

# The Energy Zone

YOUR POWER STATION FOR CONSERVATION AND SAFETY

ARE YOU READY TO  
ENTER THE ZONE?



[alliantenergykids.com](http://alliantenergykids.com)



# WELCOME TO THE ENERGY ZONE

This magazine was created to help you understand important concepts about energy and how to use it safely and wisely. We hope you enjoy it and will share what you learn with your whole family!

For more information about energy and safety and for fun online games, be sure to visit [alliantenergykids.com](http://alliantenergykids.com).

## PSST... STUFF TO TEACH YOUR PARENTS

If you use desk lamps instead of overhead lights, you'll use less energy — especially if they have LED bulbs!



## KNOW WHAT? NO, WHAT?

This edition of "Know What? No, What?" focuses on energy. It's what gives your muscles the strength to pedal a bike. It's what powers a car and heats a home. Without it, none of those electronic gadgets in our lives would work. Energy. It fuels everything!

### BUT WHAT IS ENERGY, EXACTLY?

The basic definition of energy is the ability to do work — even if we can't really tell that any "work" is going on because sometimes it's all happening at a microscopic level.

### OKAY, SO ... WHAT FORMS DOES ENERGY COME IN?

Energy comes in many different forms; heat, light, motion, **electrical, nuclear, and chemical** are just a few. Often, when energy acts within any of these forms, that's when we're able to observe and experience energy. Turning on the lights. Feeling the warmth of a fire. Getting hit in the gut with a soccer ball!

### WHERE DOES ENERGY COME FROM?

The sun is our biggest source of energy. It helps plants make food. It also drives the water cycle. Without the sun's energy, we would not be able to live here. It can also provide energy directly to us in the form of **solar energy**. Have you seen **solar panels** on rooftops? They mean that the sun is providing some electricity or perhaps some heat for that building.

### SINCE FOOD PROVIDES FUEL FOR OUR BODIES, THE SUN GIVES US ENERGY EVEN IF WE DON'T HAVE SOLAR PANELS, RIGHT?

That's right. In fact, food is a great example of **potential energy** — one of the two main categories of energy. It's considered potential energy because it's stored energy that can be used later. When we eat, our bodies break down the energy that's stored in food, so those calories are potential energy. The stored energy in batteries is another good example of potential energy.

### WHAT'S THE OTHER CATEGORY OF ENERGY?

**Kinetic energy** is the other category of energy. It's the energy of motion. The motion of millions of gallons of water moving through a dam produces energy. (Sometimes that energy is captured and produces **hydropower**.) Kinetic energy is also the movement of an **electron** from one **atom** to another. In fact, this movement is the flow of electricity.

CONTINUED ON PAGE 10

## FUN FACT

### TRUE OR FALSE

OPENING THE OVEN DOOR TO SEE IF THE FOOD INSIDE IS READY WILL OFTEN LOWER THE TEMPERATURE IN THE OVEN BY 25°, WHICH THEN REQUIRES EXTRA ENERGY TO BRING THE TEMPERATURE BACK UP.

When you're baking something in the oven (Cookies! Pizza!), it's hard to resist checking on them. After all, you don't want anything to burn! But taking a peek will lower the temperature inside the oven by 25°. So it's a TRUE statement. Use the oven light and set a timer to avoid wasting energy!

### CAN YOU CAPTION IT?



Photo by StateFarm

What do you see? What jumps out?  
What will your caption communicate?

# SO ... WHY CONSERVE?

MEET DOUG KOPP AND LEARN ABOUT CONSERVATION



Doug Kopp and his grandsons

Maybe *you* don't need convincing that conserving energy is a good idea. You already know that it's good for the environment and good for the wallet. Still, sometimes others don't see it the way you do. Maybe, just maybe, you can help educate them on energy conservation! And to help us all understand why energy conservation is so important, we've asked Doug Kopp, President of Alliant Energy's Iowa utility, to share some insights on conservation.

## FUN FACT

### TRUE OR FALSE

IF A PHONE IS PLUGGED INTO A CHARGER AND IS COMPLETELY CHARGED, IT DOES NOT USE ANY POWER FROM THE OUTLET.

It seems like a fully-charged phone or tablet has no reason to draw energy from an outlet. But that's **FALSE!** Even a charger that's not charging anything draws power. Typically, phones and tablets need only a couple of hours to charge, so don't leave them charging overnight. And unplug those chargers when they're not in use!



**Q** DOUG, LET'S START WITH A BASIC QUESTION. WHY IS IT IMPORTANT TO ALLIANT ENERGY FOR CUSTOMERS TO CONSERVE ENERGY?

**A** Well, wasting energy wastes money for everyone! That's money you and your family can save for other things like food, clothes, video games or even college. And when our customers don't conserve energy, Alliant Energy has to generate more electricity. Plus, the number of electronic gadgets and appliances in many homes continues to increase. They all need power.

So when we look ahead to the future and figure out how best to meet the growing need for power, we want people to conserve. The alternative is building additional power plants, which can cost around ... \$1 *billion* each. (That's billion with a "B"!) If we all conserve energy, Alliant Energy may be able to wait longer to build new power plants or maybe some new plants won't be needed at all.



**Q** WHAT ABOUT THE ENVIRONMENT?

**A** That's another *really* important reason to conserve. Right now, most of the power that we generate relies on **non-renewable resources** like coal and natural gas. This means there is a limited supply, so we want that supply to last as long as it can. The more that people conserve today means that more of those resources will be available in the future. We want to reduce the impact of mining and burning non-renewable resources. And whether it's mining the coal or extracting natural gas or burning those fuels, it strains the environment. Alliant Energy has been applying new technology to help make the process less harmful, but it's still really important to reduce the need for using non-renewable resources in the first place.



**Q** WHAT ABOUT RENEWABLE RESOURCES?

**A** Utilizing more **renewable resources** like solar and wind is really exciting! Alliant Energy is not alone in providing more power that comes from renewables. And as technology improves for using renewables to generate power, that trend will continue. Plus, improved technology has a way of driving down costs! However, regardless of the source of the power, it is still vital to conserve energy.

## DOUG'S TOP 5 WAYS TO SAVE ENERGY

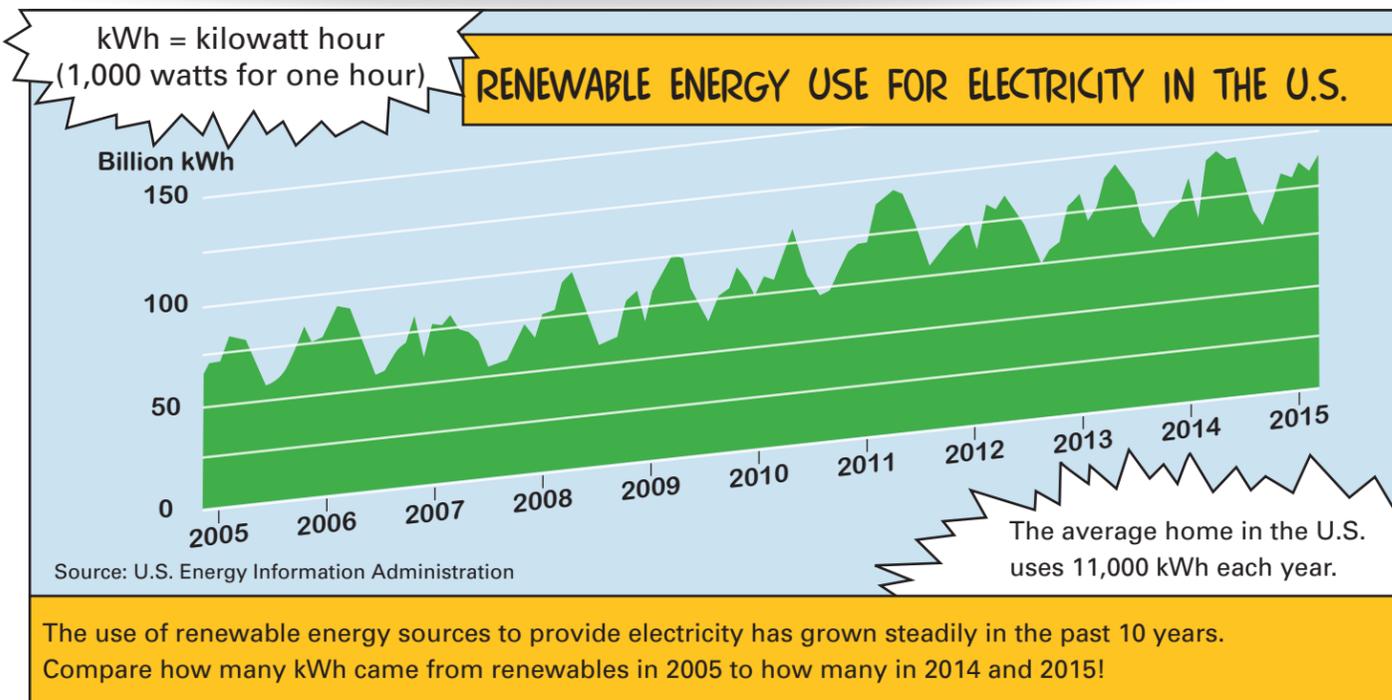
1. Turn off lights, TVs, computers and gaming systems when you're not using them.
2. Turn on *only* those lights that you need. Don't turn on every light in the room! (Usually lighting accounts for 15% of your family's utility bill.)
3. Don't leave the fridge door open as you think about what you want. Instead, decide ahead of time, or take a quick peek, close the door and then decide.
4. Take short showers instead of baths. Heating the water takes energy. And a short shower takes less water than a bath.
5. Always turn off faucets completely. Tell an adult if you notice any leaks.

### BONUS TIP

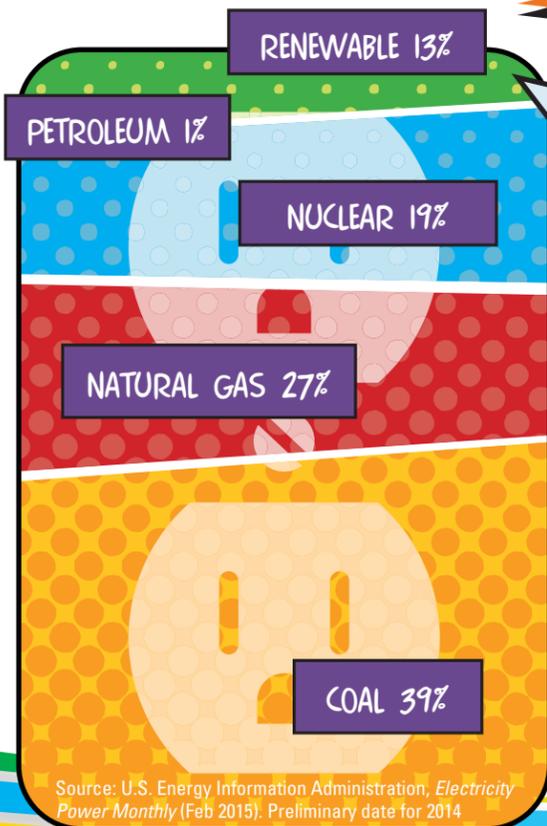
Talk to your parents about switching light bulbs to **LED** bulbs. They may be a little more expensive at first, but they last a looooooong time compared to other light bulbs!

# GENERATING A BRIGHT FUTURE FOR RENEWABLES

# Connect the consequences!



## SOURCES OF U.S. ELECTRICITY GENERATION, 2014



THE USE OF HYDROPOWER HAS NOT GROWN MUCH IN THE PAST 10 YEARS. THE BIGGEST INCREASES IN RENEWABLE USE HAVE BEEN WIND AND SOLAR.

- 48% Hydro:** electricity created using energy that comes from moving water
- 34% Wind:** energy that comes from the power of moving air
- 8% Biomass (wood):** energy that comes from burning wood/plant products
- 4% Biomass (waste):** energy that comes from processing garbage and other waste
- 3% Geothermal:** electricity created from using heat, hot water, or steam that comes from within the Earth
- 3% Solar:** energy that comes from the sun's rays

Renewable energy sources still represent a relatively small percentage of electricity generation in the U.S.

Source: U.S. Energy Information Administration, *Electricity Power Monthly* (Feb 2015). Preliminary date for 2014

*Don't do this. Don't do that.* Sometimes it seems like it's just a world full of things you can't do. Still, there are situations and consequences that you must take seriously — especially when it comes to electric and gas safety. That's because the consequences of a mistake can be very serious.

We don't want you to make those mistakes! So we've put together a list of things you **SHOULD NOT DO**. Ever. We've also created a list of potential consequences that can result from those bad decisions. We want you to try to connect each bad decision to its consequences. Any of the actions might have more than one bad consequence. And also keep in mind that each consequence might connect to many different actions.

## CONSEQUENCES TO CONSIDER



A) Shock



B) Electrocutation



C) Electrical Fire



D) Explosion



E) Injury

## THINGS YOU SHOULD NOT DO ... EVER!

- 1. Overload an outlet or extension cord:** Like outlets, extension cords are designed to handle a certain number of plugs. Keep plugs limited to that number. Potential consequences?
- 2. Touch an overhead wire:** Sometimes, things get stuck on an overhead wire. If that happens, leave it alone, or contact Alliant Energy to let us know. Potential consequences?
- 3. Touch a downed, exposed wire:** A storm might cause an overhead wire to break and come down to the ground. If you see this, stay away and contact Alliant Energy. Potential consequences?
- 4. Enter the restricted area of a substation:** The *Do Not Enter* signs and the large fences should be enough, but there's never any reason to go near a substation. Potential consequences?
- 5. Ignore the rotten egg smell of leaking gas:** Alliant Energy gives natural gas a smell (like rotten eggs!), so you will be more likely to detect a gas leak. If you smell it, immediately leave the area and call Alliant Energy. Potential consequences?
- 6. Stick a foreign object in an outlet:** What are you, a toddler who doesn't know any better? Stick only plugs into an outlet! Potential consequences?

# Decode for conservation

Acrostic puzzles use the first letters of each line to create a word or phrase. However, we have given this acrostic a twist. Instead of spelling out the phrase, we've jumbled up the order of the letters to challenge you to decode a secret phrase!

We've also made it all about energy conservation. Each line gives you a tip for using less electricity or natural gas. The coded message is also a good tip!

First, read each line. Then, try to figure out the secret phrase. We've filled in some of the letters to help you. You will also notice another hint in the colors!

**H**elp your parents save money on the utility bill by using less energy.

**S**top leaving tablets and phones connected to the charger when they're 100% charged.

**F**ree! That's how much the sun's heat is when you let it warm a home.

**R**educe air conditioner use by closing curtains during the day.

**I**nsulation in walls, floors and ceilings makes a home much more energy efficient.

**N**ote how often you open and close the refrigerator.

**L**ighting accounts for 15% of your average utility bill.

**T**ry to use the washing machine at night.

**E**NERGY STAR® certified appliances are great for conserving energy.

**I**nstall a programmable thermostat if possible!

**F**ill up the fridge! It uses energy more efficiently when it's full.

**T**ake time to unplug chargers when they're not in use.

**G**aps and cracks around windows make the heating system work harder than it should.

**I**n the spring and fall, open the windows on a nice day or night.

**O**n cold days, wear a sweatshirt when you're home.

**T**urn on the bathroom fan when you shower or take a bath.

**U**se desk lamps instead of overhead lights.

**L**et computers rest when they're not in use, by turning them off.

**M**ake sure to turn the water faucet all of the way off when you're done using it.

**S**witch lights to LEDs.

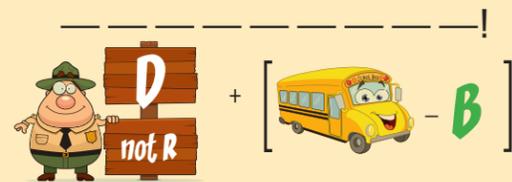
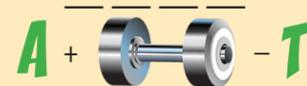
**P**lanting trees near a home will shade the home and help keep it cooler in the summer.

**S**et the thermostat at 78 in the summer and 68 in the winter.

l \_ ' \_ \_ \_ p \_ . \_ \_ u \_ \_ \_ f \_ \_ g \_ \_ !

## REBUS PUZZLE

A rebus puzzle uses letters, numbers and picture clues to represent words or sounds. See if you can figure out the puzzle below to uncover an important safety rule to remember.



## FUN FACT

### TRUE OR FALSE

FIRES CAUSED BY ELECTRICAL MALFUNCTIONS AND HEATERS ARE TWO OF THE TOP THREE MOST COMMON TYPES OF FIRES IN HOMES.

Cooking fires in the kitchen are the most common fires, but next on the list are heating and electrical fires. So it's TRUE. In fact, there are approximately 75,000 electrical and heating fires each year in the U.S.

## PSST...

STUFF TO TEACH YOUR PARENTS

Dishwashers, washing machines and dryers create heat, so you should try to run them at night when it's cooler outside. Plus, it's also good for the **power grid** since demand for electricity is lower at night!

# FUN FACT

## TRUE OR FALSE

NATURAL GAS NATURALLY HAS NO ODOR.

If you turn on a gas stove or gas grill, there's a smell that's kinda stinky, right? (Of course, that's assuming that you think the smell of rotten eggs is stinky!) In order to make it easier to detect gas leaks, Alliant Energy and other utilities add *mercaptan* to the gas to give it an odor. So it's TRUE that natural gas ordinarily has no odor.

### CONTINUED FROM PAGE 3 ELECTRICITY IS THE FLOW OF ELECTRONS?

It's true. Everything in our world is made up of teeny tiny atoms. (They're the building blocks of the entire universe.) And like planets orbiting the sun, an atom's electrons orbit its nucleus. Most electrons stay close to their home atom, but some can move from one atom to another, creating electricity. Electricity can exist naturally, such as when electrons jump from cloud to cloud and create lightning. The electricity in our homes comes from electrons flowing along a **circuit** and moving through a wire to provide power.

### BUT HOW DOES A GENERATING STATION GET ELECTRICITY TO OUR HOMES?

It starts with magnets. They do more than attract metal objects. Magnets can also push and pull electrons, causing them to flow. This is what happens in a **power generator**. There, a fuel

(such as coal) is burned to generate heat. The heat boils water, turning it into steam. The steam flows through a **turbine** that is like a giant fan. The turbine spins wire coils inside a generator, where there are powerful magnets. The magnetic field causes the electrons in the wire to flow. Voila! Electricity! Of course, it has to get to your home, so from the station the electricity travels via a **current** along power lines that are sometimes high overhead and sometimes buried underground.

### COAL ISN'T THE ONLY FUEL FOR A GENERATING STATION IS IT?

No, it's not. It's a **fossil fuel** — formed from the remains of plants and animals that lived a long time ago, even before dinosaurs tromped the Earth. Oil and natural gas are two other fossil fuels that are considered **non-renewable resources** because they can't be replaced in our lifetime. However, Alliant Energy and other power companies are using more and more **renewable** forms of fuel to generate electricity. Advances in technology have enabled power generators to capture energy from the sun's rays, the wind's flow, and the water's currents. There are even ways to utilize the energy from plant and animal waste (**biomass**) and from within the Earth itself (**geothermal**)! Not only do they tend to create less air pollution, they're renewables which means they can be replaced naturally.

# GLOSSARY

**811:** the number to call before digging in order to avoid natural gas pipes or underground wiring

**Atom:** atoms consist of a nucleus made of protons and neutrons, which are positively charged and surrounded by orbiting electrons [see definition] which are negatively charged

**Biomass:** a renewable resource [see definition] that comes from material made from plants and animals, such as wood, crops and even garbage

**Carbon dioxide (CO<sub>2</sub>):** it is a colorless, odorless gas that is present in the atmosphere, formed by the burning of fossil fuels [see definition] and other carbon-based fuels (such as wood); it also results from exhaling breath

**Chemical energy:** energy that is released during a chemical reaction, such as during an explosion, from the burning of wood, within a battery and from the mixing of baking soda and vinegar (often used to create a homemade volcano)

**Circuit:** the path that electrons [see definition] flow as an electric current [see definition] in a closed path, starting with a "source," which can be as small as a battery and as big as a power plant

**Conductor:** a material, such as metal or water, through which electricity can easily flow

**Current:** the flow of electrically charged particles within a conductor or circuit [see definitions]; can be alternating current (AC) or direct currents (DC)

**Electricity:** the flow of electrons [see definition] from one atom [see definition] to another, often created and directed to generate and provide power

**Electron:** a particle within an atom [see definition] that orbits the nucleus and carries a negative charge

**Energy:** the ability to organize or change matter (to do work)

**Energy Assessment:** a program where an energy expert inspects your home and suggests ways to save energy

**ENERGY STAR®:** a label given to a product or appliance that shows it meets tough government standards for energy efficiency

**Fossil fuel:** a source of fuel such as coal, oil and natural gas [see definition] that formed from the remains of ancient plants and animals buried underground

**Geothermal energy:** heat, hot water or steam from

within the Earth that is used to create electricity and used for heating and cooling

**Hydropower:** electricity created using energy that comes from moving water

**Kinetic energy:** the energy of motion

**LEDs:** stands for "light-emitting diode," these light bulbs are incredibly efficient and long lasting compared to other light bulbs because much more of their energy makes light and not heat

**Mercaptan:** the substance that utilities add to natural gas [see definition] to give it a bad smell similar to rotten eggs

**Natural gas:** a fossil fuel [see definition] that is a type of gas that forms in underground pockets near oil

**Non-renewable resources:** resources that cannot be replaced once they are used

**Nuclear energy:** energy stored in the nucleus of an atom [see definition] that is released by two atoms forming a new one (fusion), by an atom splitting into smaller atoms (fission) or by an atom losing some of its subatomic particles (radioactivity)

**Potential energy:** stored energy, such as the kind in food, coal and natural gas

**Power generator:** a device that creates electricity using an engine or a turbine [see definition]

**Power grid:** a network of poles and power lines that provide a path for electrical energy to flow across the country to homes everywhere

**Renewable resources:** energy sources that can be replaced naturally, such as sunlight, wind and moving water

**Solar energy:** energy that comes from the sun's rays that reach the Earth

**Solar panels:** devices that convert solar energy [see definition] into electricity

**Substation:** a hub for transmitting and distributing electricity, receiving electricity from a generating station or other substations and providing it to cities or neighborhoods

**Turbine:** a machine with blades or rotors that are turned by a force, such as wind, water or steam to create energy

**Watt:** a measure of the amount of work electricity does per second

**PSST . . .**  
STUFF TO TEACH  
YOUR PARENTS

Extension cords are not intended to be used permanently. Using them for too long increases the risk of electrical fire.

C S W A R M F F Y S Y K  
W J H C L O H P H W Z X Q L O P M D  
D L G E N E R G Y A S S E S S M E N T R R W H  
C W J N C Z C W I W K S O G E Q D X R I S E V N V G R  
X H C G B G A U L S B G E O T H E R M A L R S F A S F L J  
W I S N A G K G R O B Y M S L E Q F P E Q E L E C T R I C A L  
W Q Q X J P A N N R B G P Q C U R S E A B O D F Z M U N F O O I D  
M M A J D P W R K E M O U L H Z D A O C C K S C K T R V J N H P M Y  
C G M R U A L L I A N T E N E R G Y A Y P O W E R P L A N T S Z T D L  
X U W N G H I W J N T T T X D U R G I R A N H L A F J L Z S E C P N X  
T B X J S N A C M T D I O M V I U R B J P D D W D X R G B X R N I M D  
S G D Z E W N Q O X F T H E R M O S T A T U D F R K E A B E V E B J R  
H N P S U D C H A R G E L E E B E X S U L C R E G U N S I M A K P I Z  
F G E B U U E D F U L N P T J I F T I M T T R D Z H E T L P T L W C J  
F N F O S S I L F U E L S Q D X W I D K O M B K Z W O N F I P L D Z  
O E Y C W A L W D R E N W Q B G X M E R C A P T A N T D O E Q J  
B G E K O G K Y G O N O Y B V I T L Q K H T A B N O O N F V  
X E Z H D J I Y N O T D B R P S H O W E R K L Y F A N  
P J W P Y P S U B S T A T I O N T R B Z D E E D D  
U Z L O N T U H I H X U N L B B R O X A S Q I  
W C B A H G M A O W Z A P G G U V P D G  
Y V R I H E L E C T R I C I T Y G Y  
J G H L R N D B K A I J Q L W V  
P N N T F L H V Y S U S M E X Q  
J D C S W A R M F F Y S Y T J J  
G K G B U V X I E P G K G B U V  
X C W C W L Z Y G P X C W C W L  
Z A I U Y K Z Y C D Z A I U  
L A U N S P

# A bright idea for a word search

## DIRECTIONS

This is not your usual word search. In fact, we think it's a more challenging challenge! Instead of giving you words to find, we've given you riddles to solve that will lead you to the words to find. The numbers at the end tell you how many letters are in the words. Words in the light bulb of letters can be down, across or diagonal — never backwards! See ... isn't that a bright idea for a word search?

### Example for #1 ELECTRICITY

Look at the clue.

Electricity is the primary source of power. Plus, it can shock you. And it also has 11 letters in it.

1. It's shocking how much we take this primary power source for granted. (11)
2. Another name for boosting a phone, computer or tablet device — avoid doing this all night long is good conservation advice! (6)
3. One answer to more power from a renewable, my friend, is blowing in the \_\_\_\_\_. (4)
4. Outcome of outlet tampering — it can be a little jolt, or it can be more like a lightning bolt. (5)
5. There's certainly a sunny future ahead for this energy generation that's bred not on Earth, but 93 million miles away instead. (5)
6. The people behind your power. The folks providing *The Energy Zone* kit. Their work warms your shower. Their efforts help keep your home lit! (13, two words)
7. It's the controller of AC and heat. Moving it up or down will perform quite a feat on your power bill. (10)
8. Kitchen gadgets and machines, each one of them has the means to be an energy hog or to "Star" as the lead conservation dog! (10)
9. Sounds like an orchestra maestro, but we are sure that you know it's a material through which electricity can flow. (9)
10. "Light Emitting Diode" is another name for this cool light bulb that saves energy. (4)
11. Sometimes piped to heat your stove or your warm shower, Alliant Energy gives it an odor before it gives you some power. (10, two words)
12. Like a river of electrons flowing on a circuit, you would have no power in your home without it. (7)
13. These are *Resources* we can replace. *New* regulations have created a race to *enable* greater use and set the pace to leave a smaller carbon trace! (10)
14. Primary focus of *The Energy Zone* ... You should have no reservation about the elevation of \_\_\_\_\_ in your home and across this nation. (12)
15. *See*, this gas can be *oh* so harmful when there's *too* much of it in the atmosphere. Fortunately, trees help "eat" it so our air can be more clear. (13, two words)

FOR ANSWERS ALONG WITH ADDITIONAL BONUS CLUES TO MORE HIDDEN WORDS, VISIT [ALLIANTENERGYKIDS.COM](http://ALLIANTENERGYKIDS.COM)