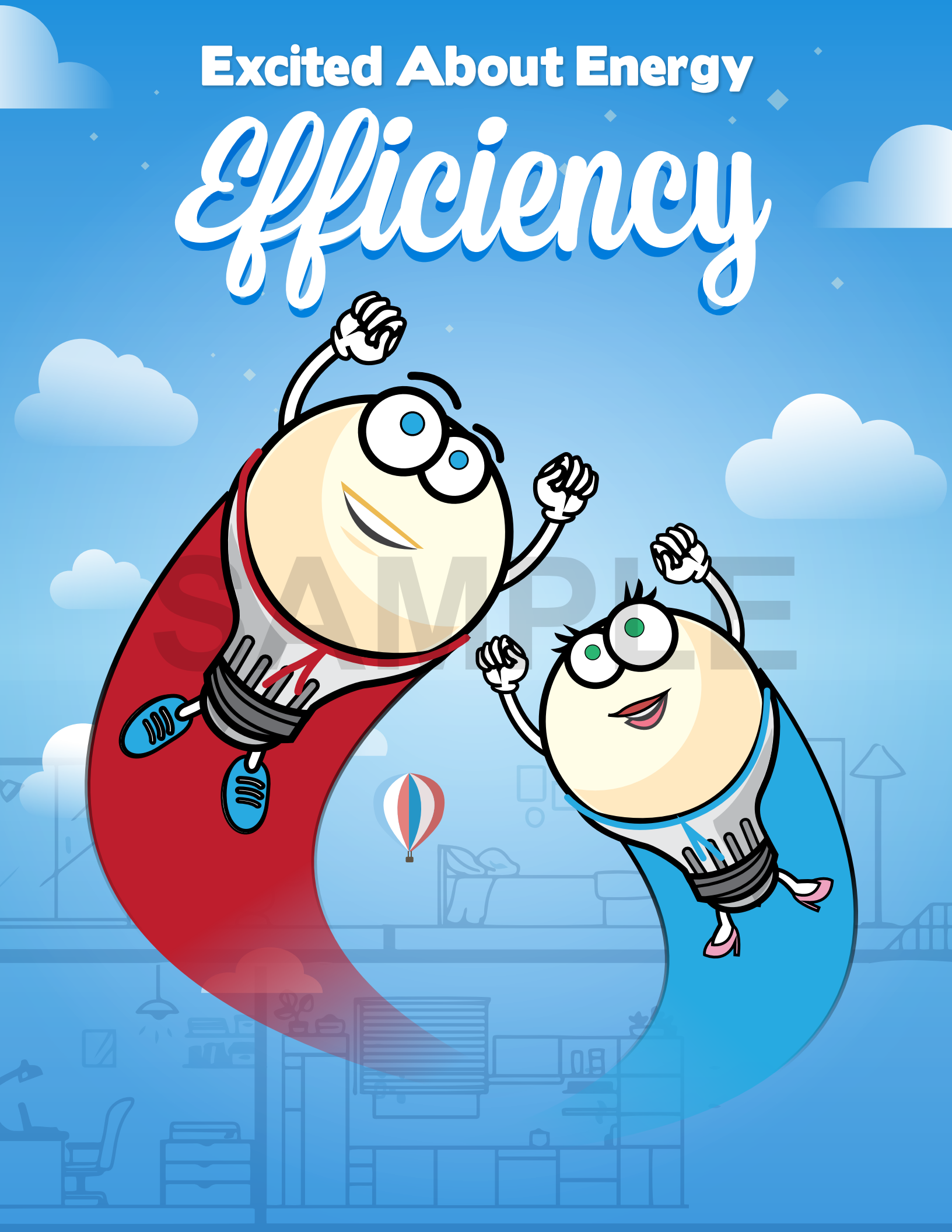
Excited About Energy Efficiency



This books belongs to:

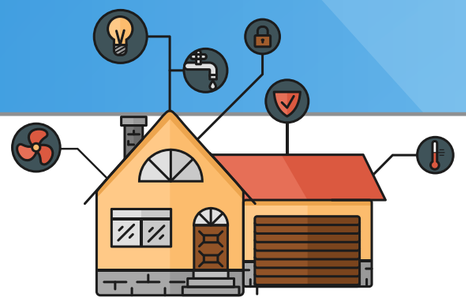
Discover how you can become your home's energy hero.

WELCOME ENERGY HEROES IN TRAINING!

We're Luke and Lilly and we're LED lightbulbs. When we're not lighting up the house, we're teaching our friends how to save energy in their homes.

Let's Go!

Ready to become your home's energy hero? Follow along as Luke and Lilly start your first training session.



Energy in Your Home

Energy provides the heat that keeps you warm in the winter and the air conditioning that keeps you cool in the summer. When you wash your hands or take a shower, energy is what heats up the water. Appliances like washing machines, microwaves, and refrigerators require energy to work. Lightbulbs need energy to brighten up your room. Did you know that your favorite devices need energy, too? Electronics like video game consoles, computers, and cell phones use energy every time they're plugged in.

Do you know what types of energy your home uses?

The most common types of energy used in U.S. homes are natural gas and electricity, followed by heating oil and propane. Natural gas and heating oil are most commonly used to heat the home. Electricity lights up the home and makes many of our appliances work. It can also be used to heat and cool. Propane is much less common, but some homes use it for heating. You might also use it to fuel a barbecue grill or camping stove.

The first step of your training is to understand how **important** energy is to your life. Let's start by imagining what life would be like **without** energy in your home.

Activity:

A Home Without Energy Fill in the Blank.

Instructions: Fill out the list of words below.

Then, write each word in the blank with the matching number.

1. Day of the week: _____

2. Place you visit often: _____

3. Name: _____

4. Food: _____

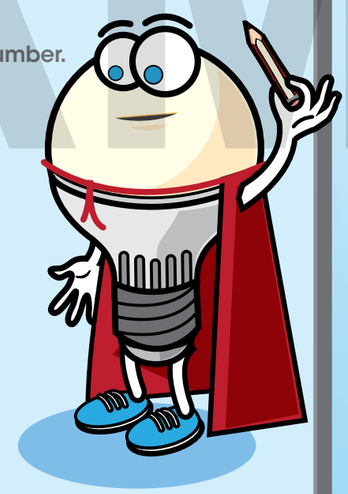
5. Exclamation: _____

6. TV show: _____

7. School subject: _____

8. Room in your home: _____

9. Adjective: _____



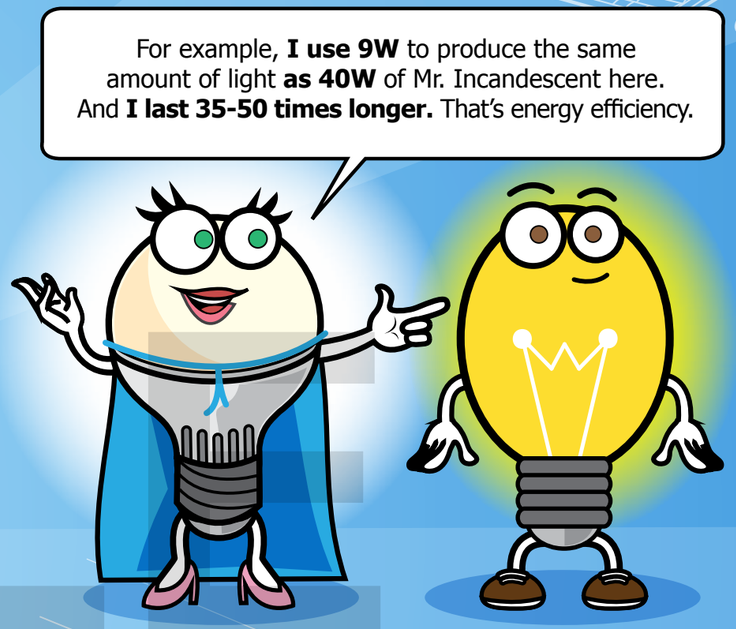
You're never going to believe what happened to me on _____(1). When I got home from _____(2), my dog _____(3) was barking noisily. I opened the door and flipped on the light switch, but the living room remained completely dark. "That's funny," I muttered, heading to the kitchen to get some _____ (4). As I approached the refrigerator, I smelled something awful. The refrigerator was warm, and everything inside had spoiled! "_____ (5)!" I exclaimed. I decided to sit down to watch my favorite show, _____(6), but the TV wouldn't turn on. "Guess I have to do my _____(7) homework," I sighed. But when I went to turn on the computer in the _____(8), it wouldn't turn on. Who knew a home without energy would be so _____ (9)?

Energy Efficiency

Now that we know how much we need energy in our daily lives, we should think about how much of it we use. Your goal in this training is to use less energy to power your life. You can do this through energy efficiency, using less energy to do something as well as or better than before.

The Cost:

Every month, your family receives something called an energy bill. The energy bill tells you how much your family has to pay for energy. The price depends on how much energy your whole home used in the last month. If you can make your home more energy efficient, the cost of your energy bill will be lower. Then, you'll have more money left over for fun adventures!



Vocabulary

"Energy efficiency"

The practice of using less energy to do something as well as or better than before.

"Energy bill"

A statement from your utility of how much energy your whole house used that month and how much money that costs.

Activity:

Question Time

How much do you know about your home's energy use?

Try answering these questions yourself. Then, find an adult in your family and ask the same questions. Compare your answers to see how much you already knew!

1. What types of energy does your home use? _____

2. How much did your family pay for last month's energy bill? _____

3. What is one thing you can do to save energy in your home? (Make your best guess. You'll learn lots of ways to save energy in this book!) _____

Your House is a System

The Building Envelope:

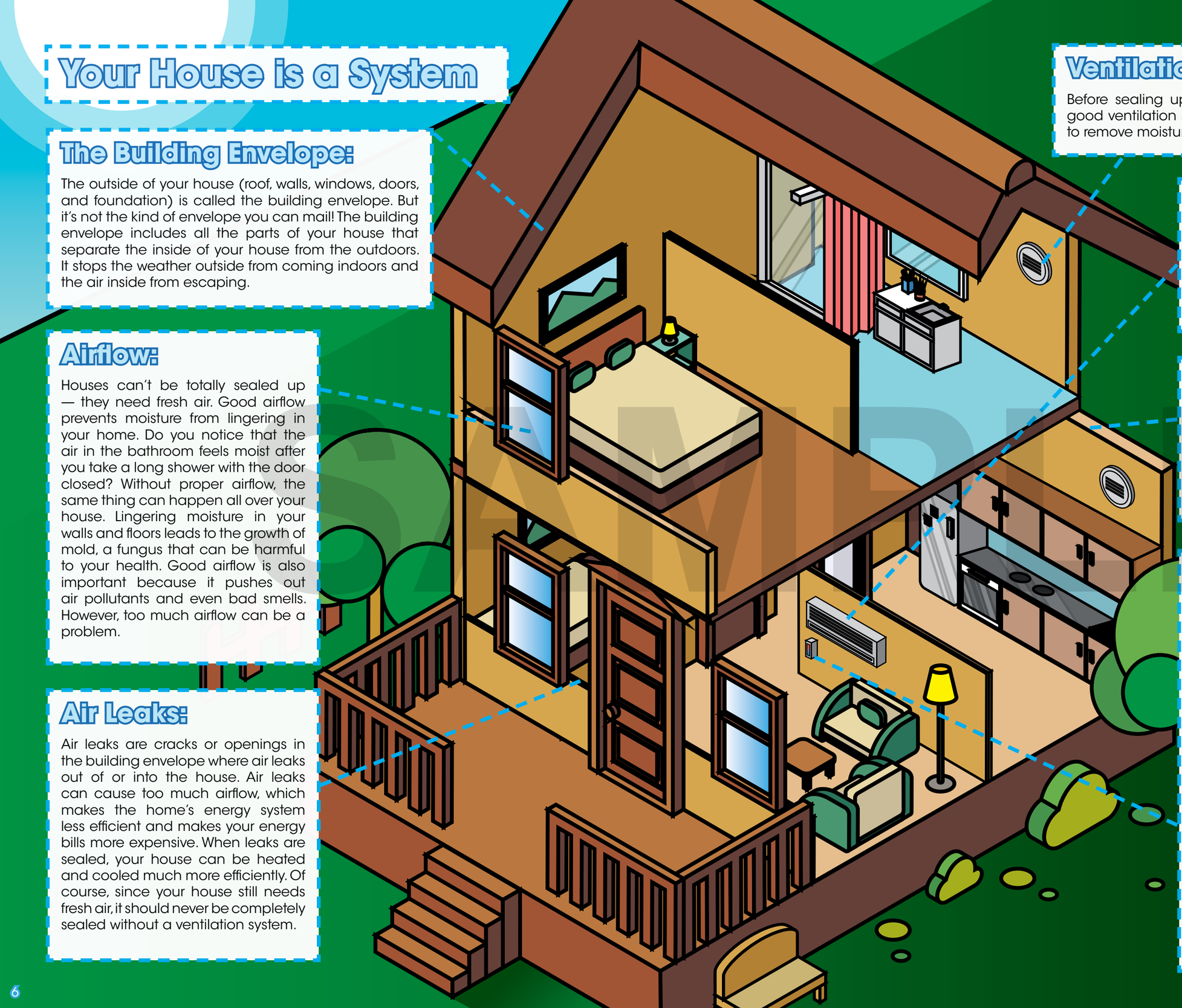
The outside of your house (roof, walls, windows, doors, and foundation) is called the building envelope. But it's not the kind of envelope you can mail! The building envelope includes all the parts of your house that separate the inside of your house from the outdoors. It stops the weather outside from coming indoors and the air inside from escaping.

Airflow:

Houses can't be totally sealed up — they need fresh air. Good airflow prevents moisture from lingering in your home. Do you notice that the air in the bathroom feels moist after you take a long shower with the door closed? Without proper airflow, the same thing can happen all over your house. Lingering moisture in your walls and floors leads to the growth of mold, a fungus that can be harmful to your health. Good airflow is also important because it pushes out air pollutants and even bad smells. However, too much airflow can be a problem.

Air Leaks:

Air leaks are cracks or openings in the building envelope where air leaks out of or into the house. Air leaks can cause too much airflow, which makes the home's energy system less efficient and makes your energy bills more expensive. When leaks are sealed, your house can be heated and cooled much more efficiently. Of course, since your house still needs fresh air, it should never be completely sealed without a ventilation system.



Ventilation:

Before sealing up air leaks, make sure that your home has a good ventilation system. Every house needs a ventilation system to remove moisture and maintain good airflow.

Heating and Cooling Appliances:

Your home's heating and cooling appliances may include a central air conditioner, a furnace, and/or a boiler. If these appliances aren't working properly, they waste a lot of energy.

Insulation:

Insulation is a material used to lower the amount of air that flows in and out of your home through the ceiling and walls. Good insulation helps you keep your house at your chosen temperature. Insulation is most effective when the home has good airflow.

Thermostat:

You can also reduce the amount of energy your heating and cooling appliances use by changing the temperature on your thermostat. To save energy, avoid setting your thermostat to very low temperatures in summer or very high temperatures in winter. Here are the recommended temperatures to save money and avoid wasting energy:

- Summer: When you are home, set your thermostat to 78 degrees or warmer. When you leave the house, you can raise it to 85 degrees.
- Winter: When you are home, set your thermostat to 68 degrees or cooler. When you leave the house, you can lower it to 55 degrees or cooler.
- You can get a programmable thermostat that automatically changes the temperature at certain times of day. That way, you won't have to remember to change it yourself!

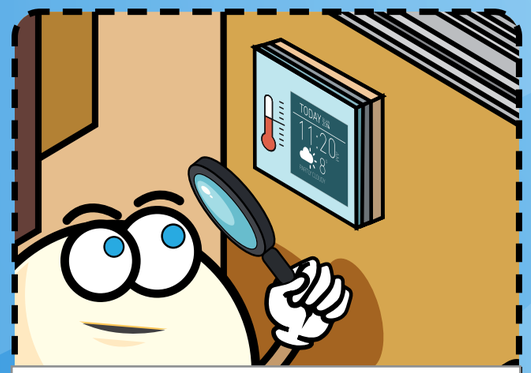
Making a Super System

The best way to make your home into a super system that works together and uses energy efficiently is to conduct an energy audit. An energy audit looks at your whole house and sees where it could improve. It's being an energy detective for your house. Some things you can look for yourself, others need a trained energy auditor with special tools.

YOU'RE THE ENERGY DETECTIVE

Do you notice some rooms get colder than others?
Is there a bit of cold air entering through the window? Or under a door? Discuss these with your parents. Sometimes a small repair can make a big difference in your comfort and energy bills.

Do a lighting audit.
Note the types of lightbulbs you have. Can they be replaced with more efficient ones?



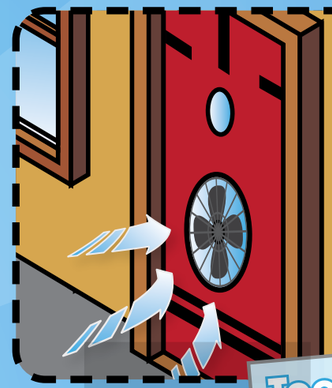
Check your thermostat.
Is it set to automatically adjust temperatures based on the needs of everyone in the house?

A Professional Audit

To really understand how energy works in your home and to create a super system, your family will need to hire a professional home auditor. A professional energy auditor will do a room-by-room assessment of your home and tell you how it uses energy.

Preparation:

Before an energy auditor visits your house, make a list of problems that you have noticed such as air leaks or drafty rooms. It is also useful to have a copy of your home's monthly and yearly energy bills handy. Your home energy auditor will use this information during the audit. You can walk through your home with the auditors as they work, and ask questions too!



"Blower door"

Blower door tests locate air leaks by using a special fan to depressurize a house. It sucks air out of the house, so you can see where air is leaking into the house. Usually, a blower door test is done before and after air sealing to check the effectiveness of the work.

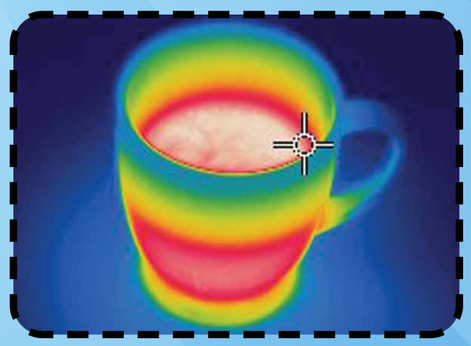
Tools

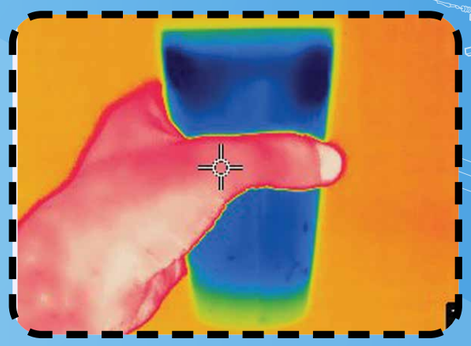
"Infrared Camera"

Infrared cameras allow auditors to 'see' heat by capturing an image of the amount of infrared radiation an object is emitting. In most cases, the higher the temperature of an object, the more infrared radiation it emits. These images help the auditor determine where insulation is needed and where air is escaping through windows and cracks. The infrared images also allow the auditor to check the effectiveness of newly installed insulation.

Fun with Infrared Cameras

Here are two infrared camera images: one of a cup with a hot drink and the other one with a cold one. Can you tell which is which? The oranges and reds are warmer and the blues are cooler.





All About Appliances (& Electronics)

The appliances and electronics in your home need energy to work, and it's important to find ways to make them more energy efficient. As an energy hero, you have the power to reduce the amount of energy used by the appliances and electronics in your home. Here are a few handy tips you can use right away.

Refrigerator Every time you open it, the fridge loses some of its cool air and has to use extra energy to cool down again. To save energy, always keep the refrigerator door closed. Choose what you want to eat before you open the door so that the cool air stays inside.

Washing Machine To avoid wasting energy, only run the washing machine when you have a full load of clothes to wash. Remember, heating up water uses a lot of energy, so use cold water as much as possible.

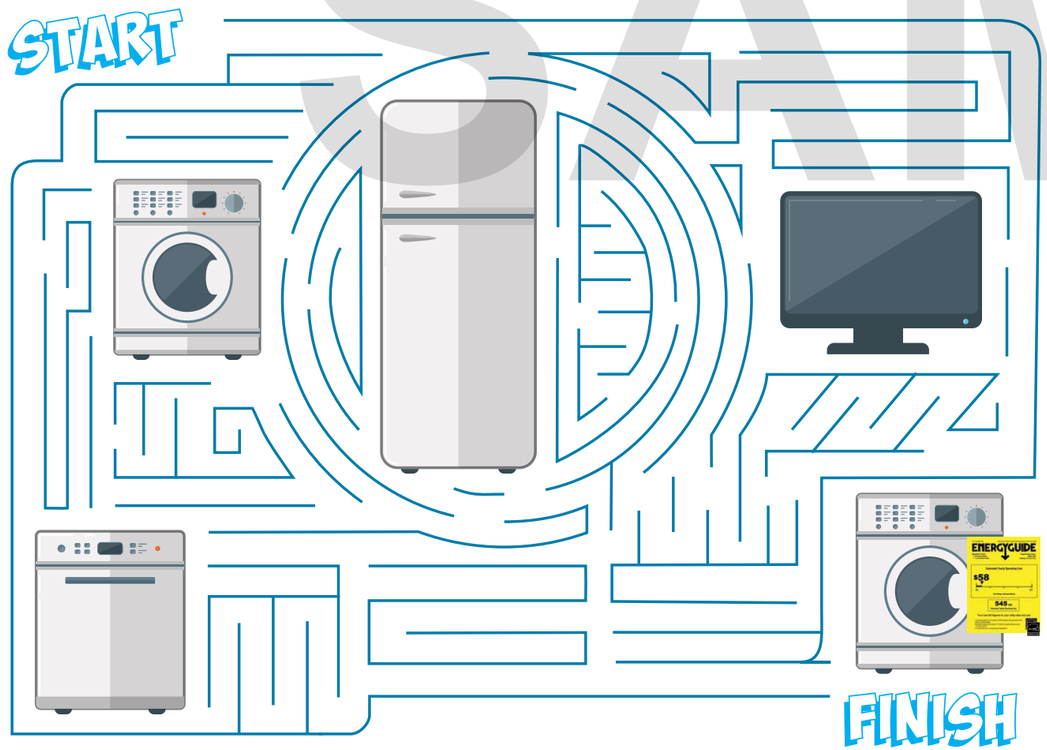
Television Turn off the TV when you leave the room. If you're not watching it, it's wasting energy!

Cell Phones and Chargers When you've finished charging your cell phone or another device, unplug the charger from the wall. Chargers use energy even when nothing is plugged into them.

Activity:

Energy Efficiency Appliance Maze

Appliances that use less energy than others to do the same job are more energy efficient. Can you move through this maze past the less energy efficient appliances to get to the more energy efficient one?



Energy Heroes, Meet ENERGY STAR®

What is ENERGY STAR? ENERGY STAR is a special certification for many appliances and electronics in your home. When something is ENERGY STAR certified, that means it's considered very energy efficient. (Remember, that means it uses less energy to do its job as well as, or better than, other products in the same category.) A product can become ENERGY STAR certified if it meets the U.S. Environmental Protection list of efficiency requirements. When you go shopping, you can tell whether an item is ENERGY STAR certified by looking for the ENERGY STAR label.

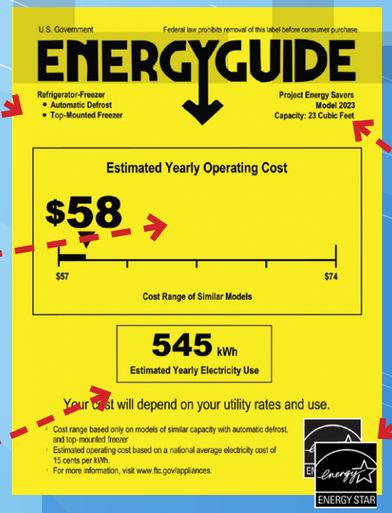
Reading the EnergyGuide Label

When a manufacturer makes a new appliance, they have to put an EnergyGuide label on it. It's the law! The EnergyGuide tells you how much energy an appliance uses. By understanding how to read the EnergyGuide, you can help your family make smart, energy efficient choices when you go appliance shopping.

This information tells you what kind of appliance you're looking at and what its special features are.

This number tells you approximately how much this appliance will cost on your energy bill each year.

This number tells you approximately how much electricity the appliance will use each year.



The name of the company that made the appliance, the appliance's model number, and the size of the appliance are here.

If you see this logo on the EnergyGuide label, you know that the appliance is ENERGY STAR certified.

Vocabulary

"ENERGY STAR"

A special certification for very energy efficient appliances, electronics, and other products.

"ENERGY GUIDE"

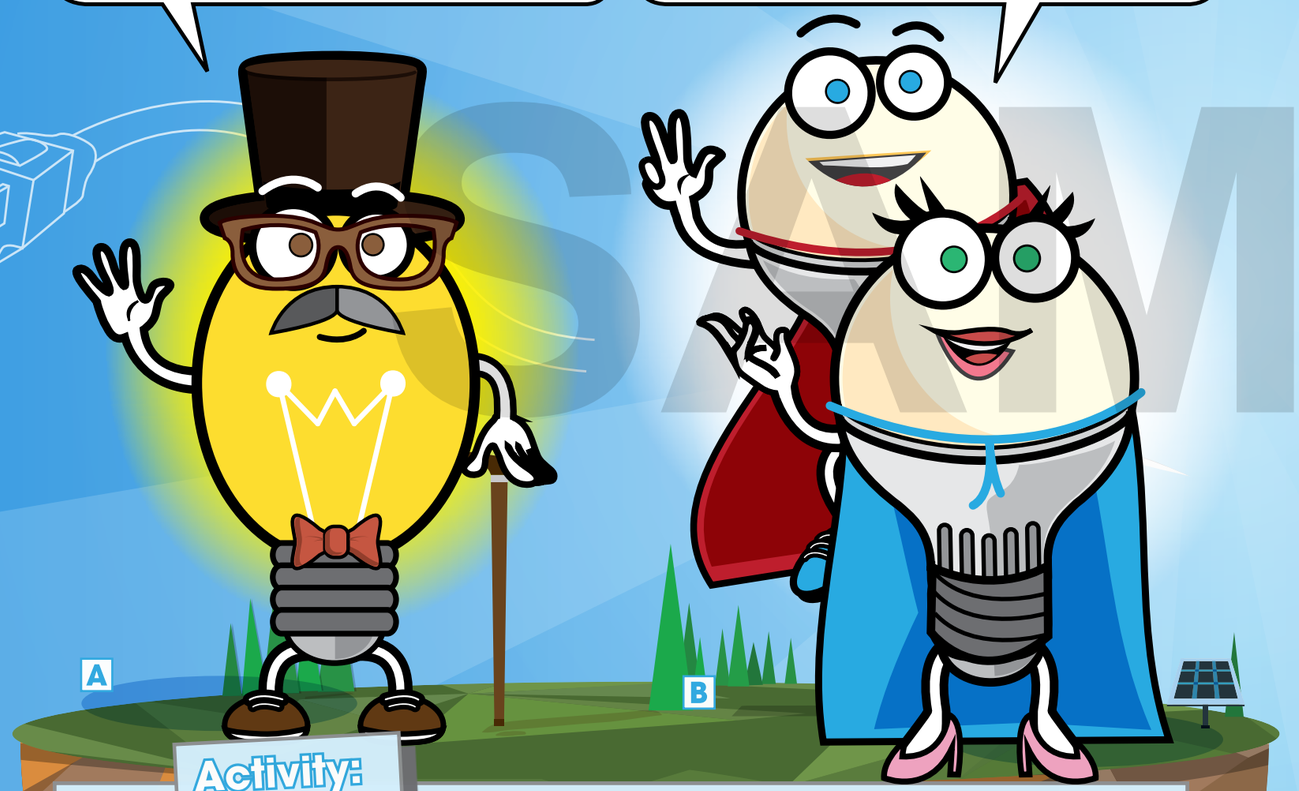
An ENERGY STAR qualified appliance must carry the EnergyGuide label. EnergyGuide labels frequently note whether the product is ENERGY STAR qualified.

Let's Talk Lightbulbs

Remember, energy heroes: one of the easiest ways to save energy is by turning off the lights every time you leave a room. Also, some types of lightbulbs are more efficient than others. You can save energy in your home by switching from older incandescent bulbs to Light Emitting Diode (LED) lightbulbs.

Greetings! My name is Mr. Incandescent. **I was invented by Thomas Edison more than 100 years ago,** so I've been lighting up these parts for a long time. How do I work, you ask? When you flip on a light switch, electricity heats up the wire within my bulb and I produce light and heat. **I'm a less energy efficient lightbulb.**

Hi, everybody! We're LEDs, the most energy efficient lightbulb. **We use less energy than incandescent bulbs and last longer, too.** Want to know the secret to our success? **LED bulbs are made up of lots of little individual LEDs, which are tiny light sources that together produce visible light.** We have lots of little LEDs inside us, and when you turn us on, all of those LEDs light up at the same time. We're proud of who we are!



Activity:

Which bulb am I?

Instructions: Match each statement to the type of lightbulb it describes.

1. This lightbulb was invented over 100 years ago **A** ☐ **B** ☐

2. This lightbulb is the most efficient and longest-lasting: **A** ☐ **B** ☐

3. This lightbulb is the oldest and least efficient: **A** ☐ **B** ☐

Answers: 1 – A; 2 – B; 3 – A

Saving Water, Saving Energy

We often think about water and energy separately, but they're connected. Every time you get water from a tap, faucet, or showerhead, there's energy involved. Pumping water into your home uses energy. Heating it up uses energy, too. When water leaves your home, treating the wastewater takes energy. By being a smart water saver, you'll use less energy.

Did you know?

On average, water heating uses as much energy as all of your appliances combined.

That's a lot of hot water!

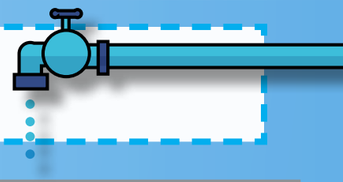
Remember to turn off the faucet when you're not using it.

Don't let the water run when you're brushing your teeth.

Take short showers instead of baths.

Look around your home for leaky faucets.

Tell your parents if you spot any!



Activity:

True or False

Instructions:

Read the following statements about the water you use in your home. Based on what you've learned, make an educated guess about whether each statement is true or false. Then, turn this page upside-down to check your answers.

	T	F
1. It's OK if your toilet leaks, because all the water stays in the toilet bowl and tank.	☐	☐
2. Showers waste less water than baths.	☐	☐
3. In the dishwasher, it costs the same amount to wash one dish as it does to wash a full load.	☐	☐
4. ENERGY STAR® washing machines use less than half the water and energy of a standard washing machine.	☐	☐
5. Always thoroughly rinse off plates before you put them in the dishwasher.	☐	☐

1. False - Toilet water flows down into the sewer system, and a leaking toilet can waste 200 gallons of water a day. Leaky toilets are one of the most expensive wastes of water, so it's important to fix them right away.
2. True - as long as you take short showers. A 5-minute shower uses 10-25 gallons of water, but a bath uses 70 gallons! That's a big difference.
3. True - That's why it's important to only run the dishwasher when you have a full load. Otherwise, you're wasting money and energy.
4. True - Using an Energy Star washing machine will cut the cost of washing your clothes by more than half. Make sure to keep your eyes peeled for the Energy Star label the next time your family goes shopping for a new washer!
5. False - There is no need to rinse plates before putting them in the dishwasher. As long as you scrape off leftover food scraps, you can load them right away.

Turn This House into an Energy Efficient Home

Energy heroes, you've learned a lot about how to make your home more energy efficient. Now it's time to show what you know!

Energy Efficiency in the Kitchen

Can you find and circle three energy-wasters in the kitchen?

Now, list three changes that would make this room more energy efficient:

1.
2.
3.

Energy Efficiency in the Living Room

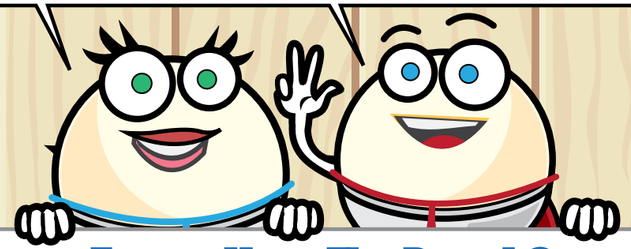
Can you find and circle three energy-wasters in the living room?

Now, list three changes that would make this room more energy efficient:

1.
2.
3.

START

Congratulations!
You're officially a home energy hero. Let's celebrate with a few fun games!



Home Energy Hero: The Board Game

Each player places a coin, button, or token at Start and rolls a die. The player who rolls the highest number goes first. Take turns rolling the die to move through the house. If you land on a picture, follow the instructions written next to it. The player who makes it to the backyard first is the winner!

It's time to install new lightbulbs in your room.

Can you remember which type of bulb is most energy efficient?

If your answer is correct, move ahead 3 spaces. If it's incorrect, move back 2 spaces.

You noticed a draft coming through one of your windows and pointed it out to your parents.

Great work!

Move ahead 3 spaces.

You shared your new energy saving knowledge with your whole family.

Great work, energy hero!

Move ahead 2 spaces.

You made it to the backyard,

you win!

Uh oh,

you left the water running while you were brushing your teeth.

Go back 2 spaces.

Spring cleaning time!

You helped your parents clean out the air filters. **Nice job!**

Move ahead 2 spaces.

What kind of certification do energy efficient appliances have?

If your answer is correct, move ahead 2 spaces. If it's incorrect, move back 1 space.

You waited to open the refrigerator **until you knew exactly** what you wanted to eat.

Grab a snack and move ahead 2 spaces.

Oops,

You forgot to turn the TV off when you left the room!

Lose a turn.

You made sure to **close the front door** tightly behind you when you stepped inside the house.

Move ahead 1 space.

Word Find

Instructions: 12 energy efficiency words are hidden in this Word Find. Can you find and circle all of them?

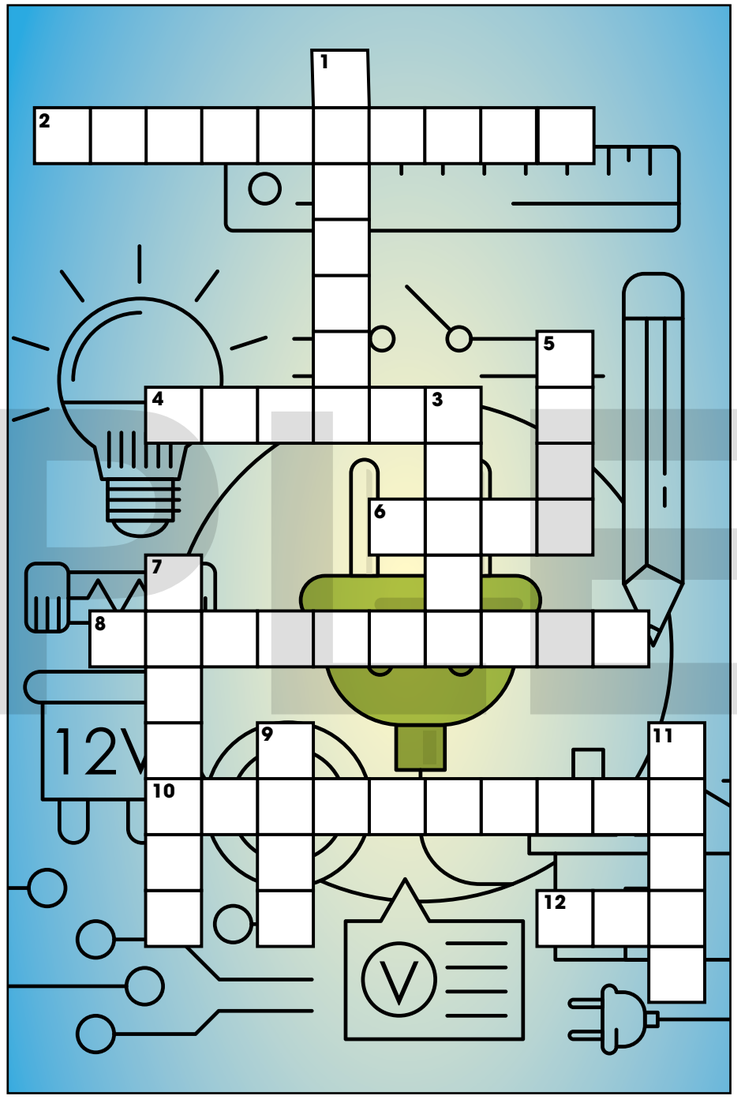
Y	Z	O	B	O	V	A	D	F	Z	I	D	I	P	I	I	O
V	M	Y	F	S	H	J	E	F	F	I	C	I	E	N	C	Y
E	Z	A	V	J	A	E	A	D	D	G	C	X	Y	S	Z	A
N	K	F	D	K	V	J	A	C	A	Y	P	G	P	U	Q	F
T	M	K	I	L	O	W	A	T	T	F	X	N	U	L	Y	K
I	H	V	T	T	U	P	A	N	I	E	D	K	P	A	K	V
L	B	R	R	O	B	R	S	F	J	N	P	O	B	T	P	R
A	O	C	H	R	X	H	E	N	E	R	G	Y	B	I	L	L
T	R	F	O	F	Y	R	T	H	Y	O	Z	O	I	O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

Word List

- Efficiency
- Energy Bill
- Insulation
- Air leaks
- Cooling
- Ventilation
- Kilowatt
- ENERGY STAR
- Heating
- LED
- Appliance
- Air flow

Energy Saver Crossword

Instructions: Solve each crossword clue by filling in the blanks to complete the energy saving tip.



Word List

- Mold
- Appliances
- Doors
- Closed
- Faucets
- LEDs
- Draft
- Showers
- ENERGY STAR
- Off
- Cold
- Thermostat

Across

2. The _____ in your home, like your refrigerator, need energy to work.

4. Always keep the refrigerator door _____.

6. Lingering moisture in your home's walls and floors can lead to the growth of _____.

8. You can reduce the amount of energy used by your heating and cooling system by adjusting the temperature on the _____.

10. When you're shopping for energy efficient appliances, look for items with an _____ label.

12. Turn _____ the TV when you leave the room.

Down

1. Look around your home for leaky _____. Tell your parents if you spot any!

3. Close windows and exterior _____ tightly.

5. Heating water uses a lot of energy, so wash your clothes in _____ water as much as possible.

7. To save water, take short _____ instead of baths.

9. When you shop for lightbulbs, choose _____, the most energy efficient and longest-lasting type.

11. If you hear or feel a _____ blowing through a crack in the window, tell your parents so they can seal and weather-strip it.

Resources

Want to learn even more about making your home energy efficient? Check out these excellent websites!

U.S. Department of Energy

www.energy.gov

U.S. Energy Information Administration

www.eia.gov

ENERGY STAR® for Kids

www.energystar.gov/kids

ES182-02