



Energy Knockdown

Materials Needed

- 10 Soda cans
- Ball
- Knockdown graphics sheets
- Masking tape
- Knockdown questions

Energy Knockdown Team Play

Each team tries to knock down two cans representing nonrenewable energy sources, renewable energy sources, or energy efficiency topics. After the cans are knocked down, the team tries to answer related questions.

Get Ready

1. Decide if you will focus on energy sources or energy efficiency.
2. Make copies of the enclosed graphics for your topic choice (pages 56-65), color each, and cut them out. Cover ten soda cans with the patterns.
3. Get a ball (such as a foam ball or a wad of aluminum foil) that will not bounce or damage the cans.

Get Set

1. On a table, arrange the cans in a row so they are equally spaced. The cans should fall over easily. Place a piece of tape on the floor 8 to 10 feet from the table—this is where the pitcher will stand. Five team members, one at a time, will each get four chances to knock down two renewable, two nonrenewable, or two energy efficiency cans. After the cans are knocked down, the team is asked a corresponding question. If the team answers correctly, it gets an energy buck.
2. Keep playing until each team member has had a chance to knock down the cans. If two cans are not knocked down after four chances, no question is asked and another team member tries his/her luck.
3. Select your questions for each category. The grade level of the teams playing the game determines the difficulty of the questions you choose. The more difficult questions are at the top of the *Knockdown Questions and Answers* (pages 53-55), and the easier ones are at the bottom.

Go!

Give these instructions to the carnival team:

1. Each team member will have four chances to knock down two renewable energy source cans, two nonrenewable energy source cans, or two energy efficiency cans. Two cans (renewable or nonrenewable) can be knocked down at once.
2. After you knock down two cans, I will ask you a corresponding question. If you answer correctly, you will receive one energy buck. If not, I will give you the answer and we will move on. If a team member does not knock down two cans after four chances, no question will be asked and another team member will try his/her luck. You will repeat the entire process a total of five times. Each time we will let a different team member throw the ball.
3. This is where you should stand when you throw the ball. Are there any questions? Who would like to be first to throw the ball at the cans? Who will be the spokesperson for the team?

Energy Knockdown Individual Play

Each player tries to knock down renewable energy source cans, nonrenewable energy source cans, or energy efficiency cans and answer five related questions.

Get Ready

1. Decide if you will focus on energy sources or energy efficiency.
2. Make copies of the enclosed graphics for your topic of choice (pages 56-65) on colored paper and cut them out. Cover ten soda cans with the patterns.
3. Get a ball (such as a foam ball or a wad of aluminum foil) that will not bounce or damage the cans.
4. Collect each player's *Energy Knockdown* coupon.

Get Set

1. On a table, arrange the cans in a row so they are equally spaced. The cans should fall over easily. Place a piece of tape on the floor 8 to 10 feet from the table—this is where the player will stand. Each player will get five chances to knock down as many energy source cans as possible. For example, if the player knocks down one renewable and two nonrenewable energy source cans, he/she is asked one renewable and two nonrenewable energy source questions. If the player is playing with the efficiency cans, select a question related to the knocked down can. For each question answered correctly, the player gets one energy buck.
2. Keep playing until the player has had five opportunities to knock down the cans. After all five attempts have been made, ask the player the appropriate number of questions.
3. Select your questions for each category. The player's grade level should determine the difficulty of the questions you choose. The more difficult questions are at the top of the *Knockdown Questions and Answers* (pages 53-55), and the easier ones are at the bottom.

Go!

Give these instructions to the player:

1. You will have five chances to knock down five cans.
2. After five throws, I will ask you one question for each can you have knocked down. If you answer correctly, you will receive one energy buck. If not, I will give you the answer and we will move on.
3. This is where you should stand when you throw the ball. Are there any questions?

Knockdown Questions and Answers

Renewable Sources

Wind, Biomass, Solar, Geothermal, Hydropower

- 1. Name the biological process that can convert agricultural products and waste into alcohol and carbon dioxide.**
Fermentation
- 2. Name the renewable energy source that is produced by uneven heating of the Earth's surface.**
Wind
- 3. Name one method of using the energy stored in biomass.**
 - a. Combustion (burning)*
 - b. Convert it into alcohol (ethanol)*
 - c. Convert it into a gas (methane)*
- 4. When sunlight hits a photovoltaic cell (solar cell), it produces what type of usable energy?**
Electrical energy (Twenty to twenty-five percent of the sunlight is changed into electricity, and the rest is changed into heat.)
- 5. What percent of the nation's energy is supplied by renewable sources of energy (plus or minus 3 percent)?**
11.4 percent (accept 8 to 14 percent)
- 6. To best use solar energy for home heating, large windows or solar panels should be facing what compass direction?**
South
- 7. Which renewable energy source provides the U.S. with 5-10 percent of its electricity?**
Hydropower
- 8. In times of drought, which energy source would experience a drop in production?**
Hydropower
- 9. Name one use of solar energy in the home.**
 - a. Hot water heating*
 - b. Space heating and cooling*
 - c. Cooking*
 - d. Clothes drying*
 - e. Electricity from photovoltaic cells*
- 10. Name the term used to describe the heat energy from the Earth.**
Geothermal
- 11. What machine is used to convert wind energy into electricity?**
Wind turbine

Nonrenewable Sources

Petroleum, Coal, Uranium, Propane, Natural Gas

- 1. What type of alcohol fuel can be produced from coal and natural gas?**
Methanol
- 2. What is the major air pollutant found in coal?**
Sulfur (less than one percent in Western coal and three percent in Eastern)
- 3. What two chemical elements are the major components of fossil fuels?**
Hydrogen and carbon
- 4. Plus or minus 10 percent, how much of the petroleum we use in the U.S. do we import today?**
40 percent (accept 30 to 50 percent)
- 5. Plus or minus five percent, what percentage of energy consumed in the United States is supplied by nonrenewable sources?**
88.4 percent (accept 83 to 93 percent)
- 6. Ninety percent of raw natural gas is composed of what gas?**
Methane (One carbon and four hydrogen atoms—CH₄)
- 7. Almost half the petroleum used in the U.S. is refined into what transportation fuel?**
Gasoline
- 8. Which fossil fuel is most abundant in the U.S.?**
Coal
- 9. What is the major use of coal in the U.S.?**
Production of electricity (91 percent of all coal consumed)
- 10. What is the major method for transporting natural gas to homes and factories?**
Pipeline
- 11. What is the cleanest fossil fuel to burn for energy?**
Natural Gas/Propane
- 12. Name three fossil fuels.**
 - a. Coal*
 - b. Petroleum*
 - c. Natural gas*
 - d. Propane*

Knockdown Questions and Answers

Energy Efficiency

LED

1. **What does LED Stand for?**
Light-emitting Diode
2. **How much energy can an LED save compared to an incandescent bulb (plus or minus 5%)?**
80% (accept 75 to 85%)
3. **How much longer can LED bulbs last compared to an incandescent light bulb?**
25 times longer

Water Heater

1. **Water heating is one of the largest energy expenses in your home. Name one way to save energy while using hot water.**
Turn down the thermostat on the water heater, take shorter showers, use a low-flow shower head or aerator on the faucet
2. **How can you reduce the amount of water you use while washing dishes?**
Fill the sink rather than letting the water run
3. **What renewable resource works well for water heating?**
Solar

Transportation

1. **What is one way you can save energy getting from one place to another?**
Carpooling, riding a bike, walking, taking public transportation
2. **What does MPG stand for?**
Miles per gallon
3. **What is one way you can increase your MPGs when driving?**
Obey the speed limit, properly inflate tires, reduce junk in the trunk, get oil changes regularly, maintain consistent speed

Thermostat

1. **What should you do with your thermostat to save energy on heating and cooling?**
Use a programmable thermostat; turn your thermostat down in winter/up in summer
2. **How can opening and closing the blinds help save on heating and cooling?**
Using day lighting can help bring in/trap warm sunlight in winter, closing the blinds can help keep a space cool in summer
3. **Which renewable source of energy can be used to pump cooler or warmer air through your home using a heat exchanger?**
Geothermal

Appliances and Machines

1. **Which kitchen appliance uses the most electricity?**
Refrigerator
2. **What are ENERGY STAR® products known for?**
Energy efficiency, saving money
3. **What is a phantom load?**
Energy usage that is being drawn when the item is not in active use

Electricity

1. **What is the average residential cost of a kilowatt-hour in the United States?**
12.9 (13) cents
2. **Name a time during the day that energy use is in its peak.**
Afternoon (12-6 PM)
3. **Name one of the top three resources used to generate U.S. electricity.**
Natural gas, coal, uranium

Building Envelope

- 1. What is the material that helps to seal our homes so that warm or cool air doesn't escape?**
Insulation
- 2. R-value describes the thickness of insulation needed. If you live in a cold climate you will have a _____ R-value than a warm climate.**
Higher
- 3. What is an example of a place heat loss might occur in a home?**
Attics, vents, doors, windows, outlets, chimneys

Lighting

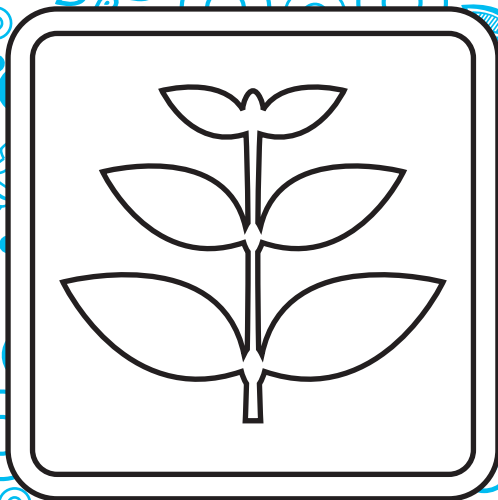
- 1. What percentage of a typical energy bill is due to lighting the home (plus or minus 3 percent)?**
8 percent (accept 5 to 11 percent)
- 2. What is the most energy efficient light bulb type you can buy?**
LED, light emitting diode
- 3. What is the unit for measuring light output from a light bulb?**
Lumens

Recycling

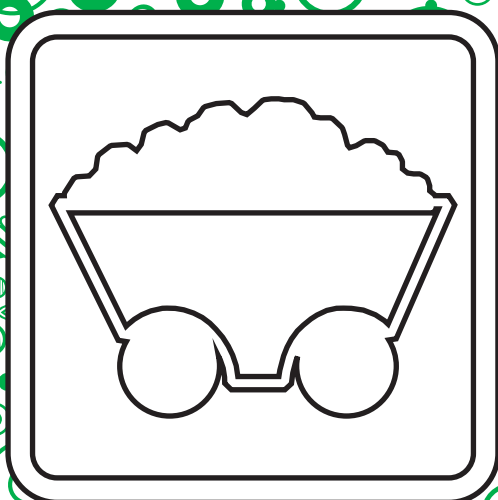
- 1. Name the four common types of recyclable materials most people recycle.**
Glass, plastic, metal, and paper
- 2. Name one benefit to recycling.**
Saves natural resources, reduces air pollution, reduces water pollution, creates jobs, uses less energy
- 3. What is the difference between open and closed loop recycling?**
Open loop recycling – recycled materials are made into something different than the original item
Closed loop recycling – recycled materials are made into the same item again

Resources

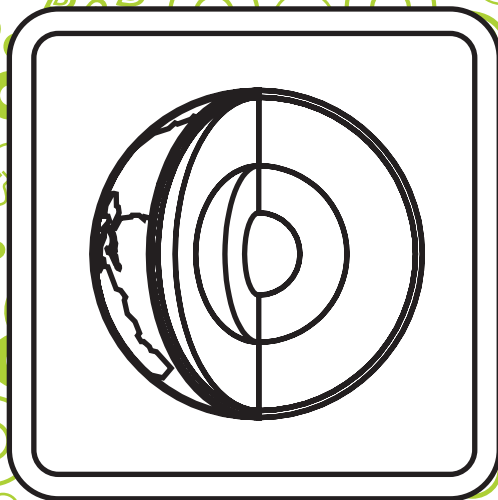
- 1. Name two renewable resources.**
Solar, wind, hydropower, geothermal, biomass
- 2. Name two nonrenewable resources.**
Coal, petroleum, uranium, natural gas, propane
- 3. What percentage of U.S. energy comes from renewable resources (plus or minus 3 percent)?**
11.4 percent (accept 8 to 14%)



BIOMASS
ENERGY *Knockdown*



COAL
ENERGY *Knockdown*



GEOHERMAL

ENERGY *Knockdown*



HYDROPOWER

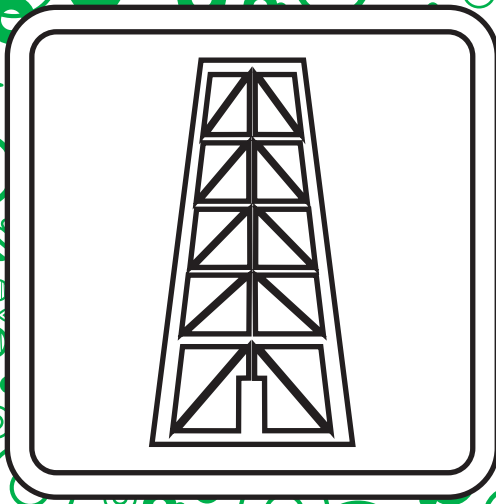
ENERGY *Knockdown*



NATURAL GAS
ENERGY *Knockdown*

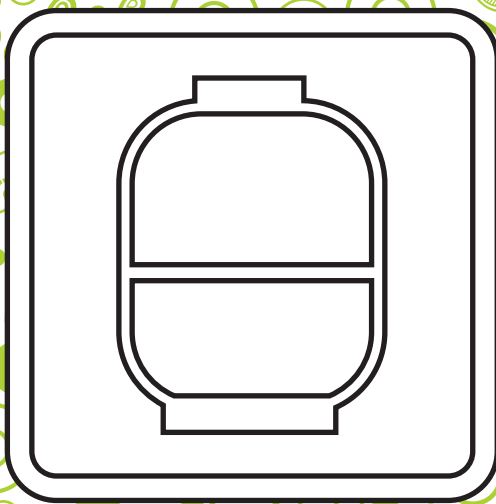


URANIUM
ENERGY *Knockdown*



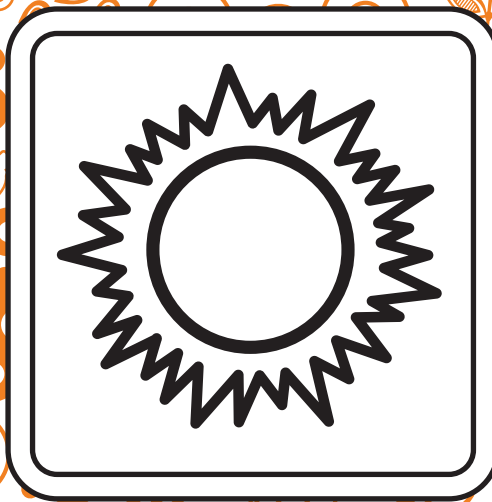
PETROLEUM

ENERGY *Knockdown*

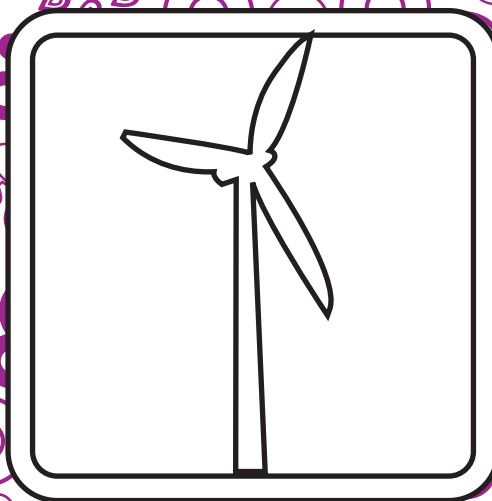


PROPANE

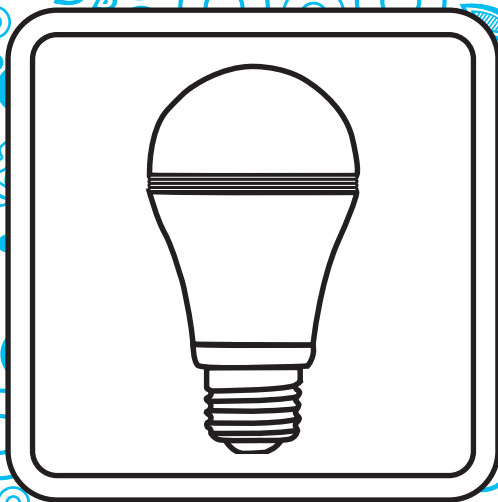
ENERGY *Knockdown*



SOLAR
ENERGY *Knockdown*



WIND
ENERGY *Knockdown*



LED
ENERGY EFFICIENCY *Knockdown*

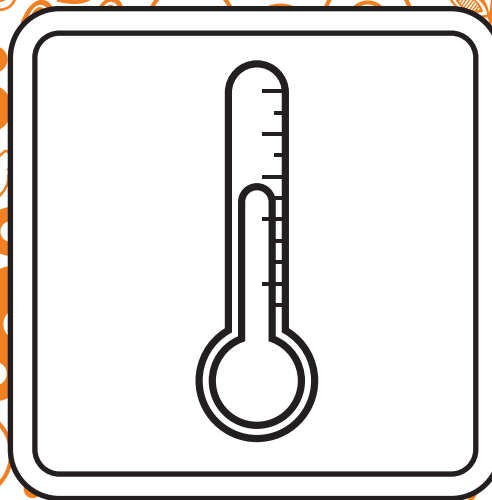


WATER HEATER
ENERGY EFFICIENCY *Knockdown*



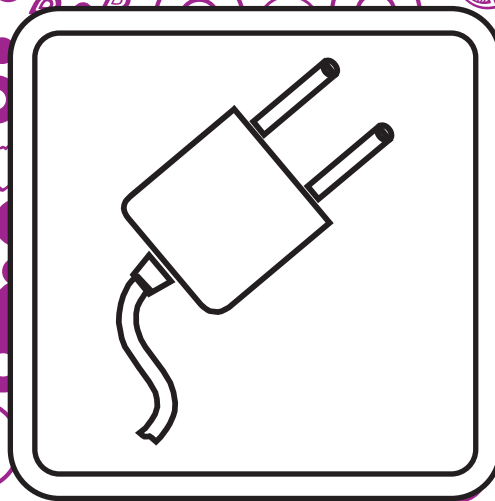
TRANSPORTATION

ENERGY EFFICIENCY *Knockdown*



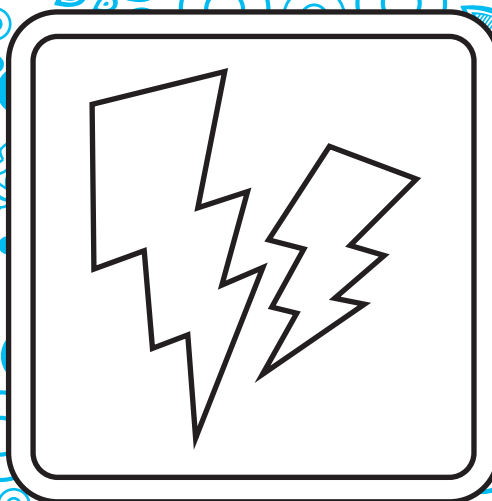
THERMOSTAT

ENERGY EFFICIENCY *Knockdown*



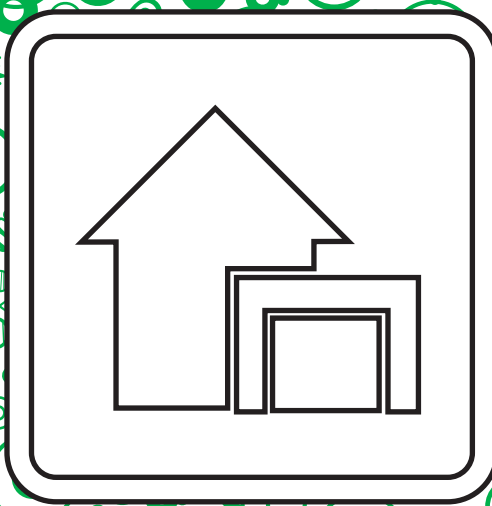
APPLIANCES AND MACHINES

ENERGY EFFICIENCY *Knockdown*



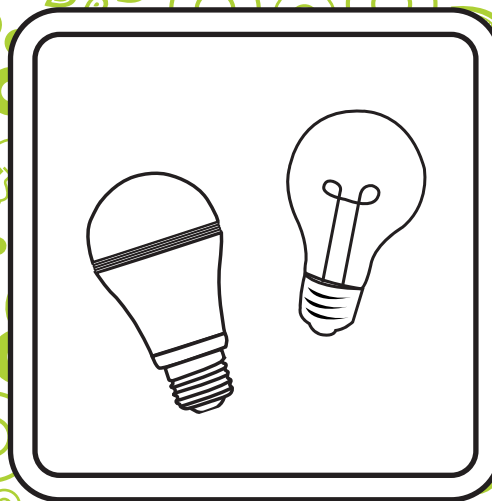
ELECTRICITY

ENERGY EFFICIENCY *Knockdown*



BUILDING ENVELOPE

ENERGY EFFICIENCY *Knockdown*



LIGHTING

ENERGY EFFICIENCY *Knockdown*



RECYCLING

ENERGY EFFICIENCY *Knockdown*



RESOURCES

ENERGY EFFICIENCY *Knockdown*
