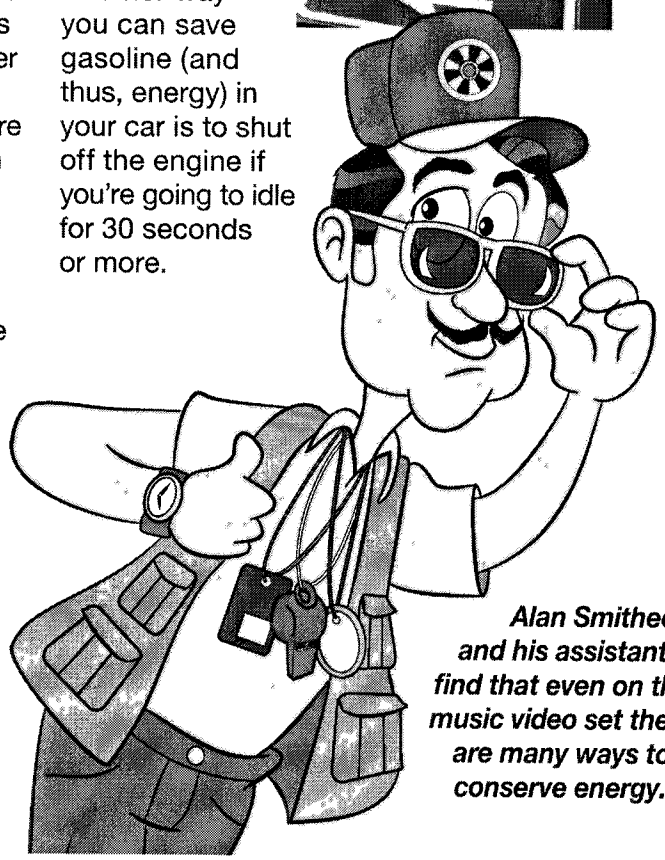
Switch it Out

Switching from regular light bulbs to compact fluorescent light bulbs (CFLs) can cut your energy usage by 25%. A regular light bulb uses four times the energy of a CFL. That's like having 4 TVs on, but only watching one of them.

Find a Friend

Carpooling is a great way to save energy. Gasoline is made from oil, which is a non-renewable resource. So if you and a friend are going to the same football game, movie or store, ride together. Another way you can save gasoline (and thus, energy) in your car is to shut off the engine if you're going to idle for 30 seconds or more.





Alan Smithee and his assistant find that even on the music video set there are many ways to conserve energy.

Efficiency?

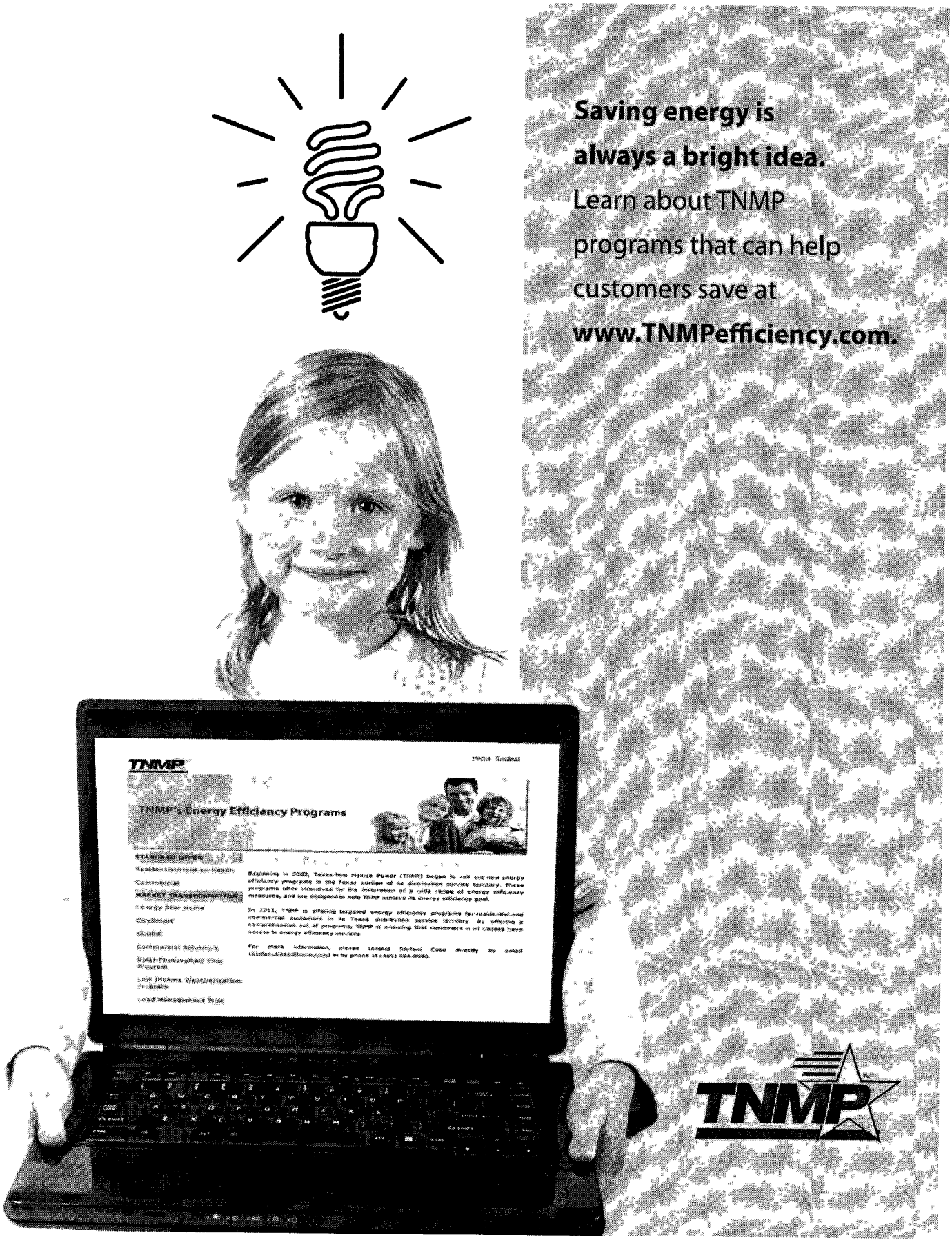
Bring a Bag

Both paper and plastic bags are created in factories using large amounts of energy. You can do your part by bringing your backpack or school bag to the store. We're not suggesting cramming a week's worth of groceries into your backpack, but if you're only buying one or two things, use your bag instead of theirs. Fact: Plastic bags are made from petroleum, or in other words, oil. To make 14 plastic bags, you'd need the same amount of oil that it would take to drive a car one mile.

Conservation Challenge:

Challenge yourself to conserve as much energy as you can in one week. Keep a log of your energy saving activities. Below are some examples of how you can start saving energy:

- Switching to a low-flow showerhead doesn't just save water, it saves energy too. If you use less water, your water heater will have to heat less water.
- Make sure to close the refrigerator door after you are done getting something or putting something away. Just like with lights, electricity makes the refrigerator work. So keep the door closed to keep the cool air trapped inside. The more you let in warm air, the more electricity you need to cool it down again.
- Ask your parents to install a programmable thermostat. A programmable thermostat automatically adjusts the heat and air conditioning so they don't run all day when nobody's home, but still have the temperature just right by the time you get home from school.
- Do you recycle your cans, bottles and paper at home? Try to recycle all the cans, bottles and paper that you use.
- Try to ride a bike or walk when you are going somewhere close by instead of driving in a car with your family. Taking the bus or train is fun, too!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