



Oxford Read and Discover

Incredible Energy

Louise and Richard Spilsbury

Read and discover all about incredible energy ...

- What is kinetic energy?
- What types of energy does electricity give us?

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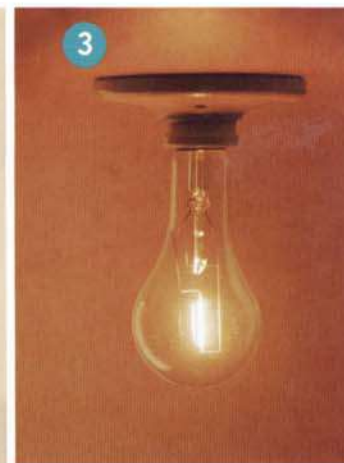
Introduction

Energy is incredible because we use it for everything that we do. Energy can make things work, make things move, and make things happen. People use energy to work and to play. When people do things like cook food, listen to music, and use a lamp, they are using heat energy, sound energy, and light energy.

What types of energy can you see here?

What type of energy makes televisions and computers work?

What types of energy do you use every day?



Now read and discover more about incredible energy!

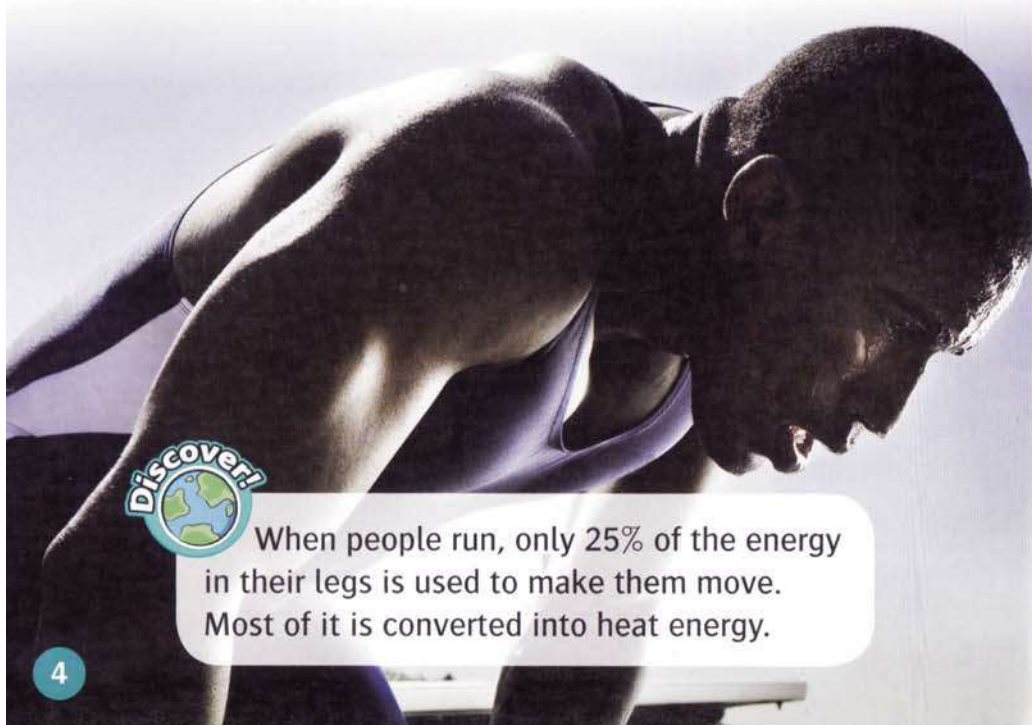
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Energy Everywhere

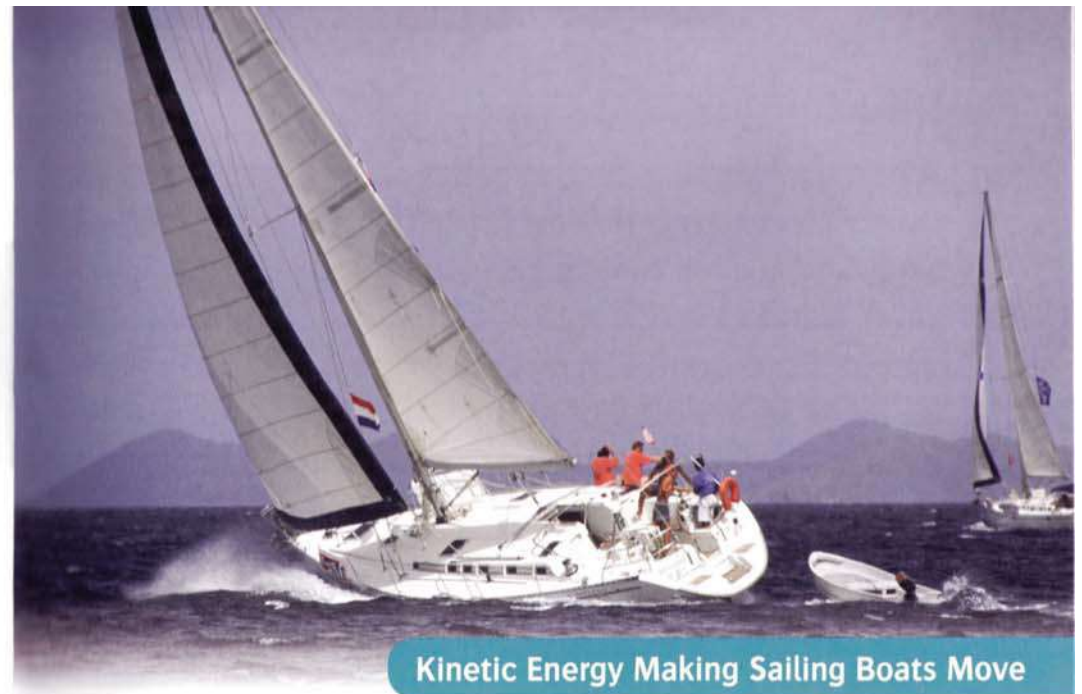
Energy is everywhere and energy is in everything. We can't make energy and we can't destroy it. When we use energy to make something happen, we don't lose it. It becomes a different type of energy.

Converting Energy

One type of energy can be converted into another. For example, when we move, we use energy from the food that we eat. When runners use this energy to run fast in a race, some of it is converted into heat energy. That's why runners look and feel so hot at the end of a race!



When people run, only 25% of the energy in their legs is used to make them move. Most of it is converted into heat energy.



Kinetic Energy Making Sailing Boats Move

Different Types of Energy

There are many different types of energy, for example electrical energy and heat energy. Two important types of energy are kinetic energy and potential energy.

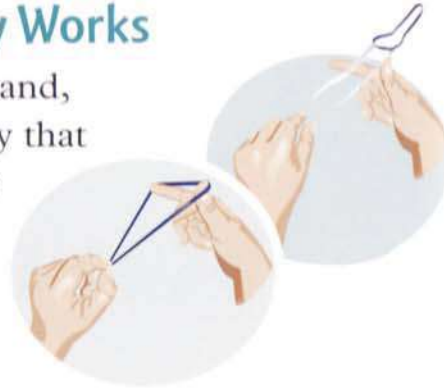
Kinetic energy is a type of energy that's moving. All things that move have kinetic energy. Wind is moving air. We use the kinetic energy in wind to fly kites and to sail boats.

Things that are not moving also have energy. Potential energy is stored energy. It's energy inside something that's waiting to be used. It's energy that has the potential to do work. We have potential energy stored in our bodies. When we run, some of this potential energy is converted into kinetic energy to make our legs move.

How Potential Energy Works

When we stretch a rubber band, we give it energy. The energy that we use to stretch the rubber band is stored inside it as potential energy. When we let go of the rubber band, it moves. When we stretch the rubber band more, it has more potential energy, and it can move more.

When we jump on a trampoline, this stretches the trampoline springs. This gives the springs potential energy. When the springs can't be stretched any more, this potential energy is converted into kinetic energy. The springs move back, and this throws us up into the air!



Jumping on a Trampoline

springs

From High to Low

Some things have potential energy because they are high up. When we lift a picture off the floor and put it on a wall, some of the energy that we use for lifting goes into the picture. If the picture falls off the wall, that potential energy is converted into kinetic energy. When something is very high up, it has a lot of potential energy. The water at the top of a high waterfall has a lot of potential energy. When it falls, it moves very fast because it has a lot of kinetic energy.



Angel Falls in Venezuela is the highest waterfall in the world. The water falls almost 1 kilometer from top to bottom!



→ Go to pages 36–37 for activities.

2

Heat Energy

We use heat energy for many things. Heat energy makes our homes warm, cooks our food, and makes hot water that we can use for drinking and washing.



How We Get Heat Energy

We can get heat energy in different ways. Heat energy from the sun makes Earth warm. We can also get heat energy when we burn wood. When things move, some kinetic energy is converted into heat energy. Inside our body we make heat energy to keep us warm.

When heat is added to something, its temperature gets higher. When something has a high temperature it's very hot. Things are cold when they have less heat energy. When something is cold, it has a low temperature.

Inside Hot Things

Everything in the world is made of parts called atoms. Atoms join together to make molecules. Atoms and molecules are so small that we can't see them, but they are inside everything – rocks, water, air, and people.

When water is frozen, it becomes solid ice because it has very little heat energy. Molecules in ice are very near each other and they don't move very much. When heat energy is added to something, it makes the molecules inside move more. When heat energy is added to ice, molecules inside it move more. The ice melts and becomes liquid water again. If more heat is added to the water so that it boils, the molecules move so much that the water changes into a gas called steam.

Water Molecules in Different Forms



How Heat Energy Moves

Heat energy doesn't stay still. It moves from things that are warmer to things that are cooler. When heat moves between things that are touching, it's called conduction. Heat moves between two things until they are the same temperature.

Heat moves quickly and easily through some materials, like metal. For example, heat from a stove moves quickly through a metal pan to heat the food inside it. When we pick up a metal spoon from a table it feels cold because heat moves from our fingers into the spoon. Heat moves slowly through other materials, like wood. We use wooden spoons to stir food so that heat from the pan does not move into our hands.

A Metal Pan Heating Food



Insulators

To keep our homes warm when it's cold, we have to stop heat energy moving from the inside to the outside. In cold countries, people put insulators in the roofs of their homes. Insulators are materials that stop heat moving from warm places to cold places. Insulators in a roof stop heat moving from the rooms inside the home to the cold air outside.

Heat moves slowly through air, so air can be used as an insulator, too. When we wear a jacket in winter, the jacket holds air next to our body. The air stops heat leaving our body and so it helps to keep us warm.

3

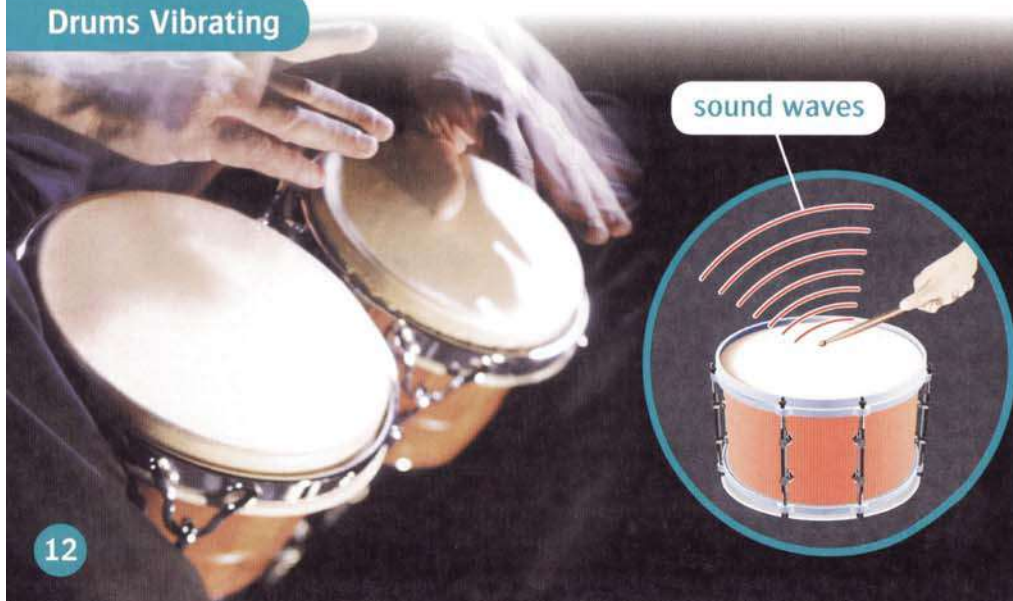
Sound and Light

Sound and light are types of energy that travel in the air. We use sound energy to hear, to listen to music, and to communicate by telephone. We use light energy from the sun to see during the day, and light from lamps to see when it's dark.

Sound

Sound happens when something vibrates. When we hit a drum, it vibrates and this makes the air around the drum vibrate, too. The vibrations of sound travel through the air in all directions. These movements are called sound waves. Sound waves are invisible – we can't see them. We hear the sound of the drum when the sound waves reach our ears.

Drums Vibrating



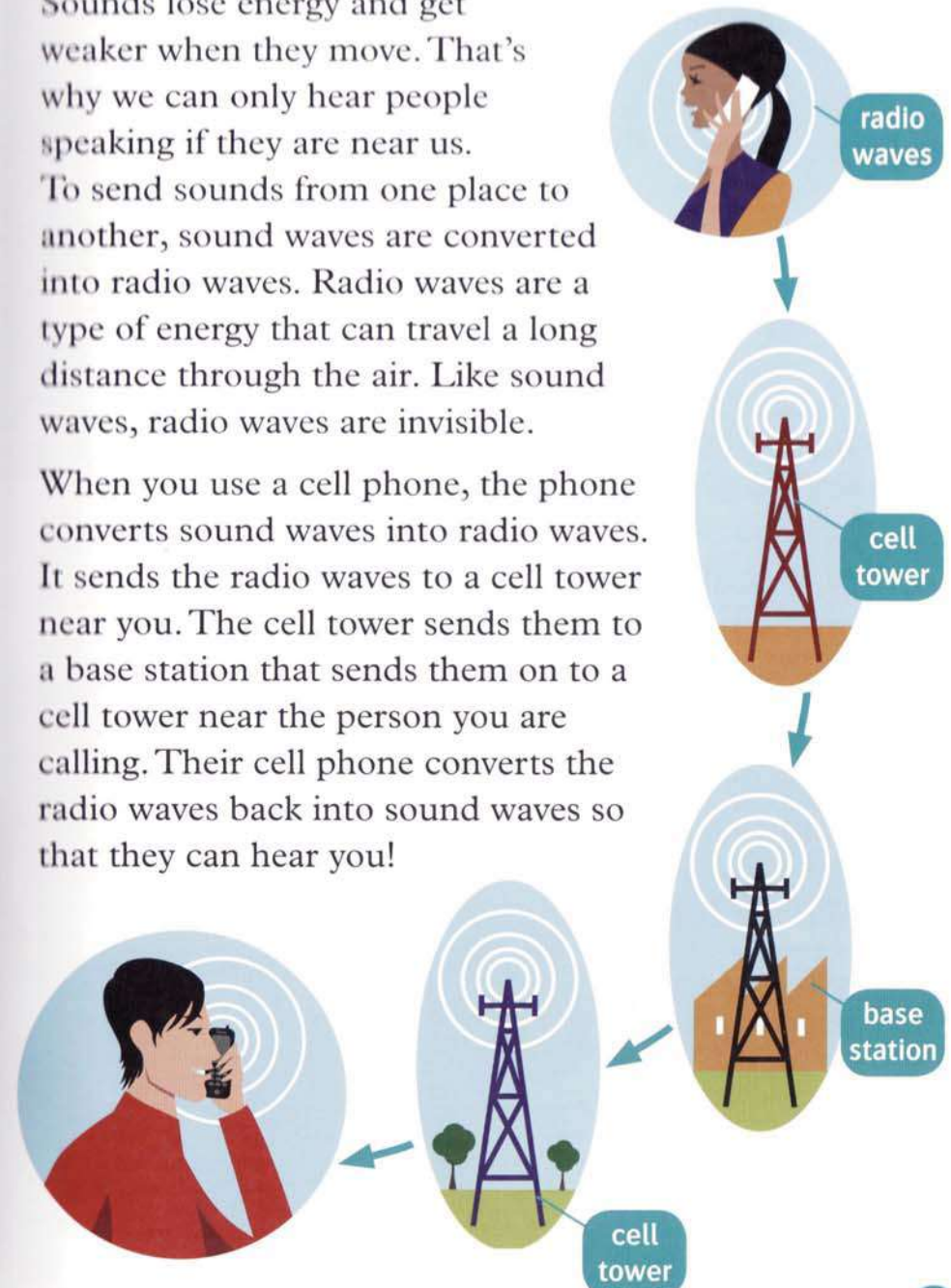
Radio Waves

Sounds lose energy and get weaker when they move. That's why we can only hear people speaking if they are near us.

To send sounds from one place to another, sound waves are converted into radio waves. Radio waves are a type of energy that can travel a long distance through the air. Like sound waves, radio waves are invisible.

When you use a cell phone, the phone converts sound waves into radio waves. It sends the radio waves to a cell tower near you. The cell tower sends them to a base station that sends them on to a cell tower near the person you are calling. Their cell phone converts the radio waves back into sound waves so that they can hear you!

How Cell Phones Work

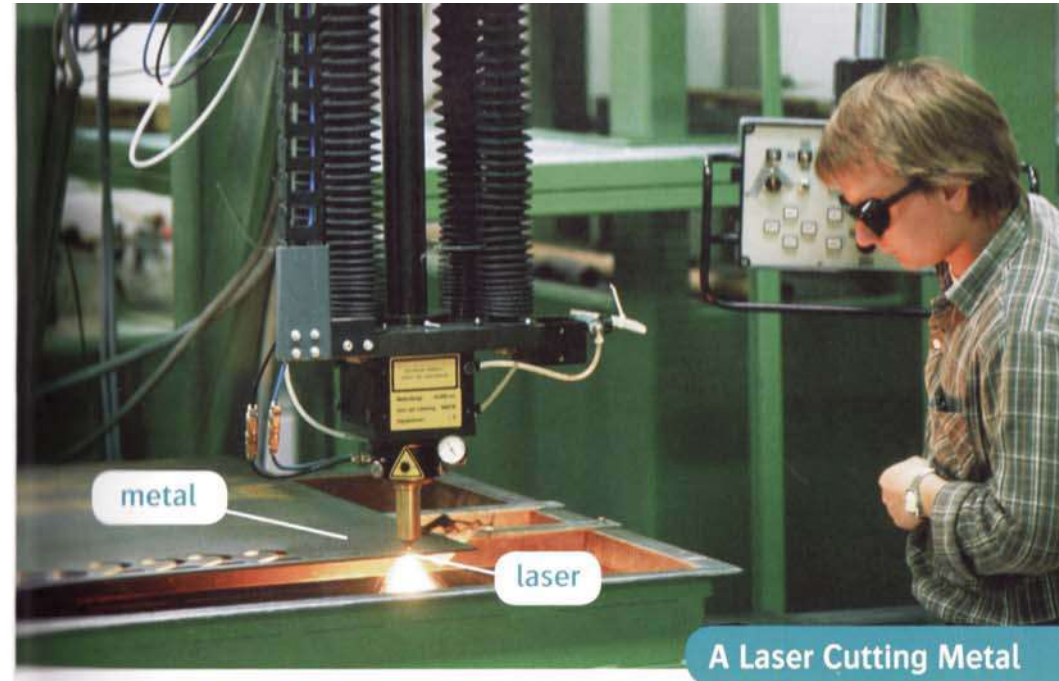
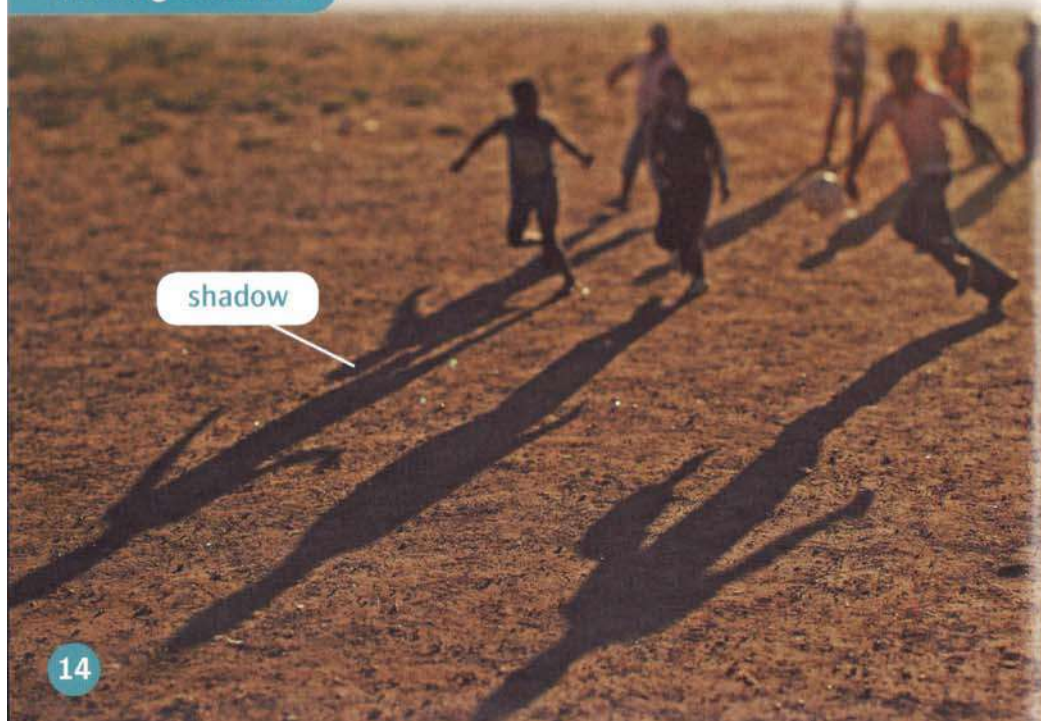


Light

When something is luminous, it gives off light. Lamps, candles, fires, televisions, and the sun are luminous. Light energy travels from luminous things in straight lines. Light can move through transparent things like air, water, and windows. It can't move through opaque things like walls, trees, or people.

Shadows happen when something opaque stops light moving through it. Shadows happen on the other side of an opaque thing, where light can't reach. For example, when we stand outside on a sunny day, we block the sunlight and we make a shadow. Some transparent materials can make a thin shadow because they stop some light.

Making Shadows



A Laser Cutting Metal

Lasers

A laser is a type of light that we get from machines. It's a very thin beam of light that has a lot of light energy and heat energy. Lasers have more energy than sunlight! We use lasers in many machines, like CD players and DVD players. Lasers have so much energy that some factories use them to cut through metal, and doctors use lasers to operate on some parts of the body, like eyes.



In clothes factories, people use lasers to cut through hundreds of pieces of fabric at the same time.



4

Chemical Energy

Chemical energy is a type of potential energy. Wood and gasoline have chemical energy. Chemical energy is very useful because we can convert it into many other types of energy.

Using Chemical Energy

When a material has chemical energy, we call this material fuel. Fuels like wood and gasoline have a lot of chemical energy. When we burn gasoline in a car engine, chemical energy from the fuel is converted into kinetic energy that makes the car move. When we burn wood in a fire, chemical energy is converted into heat energy to keep us warm.



The engine in a rocket converts chemical energy from fuel into kinetic energy to send the rocket into space!



Fireworks



Inside a firework there are powders that use chemical energy in different ways. When we burn a firework, these different types of chemical energy are converted into an amazing, colorful display of kinetic energy, light energy, and sound energy!

The first thing that burns in a firework is fuel. This gives us the kinetic energy that sends the firework up into the sky. Then, different metals start to burn and they make sparks of different colors. For example, when copper burns it makes blue sparks. Some chemicals inside the firework make loud sounds when they burn.

Food Energy

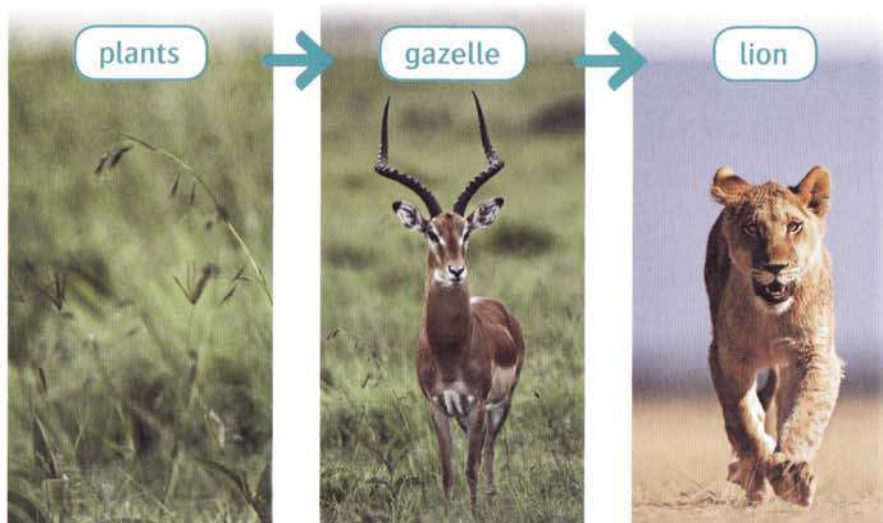
Food has chemical energy, too. Our body converts the chemical energy in our food into chemical energy that we can use to live, to move, and to grow. The chemical energy in our food, and in the food that other animals eat, comes from plants.

Food Chains

Plants convert light energy from the sun into chemical energy that they can use as food. Plants also store chemical energy.

When an animal, like a gazelle, eats plants, it uses some of the chemical energy from the plant. When a lion eats a gazelle, it uses some of the chemical energy from the gazelle's body. When energy from food moves from one living thing to another like this, it's called a food chain.

A Food Chain



Chemicals in the Ocean

Most food chains start with energy from the sun, but some food chains in the ocean start with a different type of energy. The rock under deep oceans is very, very hot. When water goes underground through small holes, the rock makes the water as hot as the inside of a pizza oven. The hot water dissolves some of the chemicals in the rock. So the chemicals become part of the water. When water with chemicals dissolved in it comes out of the rock, living things called bacteria feed on the chemicals. Other animals in the ocean feed on the bacteria.



Deep in the ocean, some bacteria live inside the bodies of giant worms that can be 3 meters long! The bacteria make food for the worms.

worms

➔ Go to pages 42–43 for activities.

5

Electricity

How often do you use televisions, lights, and computers? Without electricity, these and many other machines can't work! Electricity is a very useful type of energy that gives us heat energy, light energy, sound energy, and kinetic energy.

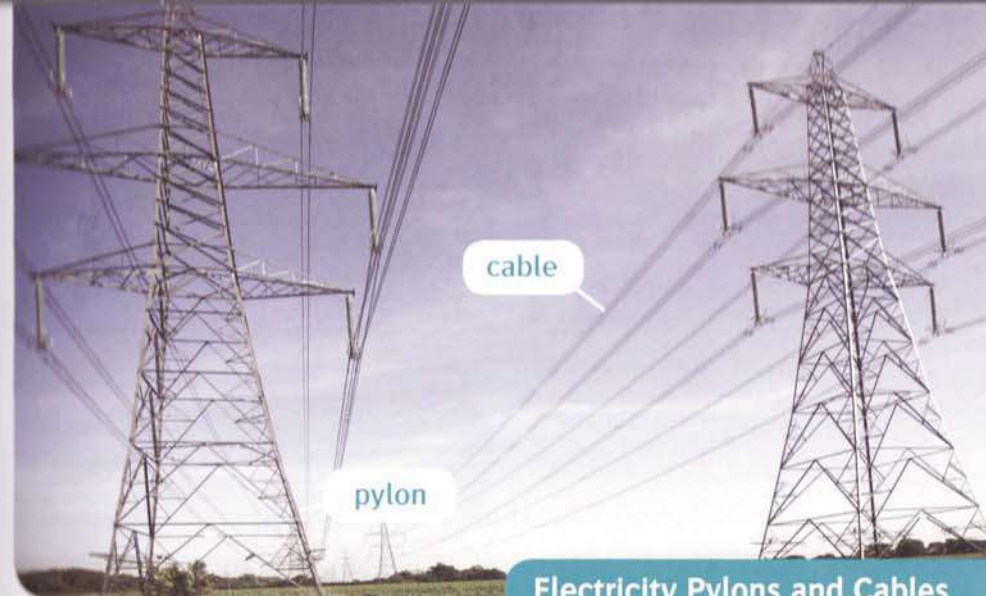


A Flash of Lightning

What Is Electricity?

Inside atoms there are parts called electrons. Electrons can move from one atom to another, and when they do this they make electricity.

Lightning is a type of electricity. It happens when the wind makes atoms of ice inside clouds move around and crash into each other. Electrons move quickly from one atom to another, and we see this movement of electricity as a flash of lightning.



Electricity Pylons and Cables

How Electricity Moves

Power stations are factories that make electricity. The electricity goes through cables and pylons to our homes. This electricity makes the machines in our homes work.

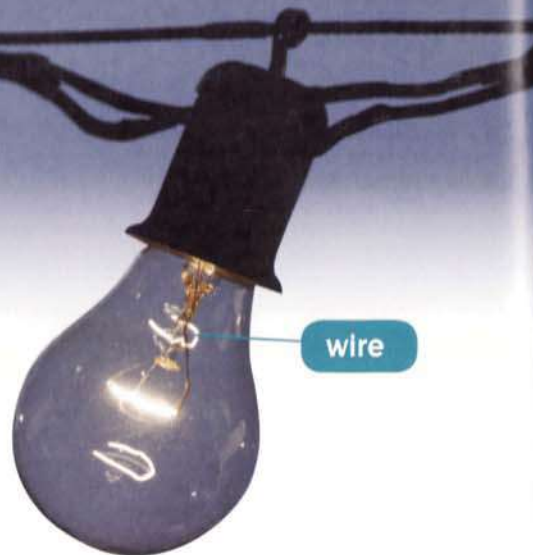
Some materials are called conductors – electricity can move easily through these materials. Most metals, like copper and gold, are good conductors. This is why electricity cables are made of metal. Other materials, like rubber and air, are called insulators – electricity can't move easily through these materials.



Some animals are dangerous because they make their own electricity. Electric eels store electricity in their body and use it to kill other fish!



A Light Bulb



Using Electricity

Electricity gives us different types of energy. In a toaster, electricity is used to make heat energy to cook bread. Wires inside a toaster are made from a type of metal that slows down the electricity so that some of its energy is converted into heat.

In a hairdryer, electric wires give us heat energy and then electricity turns a fan. The fan uses kinetic energy to push the heat out of the hairdryer so that we can dry our hair.

In many electric lamps, electricity moves slowly through a thin, curly wire inside a light bulb. This makes the wire so hot that it becomes white, and it glows to give us light.



Most of the electricity that moves through the wire in a light bulb is converted into heat, not light!



Using Batteries

Some machines, like calculators and music players, use batteries for their electrical energy. Batteries only give us small amounts of electricity, but they are useful because they can store electricity to use in machines that we take with us when we travel around. Small batteries are useful in small machines like watches. Bigger batteries have more potential energy and we can use them in machines like flashlights. Some machines need two or more batteries.

Batteries store chemical energy. The chemical energy is converted into electricity when we turn on a machine. The chemicals inside a battery are dangerous, so never play with a battery or open a battery.

Putting Batteries into a Flashlight



➔ Go to pages 44–45 for activities.

6

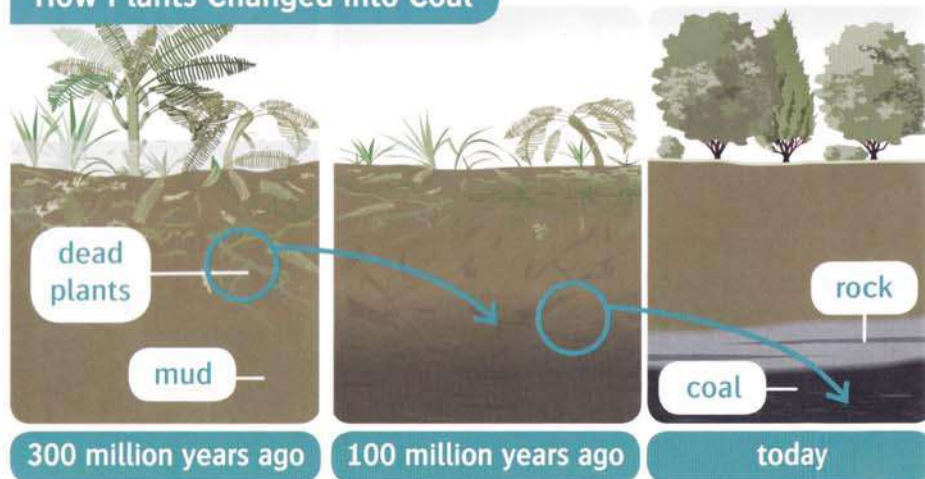
Fuels for Energy

Coal, oil, and gas are fossil fuels. We use fossil fuels and nuclear fuels to make electricity. We use fossil fuels to heat homes and to power cars, buses, and trucks.

Fossil Fuels

Fossil fuels are made from plants and animals that lived on Earth millions of years ago. Coal was made like this. When giant plants in ancient jungles died, they sank into mud. Slowly, over millions of years, the mud became hard and changed into rock. The heavy rock pressed down on the plants, and heat from inside Earth helped to change the plants into black coal. Oil and gas were also made like this, but they come from animals that lived in ancient oceans.

How Plants Changed into Coal



Getting Coal

Miners are people who get coal from under the ground. They use machines to cut holes and tunnels in the ground. Then they cut pieces of coal out of the rock from under the ground. Trucks and trains take coal to power stations or to people's homes, where the coal is burned to give us heat.

Getting Oil and Gas

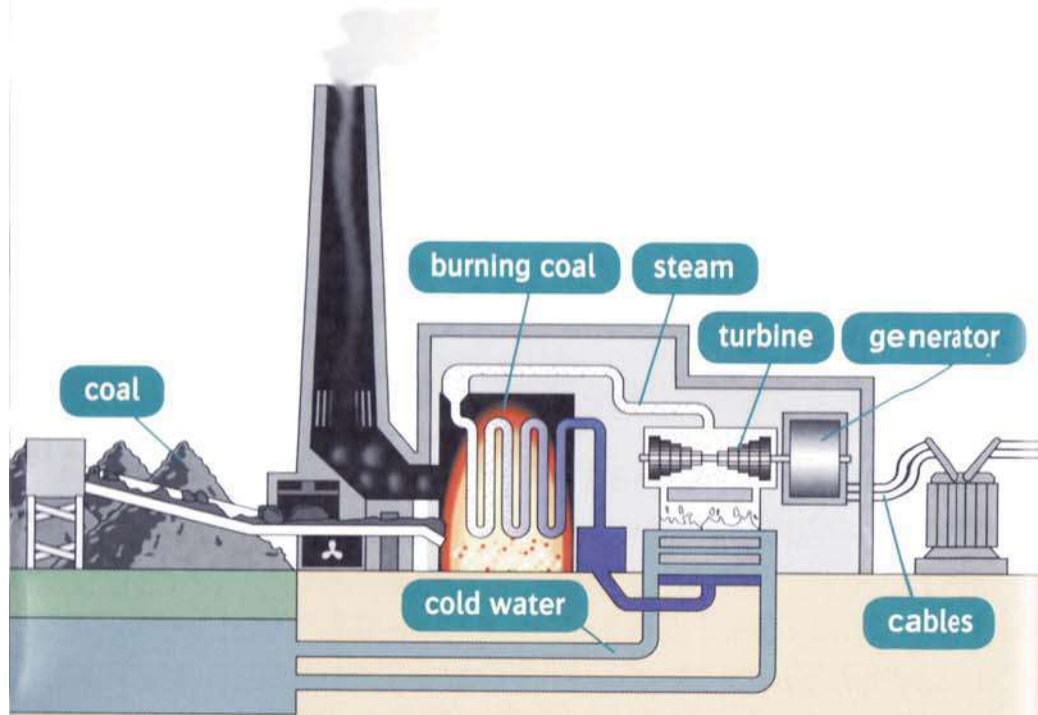
People get oil from oil rigs in the ocean, and they get gas and more oil from wells on land. The oil and gas move through long pipes to where people need it. People mostly use gas for heating and cooking. They usually use oil to make gasoline and to make new chemicals.



One of the longest gas pipes in the ocean goes 1,200 kilometers from Norway to the United Kingdom.



Gas Pipes, USA



How a Coal Power Station Works

Fossil Fuels for Electricity

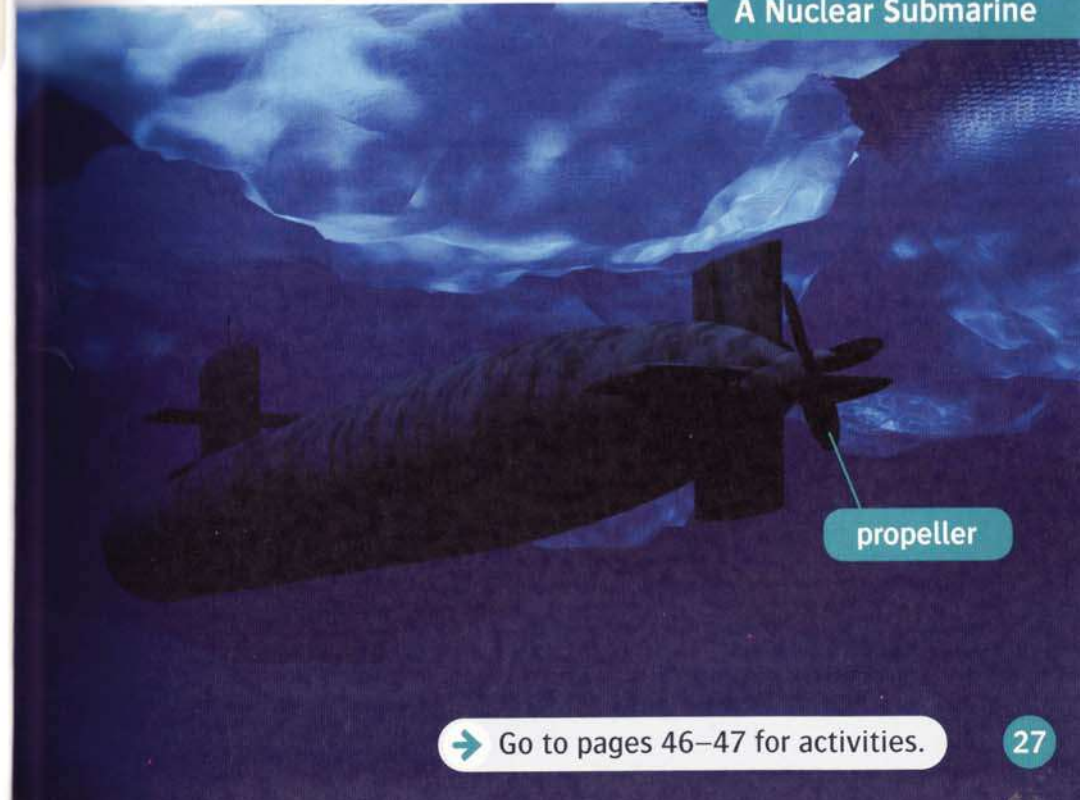
Most large power stations use the chemical energy in coal to make electricity. In a coal power station, people use heat energy from burning coal to boil water. The boiling water makes steam that has lots of kinetic energy. The steam turns a turbine. The turbine turns a generator and this makes electricity. Cold water then cools the steam and converts it back into water. Some water is heated up again by burning more coal to make more steam. The electricity moves through cables to our homes and other buildings where we can use it.

Nuclear Energy

Nuclear energy doesn't come from fossil fuels. It's a different type of energy. Nuclear fuel is a metal called uranium. We get nuclear energy when atoms inside uranium are broken. Every atom has a part called the nucleus, and this is where nuclear energy is. When a uranium atom breaks open, the energy comes out as heat. When many atoms break open at the same time, large amounts of heat are made.

Heat from nuclear energy is used to make steam that turns turbines and generators in a nuclear power station. In nuclear submarines, the steam turns propellers that move the submarine forward.

A Nuclear Submarine



7

Problems with Fuels

About 75% of the energy that people use for power stations and vehicles around the world is made from fossil fuels. Fossil fuels and nuclear fuels are very useful, but there are problems with using both of them.



Using Earth's Coal

Non-Renewable Fuels

One problem with fossil fuels is that they are non-renewable. Fossil fuels are made from plants and animals that lived millions of years ago. When we have used all the fossil fuels that are on Earth now, there will not be any more. Some scientists say that oil will run out in 40 to 70 years, and gas in 50 to 150 years. Coal will run out in about 1,000 years.

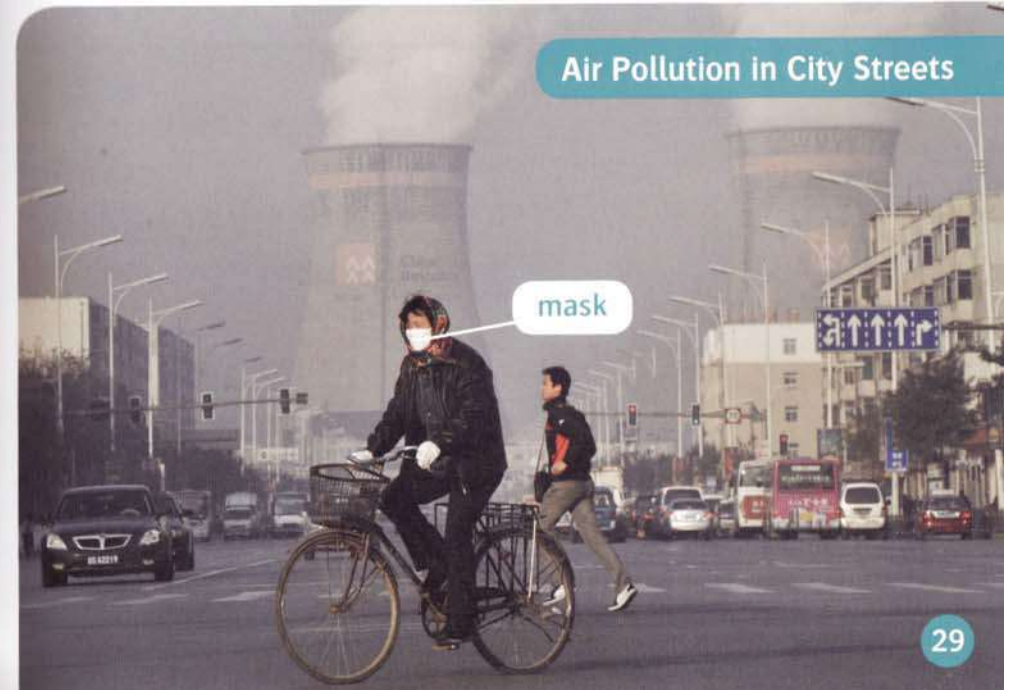
Dirty Air

When fossil fuels are burned, they make different gases that make the air dirty. This is called air pollution. Air pollution is bad for plants, animals, and people.

Power stations and vehicles make air pollution. When gasoline is burned in cars and other vehicles, people who are walking or riding bicycles in the streets sometimes start to cough. The problem is worse in cities, where there are many cars. In some cities you can see the air is dirty. Some people wear a mask over their face so that they don't breathe the pollution.



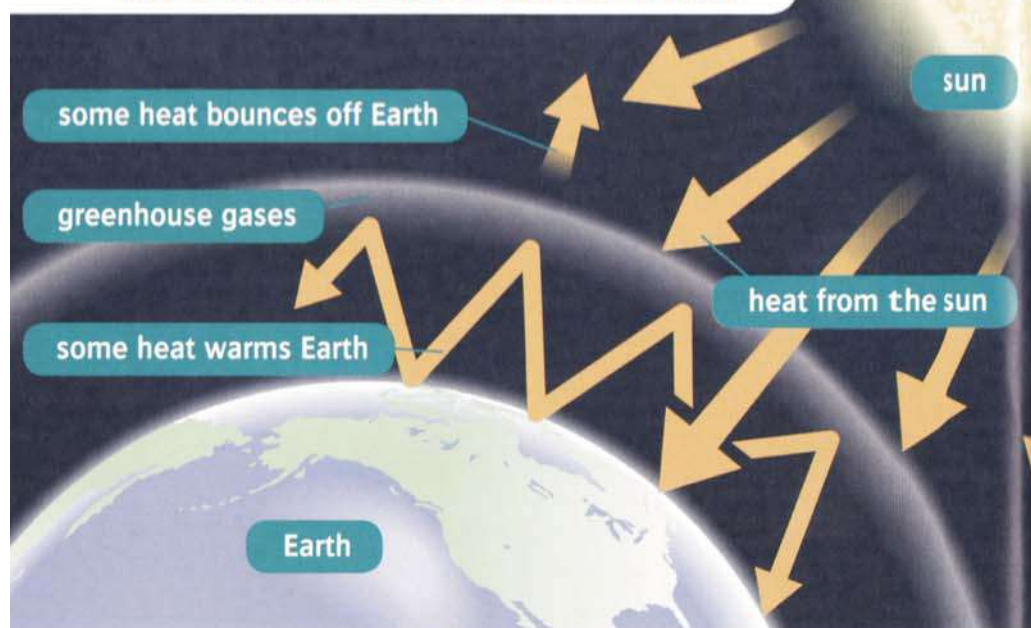
There are 700 million cars in the world. There may be 1,400 million in 30 years!



Air Pollution in City Streets

mask

How Greenhouse Gases Work



Greenhouse gases are a mixture of gases in the air around Earth. When heat from the sun warms Earth, some of it bounces off Earth and goes back into space. Greenhouse gases stop some of this heat going back into space.

Greenhouse gases are useful because they store the heat and they keep Earth warm. Without greenhouse gases, Earth would be so cold that we would not be able to live here!

Greenhouse Gas Problems

When lots of fossil fuels are burned, they put too many greenhouse gases into the air. This makes it warmer on Earth and it can change the world's climate. This is called global warming.

Many scientists think that global warming has started forest fires, has created more floods, and is melting glaciers and ice in the Arctic and Antarctic.



If polar bears in the Arctic don't have ice to climb onto, they could die.



Nuclear Problems

The biggest problem with nuclear fuel is that after uranium has been used, it makes dangerous radioactive waste. The radioactive waste stays dangerous for hundreds of years so it has to be stored very, very carefully. The radioactive waste is invisible, but it's very dangerous and it can kill living things.

Storing Radioactive Waste



8

Saving Energy

There are problems with fossil fuels and nuclear fuels, and we need to use more renewable energy. Renewable energy comes from things like wind, water, and sunlight. These are types of energy that will not run out.

Solar Panels Making Electricity



32

Solar Energy

People use the sun's energy, or solar energy, to heat water and to make electricity. In some homes, solar panels use the sun to heat water. The panels take heat from the sun and then they heat the water in pipes. Some types of solar panel have photovoltaic cells inside. The photovoltaic cells convert sunlight into electricity. They can be used in small machines like laptops, or on a roof to make electricity. Many photovoltaic cells together can make electricity for thousands of people.

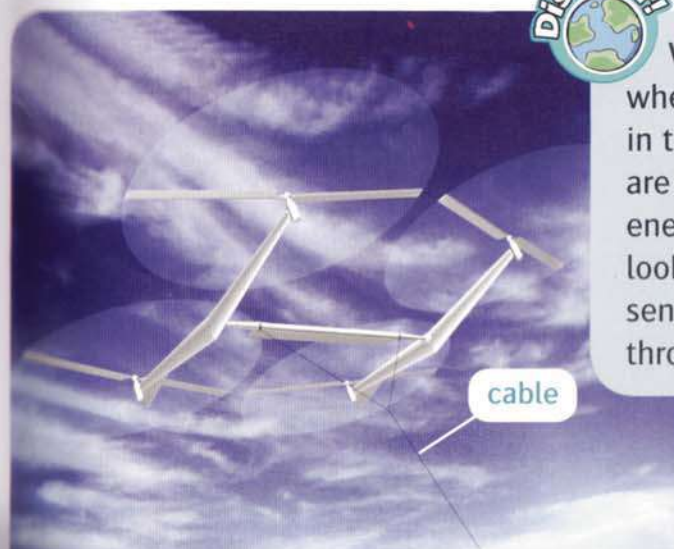
Wind Energy

Wind is moving air. To catch wind energy, people build wind turbines in windy places, like high hills or near beaches. Wind turbines are tall and they have three or four blades at the top. The blades turn like a propeller when the wind blows on them. The blades then turn a generator inside the wind turbine to create electricity. When many wind turbines are built together to make a lot of electricity, this is called a wind farm.

A Wind Farm



Winds are stronger when they are higher in the sky, so scientists are inventing wind energy machines that look like kites! They send electricity to Earth through long cables.

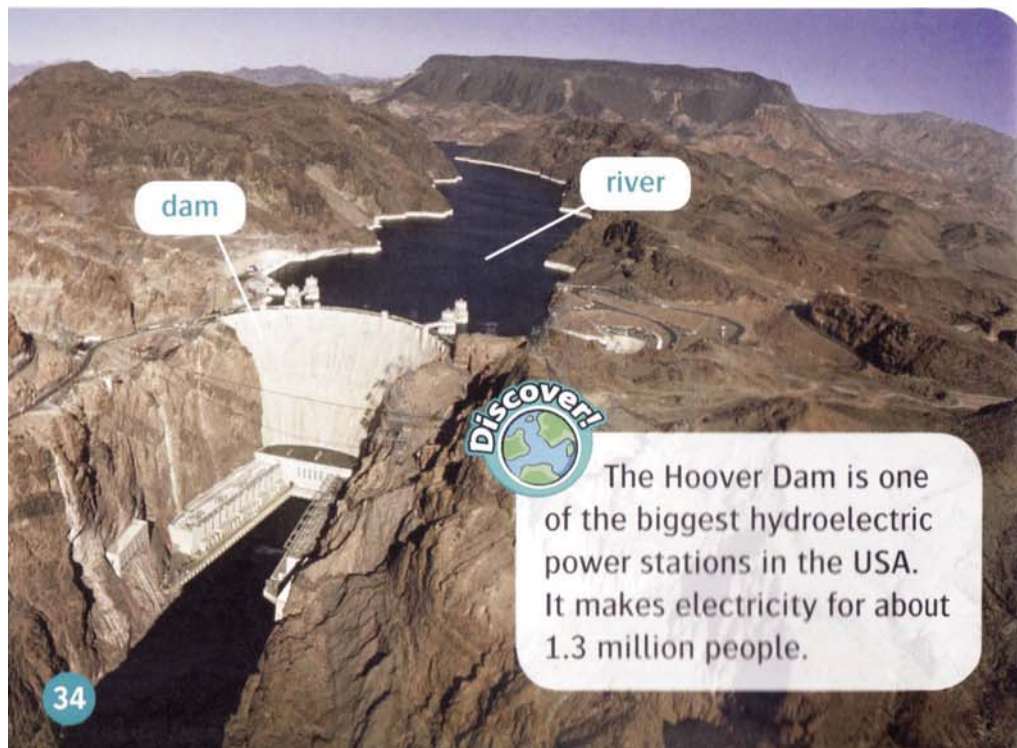


33

Energy from Water

People can use the kinetic energy of moving water to make electricity. For example, water that moves down mountains moves very quickly and so it has a lot of kinetic energy. In a hydroelectric power station, this water moves quickly into pipes, which push it through turbines. The water turns turbines that turn generators to make electricity.

Some hydroelectric power stations are next to rivers. A large wall called a dam holds the water so it becomes a store of potential energy. When the water stored behind a dam is pushed through pipes and turbines, the potential energy is converted into kinetic energy that can be used to make electricity.



The Hoover Dam is one of the biggest hydroelectric power stations in the USA. It makes electricity for about 1.3 million people.



A Bicycle Park, the Netherlands

What Can We Do?

We can all help to save energy. We can use fewer fossil fuels every day by changing some of the things that we do. For example, we can save oil by walking, riding bicycles, sharing rides to school, or traveling by bus instead of making all our journeys by car. This will also reduce the amount of air pollution and greenhouse gases that go into the air. We can use less electricity by turning off lights and electric machines when we aren't using them.

In the future, there will be more people on Earth and we will need more electricity and more energy for our vehicles. What will you do to help to save energy for the future?

→ Go to pages 50–51 for activities.

1

Energy Everywhere

← Read pages 4–7.

1 Write *true* or *false*.

- 1 When we use energy, we lose it. false
- 2 When we use energy, it becomes a different type of energy. _____
- 3 When we move, we use energy from the food that we eat. _____
- 4 When runners run, some of their energy is converted into light energy. _____

2 Complete the sentences.

sailing boats stored energy Potential Wind kinetic

- 1 There are many different types of energy.
- 2 All things that move have _____ energy.
- 3 _____ has kinetic energy.
- 4 Kinetic energy makes _____ move.
- 5 _____ energy is stored energy.
- 6 When we run, potential energy that's _____ in our body is converted into kinetic energy.

3 Order the words.

- 1 stretch a / we give it energy. / When we / rubber band,
When we stretch a rubber band, we give it energy.
- 2 jump on a / When we / its springs. / this stretches / trampoline,

- 3 potential energy. / the springs / When we stretch / this gives / a trampoline

- 4 When springs / is converted into kinetic energy. / potential energy / can't be stretched any more,

4 Circle the correct words.

- 1 Some things have potential / kinetic energy because they are high up.
- 2 When you lift something off the floor, some of the energy / time that you use goes into it.
- 3 When something falls, potential energy is converted into kinetic / heat energy.
- 4 When something is very high up, it has a lot of potential / kinetic energy.
- 5 Water in a high waterfall moves fast because it has a lot of potential / kinetic energy.

2

Heat Energy

← Read pages 8–11.

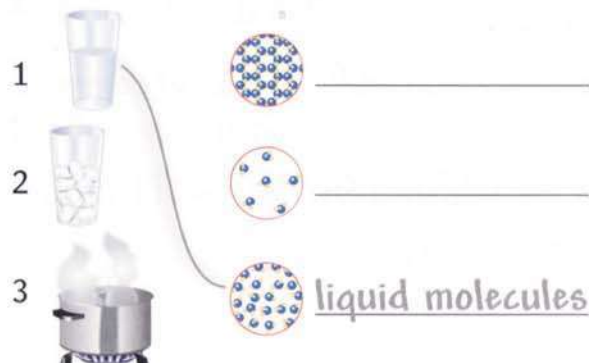
1 Match.

- | | |
|-----------------------------------|------------------------------|
| 1 Heat energy from the sun | make our homes warm. |
| 2 Inside our body, heat energy | it has a low temperature. |
| 3 We can use heat energy to | keeps us warm. |
| 4 When heat is added to something | makes Earth warm. |
| 5 When something is cold | its temperature gets higher. |

2 Circle the correct words.

- Everything in the world is made of parts called **atoms** / air.
- Atoms join together to make **molecules** / rocks.
- Atoms and molecules are very **big** / small.
- When heat energy is added to something, it makes the molecules inside move **more** / less.

3 Match. Then write the words.



liquid molecules
solid molecules
gas molecules

4 Complete the sentences.

conduction temperature wood cooler materials

- Heat energy moves from things that are warmer to things that are _____.
- When heat moves between things that are touching, it's called _____.
- Heat moves between two things until they are the same _____.
- Heat moves quickly through _____ like metal.
- Heat moves slowly through materials like _____.

5 Answer the questions.

- What do we have to do to keep our homes warm when it's cold?
We have to stop heat moving from the inside to the outside.
- What do insulators do?

- Why can we use air as an insulator?

- How do jackets help to keep us warm in winter?

3 Sound and Light

← Read pages 12–15.

1 Complete the chart.

windows walls water
trees doors air

Things that are transparent:	Things that are opaque:
windows	

2 Order the words.

1 that travel in the air. / are types of energy / Sound and light

2 when something / Sound happens / vibrates.

3 it makes the air / around the drum vibrate, too. /
When a drum vibrates,

4 travel through the air / The vibrations / in all directions. /
of sound

5 are called / in the air / The vibrations / sound waves. /
of sound

3 Correct the sentences.

1 Sounds get more energy and get stronger when they move.

Sounds lose energy and get weaker when they move.

2 To send sounds from one place to another, light waves are converted into radio waves.

3 Radio waves are visible. We can see them.

4 Cell phones convert radio waves back into sound waves so that we can see the sounds.

4 Write true or false.

1 When something is luminous, it gives off light. _____

2 Lamps, candles, and fires are not luminous. _____

3 Shadows happen when something opaque stops light moving through it. _____

4 A laser is a type of light that we get from the sun. _____

5 A laser beam has very little energy. _____

6 Doctors use lasers to operate on some parts of the body. _____

5 Write about sounds that you like.

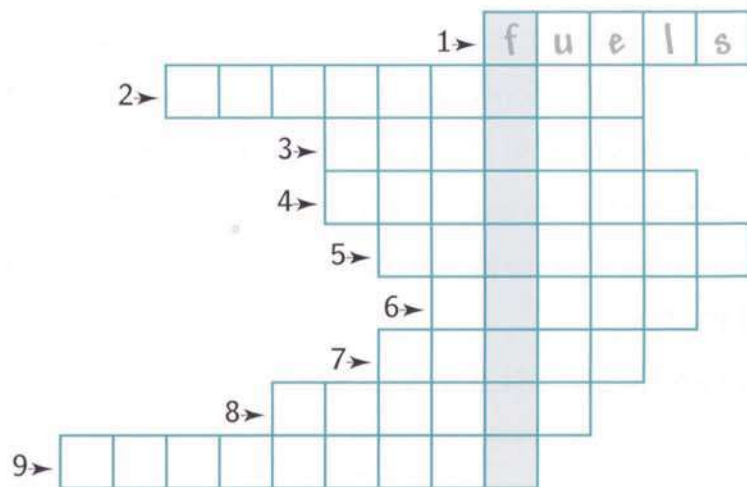
4

Chemical Energy

← Read pages 16–19.

1 Complete the puzzle. Then write the secret word.

- Materials that have chemical energy are called ____.
- Chemical energy is a type of ____ energy.
- Wood and gasoline have a lot of chemical ____.
- In a car engine, chemical energy from fuel is converted into ____ energy.
- Inside a firework there are ____ that use chemical energy in different ways.
- Fireworks convert chemical energy into kinetic energy, light energy, and ____ energy.
- The ____ thing that burns in a firework is fuel.
- When metals in a firework burn, they make ____ of different colors.
- Some ____ inside fireworks make loud sounds when they are burned.



The secret word is:

2 Match. Then write the sentences.

We use chemical energy from food
Plants convert light energy

Plants store

Animals eat plants to use some

In food chains, energy from food

chemical energy.

from the sun into chemical energy.

of the chemical energy from the plant.

moves from one living thing to another.

to live, to move, and to grow.

1 We use chemical energy from food to live, to move, and to grow.

2 _____

3 _____

4 _____

5 _____

3 Complete the sentences.

energy sun dissolves chemicals

1 Most living things need energy from the _____.

2 Some food chains in the oceans start with a different type of _____.

3 Hot water _____ some of the chemicals in rock under deep oceans.

4 Living things called bacteria feed on the _____.

5 Electricity

← Read pages 20–23.

1 Write the type of energy.



1 _____



3 _____



2 _____



4 _____

light energy heat energy
kinetic energy sound energy

2 Complete the sentences.

movement electrons lightning electricity

- 1 Inside atoms there are parts called _____.
- 2 When electrons move from one atom to another, they make _____.
- 3 One type of electricity is _____.
- 4 A flash of lightning is the _____ of electricity.

3 Write *true* or *false*.

- 1 Power stations are factories that make electricity. _____
- 2 Electricity can't move easily through materials called conductors. _____
- 3 Most metals are bad conductors. _____
- 4 Electricity cables are made of metal. _____
- 5 Electricity can't move easily through materials called insulators. _____

4 Order the words.

- 1 is used / In a toaster, / to cook bread. / electricity

- 2 slow down electricity / is converted / Metal wires / so that / some of its energy / in a toaster / into heat.

- 3 give us heat. / electric wires / In a hairdryer,

- 4 a hairdryer / Electricity turns / to dry hair. / to push heat / out of / a fan

- 5 a wire / so hot / white and glows. / electricity makes / In a lamp, / that it becomes

5 Answer the questions.

- 1 What do small machines like calculators use for their electrical energy?

- 2 Why are batteries useful?

- 3 When is the chemical energy in a battery converted into electricity?

- 4 Why shouldn't you play with a battery or open a battery?

6 Fuels for Energy

← Read pages 24–27.

1 Find and write the words.

f	i	o	c	c	e	a	r	t	h
u	x	i	a	n	c	i	e	n	t
e	t	l	t	a	b	y	h	e	c
l	n	e	m	u	d	g	e	s	e
s	q	w	c	d	x	e	a	o	m
l	f	c	o	a	l	n	t	w	l
b	p	l	a	n	t	s	n	g	s
l	u	n	a	n	i	m	a	l	s
f	u	a	t	o	i	r	a	t	i
t	x	d	j	u	n	g	l	e	s

- 1 fuels
- 2 c
- 3 o
- 4 a
- 5 j
- 6 e
- 7 h
- 8 m
- 9 a
- 10 p

2 Circle the correct words.

- 1 Coal, oil, and **gas** / **water** are fossil fuels.
- 2 Coal is made from **plants** / **animals** that lived millions of years ago.
- 3 Oil and gas come from animals that lived in ancient **forests** / **oceans**.
- 4 People who collect coal are called **miners** / **doctors**.
- 5 People cut coal out of the rock under the **ground** / **ocean**.
- 6 People **mostly** / **never** use gas for heating and cooking.
- 7 People usually use **oil** / **coal** in cars and other vehicles.

3 Order the words. Then answer the questions.

- 1 What do / electricity? / large power stations / use to make

- 2 coal power station? / burn coal / in a / Why do people

- 3 have? / does steam / of energy / What type / from boiling water

- 4 power station, / In a / steam turn? / what does

- 5 make electricity? / help to / a turbine / How does

4 Write true or false.

- 1 We get nuclear energy when atoms inside uranium are joined. _____
- 2 Nuclear fuel is a metal called uranium. _____
- 3 Nuclear energy is in the nucleus of an atom. _____
- 4 When a fuel atom breaks open, the energy comes out as heat. _____

7 Problems with Fuels

← Read pages 28–31.

1 Write sentences with these words.

fossil fuels non-renewable oil gas

1 Fossil fuels are made from plants and animals that
lived millions of years ago.

2 _____

3 _____

4 _____

2 Correct the sentences.

1 Fossil fuels make different gases that make the air clean.

2 Air pollution is good for plants, animals, and people.

3 Power stations and vehicles stop air pollution.

4 Air pollution is worse in cities where there are few cars.

5 In some cities, people wear a mask over their bicycle.

3 Write the sentences in order.

Greenhouses gases store	warms Earth.
Greenhouses gases stop	and goes back into space.
Some heat bounces	some heat going back
off Earth	into space.
Heat from the sun	heat and keep Earth warm.

How greenhouse gases keep Earth warm:

1 Heat from the sun warms Earth.

2 _____

3 _____

4 _____

4 Complete the sentences.

fires uranium warming ice invisible air climate

1 Burning fossil fuels puts more greenhouses gases into the
_____.

2 More greenhouses gases can change the world's
_____.

3 This is called global _____.

4 In some countries, global warming has started forest
_____.

5 The _____ is melting at the Arctic and Antarctic.

6 After _____ has been used, it makes radioactive
waste.

7 Radioactive waste is _____.

← Read pages 32–35.

1 Match.

- 1 We need to use fewer
- 2 Renewable energy comes
- 3 Renewable energy
- 4 People use solar energy
- 5 Solar panels in a roof use
- 6 Photovoltaic cells

will not run out.
to heat water and to
make electricity.
heat from the sun
to warm water.
convert sunlight
into electricity.
fossil fuels.
from wind, water,
and sunlight.

2 Complete the sentences.

propeller blades air tall generator turbines

- 1 Wind is moving _____.
- 2 To catch wind energy, people build wind _____
in windy places.
- 3 Wind turbines are _____.
- 4 Wind turbines have three or four _____ at the top.
- 5 The blades turn like a _____ when the wind blows
on them.
- 6 The blades turn a _____ inside the wind turbine to
create electricity.

3 Answer the questions.

- 1 What type of energy does moving water have?

- 2 What happens in a hydroelectric power station?

- 3 What does a dam do?

- 4 What happens when water behind a dam is pushed through
turbines?

- 5 How much electricity does the Hoover Dam make?

4 Write about the things you do to save energy. What other things could you do to save energy for the future?

Project 1

An Energy Survey

1 Write notes about the electricity that you use.

What machine do you use?	What do you use it for?	How long do you use it for?

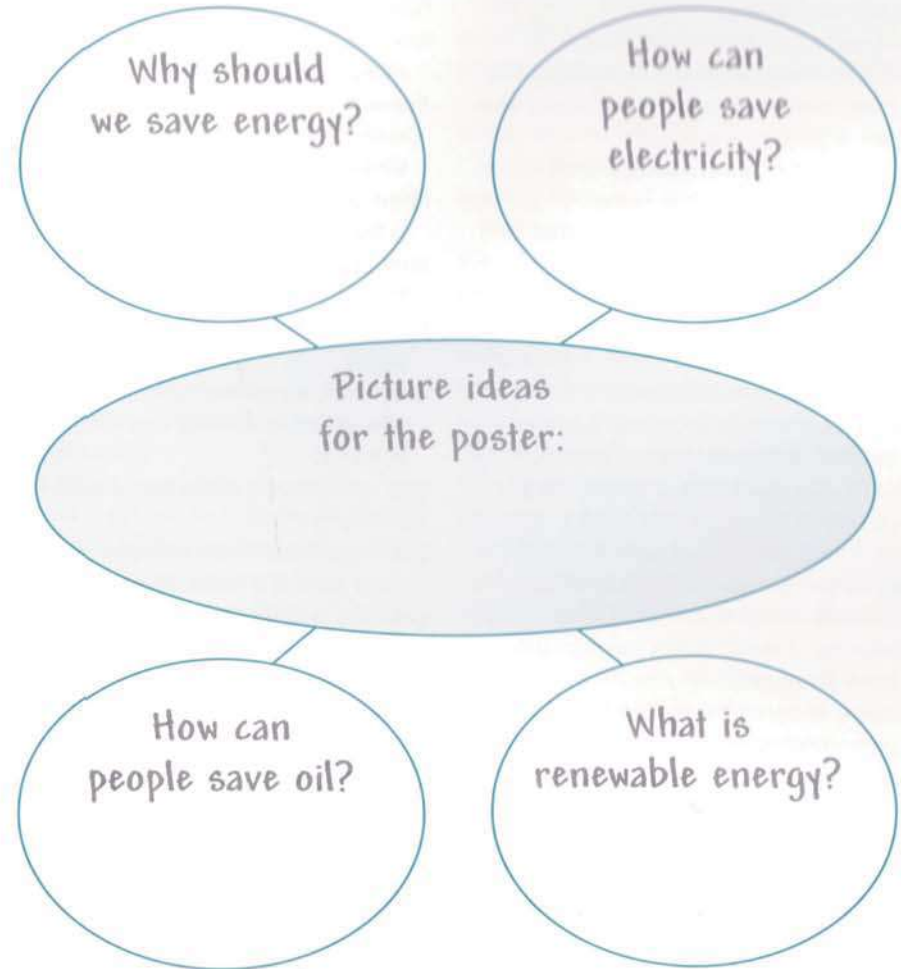
2 Write about your results.

3 Display your results.

Project 2

An Energy Poster

1 Design a poster about saving energy. Write notes.



2 Make a poster. Write sentences and add pictures to decorate your poster.

3 Display your poster.