

7

Energy How Things Work

Chapter Notes:

What is Energy?

- We see many activities around us — cooking, moving, lighting, making sound, heating or cooling.
- The **Sun** gives us **light** and **heat**.
- Around us, things move, light up, make sounds, or get warm or cool — something makes this happen.
- That “something” is **Energy**.
- **Energy** makes things move, light up, produce sound, do work, and change temperature.
- We use energy every day, often without noticing.

Sources of Energy

- The food we eat gives us energy to move, play and work.
- When we don't eat, we feel tired; when we eat, we feel active.
- Food is a **source of energy** for all living things.
- Animals also get energy from food.
- Our brain uses energy even when we are sitting or thinking.
- In cold places, people keep cattle below their homes — the heat from animals keeps rooms warm.

Energy from Fuel

- Fuels like **petrol, diesel, kerosene, wood, coal, and LPG** provide energy.
- At home, we use **cooking gas, wood, or coal** as fuel.
- Burning wood or coal creates smoke and pollution, so it must be used carefully.

Energy from Electricity

- Many things need electricity to work — fans, lights, mixers, coolers, computers, etc.
- Electricity is used for movement, light, sound, and heat.
- Our lives have become easier with electricity.
- It is also used in industries to run machines.
- **Safety Rules:-**
 - Do not touch wires or electrical devices when plugged in.
 - Do not insert objects into sockets.
 - Stay away from broken wires and poles.
 - Do not play near electric boxes or transformers.
 - Always tell an adult if something looks unsafe.
- **Energy efficiency** means using less energy to do the same work — for example, using LED bulbs instead of normal ones.

Generating Energy from the Sun, Wind and Water

- Most electricity comes from burning coal, which causes pollution.
- We can produce electricity using the Sun, wind, and water without pollution.
 - 🌞 **Solar Energy** – From the Sun.
 - 🌬️ **Wind Energy** – From moving air.
 - 💧 **Water Energy** – From flowing water (used in watermills or turbines).

Clean Energy

- Solar panels capture sunlight to make electricity.
- Windmills and fast-flowing rivers generate electricity.
- These do not pollute the environment and are called **clean energy**.

New Terms

Term	Meaning (as per textbook context)
• Energy	- What makes things move, light up, make sound, do work, and change temperature.
• Heat Energy	- The energy that makes things warm or hot; we get it from the Sun, fire, fuel, or electricity.
• Light Energy	- The energy that helps us see things; comes from the Sun, bulbs, or lamps.
• Sound Energy	- Energy produced when things vibrate, such as a plucked rubber band.
• Fuel	- A substance like petrol, diesel, wood, coal, or gas that gives energy when it burns.
• Electricity	- A form of energy used to run devices like fans, lights, TVs, and refrigerators.
• Solar Energy	- Energy we get from the Sun's light and heat.
• Wind Energy	- Energy we get from moving air (wind), used in windmills and sails.
• Water Energy	- Energy from flowing or falling water, used in water wheels or hydro plants.
• Clean Energy	- Energy from natural sources like Sun, wind, and water that does not pollute the environment.
• Energy Efficiency	- Using less energy to do the same work, e.g. using LED bulbs instead of normal ones.
• Stored Energy	- Energy that is kept for later use, such as in batteries or our body.
• Pollution	- The harmful effect caused by smoke or waste from burning fuels.
• Fuel Efficiency	- The distance a vehicle can travel using a certain amount of fuel.

What is Energy?

Q. Let us observe a kitchen for some time. Write your observations and the questions that come to your mind in the table given below.

Answer:

I Observe	I Wonder
• The food is getting cooked.	- How is it being cooked? <i>(It is being cooked using heat energy from gas or fire.)</i>
• The fan is moving.	- How does the fan move? <i>(It moves using electrical energy.)</i>
• The light is glowing.	- How does the light glow? <i>(It glows using electrical energy.)</i>
• The pressure cooker is making a sound.	- Why is it making a sound? <i>(Because of the steam energy inside it.)</i>

From observations of nature and society, here are three things we can notice for each category:

- **Moving:** Wind rustles the leaves, cars drive on roads, and birds fly in flocks.
- **Providing Light:** The Sun lights up the Earth, streetlights glow at night, and fireflies twinkle in the fields.
- **Making a Sound:** Thunder booms during storms, voices buzz in the market, and crickets chirp at night.
- **Making Things Cool:** Breezes cool the lakeside, air conditioners chill rooms, and tree shade lowers the temperature.
- **Making Things Hot:** The Sun heats the roads, stoves cook food, and furnaces melt metals.

Discuss

Q. What makes these things move, shine, make a sound or get warm and cold?

Answer: All these things move, shine, make a sound, or get warm and cold because of energy. Energy is what makes things work — it helps things move, produce light, make sounds, and change temperature.

Activity 1

1. Take a balloon and blow into it until it fills up.
2. Hold it tightly.
3. Then, release the mouth of the balloon and observe what happens.

When air rushes out of the balloon, it pushes the balloon forward. This is how the movement of air generates energy.

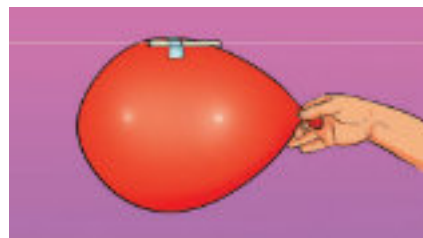
Extension Activity: Balloon Air Rocket

1. Fill the balloon with air, and attach it to a small and light object to make it move.
2. Fill the balloon with air and attach it to a straw with tape. Pass a string through the straw. Now, release the balloon and watch it move along the string.

Answer: When the air rushes out of the balloon, it pushes the balloon forward. This shows that the movement of air produces energy, which makes things move.

Extension Activity (Balloon Air Rocket):

- When the balloon filled with air is released, the air coming out pushes it along the string.
- This happens because moving air gives energy and causes motion.



Think

Q. What would you change in the activity to make the toy move faster or slower?

Answer: To make the toy move faster, fill the balloon with more air so that more air rushes out and gives a stronger push. To make it move slower, fill the balloon with less air so that less air comes out and the push is weaker.

Activity 2

Rubber Band Guitar

1. Make a hole on the top of a cardboard box.
2. Stretch rubber bands around the box and across the hole.
3. Place a ruler or pencil under the bands at one end to raise them.
4. Pluck the bands and listen to the sounds produced.



Plucking the rubber bands makes them vibrate and produce sounds. This is known as sound energy.

Answer: When the rubber bands are plucked, they vibrate and produce sound. This shows that vibrating objects produce sound energy.

Think

Q. What happens if you use thinner or thicker rubber bands? Do they sound different?

Answer: Yes, they sound different. Thinner rubber bands make a higher-pitched (sharper) sound, while thicker rubber bands make a lower-pitched (deeper) sound.

Activity 3

Sun-powered Water Warmer

1. Fill two cups with water.
2. Place one cup in the sunlight and another in the shade.
3. Wait for 15–20 minutes and then touch the water in both the cups. What do you notice?

The water kept in the sunlight is warmer because the Sun heats it up. This shows how the sunlight gives us heat energy.

Answer: The water kept in the sunlight becomes warmer than the one kept in the shade. This shows that the Sun gives us heat energy, which warms things up.



Think

Q. What do cars and scooters need to keep running?

Answer: Cars and scooters need fuel such as petrol or diesel to keep running.

Write

Q. How is food cooked in your house?

Answer: Food in my house is cooked using cooking gas (LPG), which provides heat energy for cooking.

Discuss

1. What kind of fuel do you use at home for cooking?

Answers: At home, we use cooking gas (LPG) as fuel for cooking.

2. What are the problems using too much wood or coal?

Answers: Using too much wood or coal causes smoke and air pollution, which is harmful to our health and the environment.

Activity 4

Understanding How Fuel Works

1. Place two diyas (lamps) on a flat surface.

2. In Diya 1—place a cotton wick without any oil, and in Diya 2—place a cotton wick and pour some oil around it.

3. Light the wicks in both the diyas under adult supervision.

4. Observe what happens to the diyas.

(a) Which diya burns longer? Why?

(b) What is acting as a fuel here?

Answer:

(a) The diya with oil burns longer because the oil acts as fuel and keeps the flame burning.

(b) Oil is acting as the fuel in this activity.

Electricity

Q. What are the things in your home that need electricity to work?

Answer: Things in my home that need electricity to work are fans, lights, television, refrigerator, mixer, and washing machine.

Activity 5

Walk around your home or classroom. Identify five things that run on electricity. Fill in the following table.

S. No.	Device	What it does?	What it requires? (light/sound/heat/movement/cooling/ other)
1.	Fan	Blows air	Movement
2.	Tube light / Bulb	Gives light	Light
3.	Television	Shows pictures and sound	Sound and light
4.	Refrigerator	Keeps food cool	Cooling
5.	Mixer / Grinder	Grinds food items	Movement
6.	Iron	Presses clothes	Heat

Think

Q. What would your day be like if there was no electricity at all?

Answer: If there was no electricity at all, my day would be very difficult. There would be no lights, fans, or TV, and I would not be able to use the refrigerator, charge my phone, or study comfortably at night.

Think

Q. Place a small damp cloth in the Sun. Keep another damp cloth in the shade. Which one do you think will dry first? Why?

Answer: The cloth kept in the Sun will dry first because the Sun's heat energy makes the water in it evaporate faster.

Activity 6

Pinwheel

1. Take a square piece of paper.
2. Draw its two diagonals with the help of a ruler.
3. Now, you have four equal parts.
4. Cut halfway along each of the four lines.
5. Fold each corner and pin it to the stick as shown in the image.
6. Now, hold your pinwheel in the wind. If there is no wind, hold it up and run with it.



What happens to your pinwheel?

Answer: When the pinwheel is held in the wind or when we run with it, it spins or rotates. This shows that moving air (wind) has energy which can make things move.

Activity 7

Sunlight in Focus

1. Take a piece of paper and a magnifying glass.
2. Place the paper in direct sunlight and use the magnifying glass to focus the light on it.

Tip: The activity has to be done under adult supervision.

3. What happens to your paper?

Answer: When sunlight is focused on the paper using a magnifying glass, the paper starts to burn or becomes brown. This shows that sunlight gives us heat energy.

Activity 8

Water Wheel

1. Take an empty paper cup and five spoons.
2. Make five holes around the cup and insert the spoons.
3. Then, insert a pencil or straw through the bottom of the cup.
4. Observe that the cup moves around the pencil like a wheel.



5. Balance your wheel on a container as shown in the image.

6. Now, pour water onto your wheel.

7. Does the water make the wheel move?

Answer: Yes, when water is poured onto the wheel, it starts moving or spinning.

This shows that flowing water has energy that can make things move.

Write

1. Can you think of more examples where we use the Sun, the wind or the flowing water?

Answer: Yes, here are some examples:

- **Sun:** Used for drying grains, making solar cookers work, and heating water.
- **Wind:** Used to fly kites, run windmills, and sail boats.
- **Flowing Water:** Used to turn watermills and generate electricity in dams.

2. Did you know that even our vehicles can run on electricity?

Answer: Yes, some vehicles like electric cars, bikes, and buses can run on electricity instead of petrol or diesel. These vehicles help to reduce air pollution and save fuel.

Write

Energy All Around Us

List actions that you see in the picture above and fill in the following table.

Activity	Source of Energy
• A child carrying a school bag.	- Food
• A car moving on the road.	- Petrol or diesel (fuel)
• A fan spinning.	- Electricity
• Clothes drying in the sun.	- Sunlight
• A boat sailing.	- Wind

Activity 9

Energy Flow Game

- Prepare paper slips with names or pictures of energy sources: the Sun, wind, water, food, fuel and electricity.
- The second paper slips should indicate types of energy, like heat, light, movement and sound.
- The last paper slips should contain the uses or examples of where this energy is used—drying clothes, lighting a bulb, turning a turbine, cooking, running, etc.

Step 1: Assigning a Role

Give each student one card, where they will either be:

- A source of energy (the Sun, wind, etc.)
- Type of energy (heat, light, etc.)
- Use (for example, helps plants grow, moves a car, etc.)

Step 2: Walk Around and Find Your Match

Students should walk around the class trying to find the two others who complete their energy chain.

For example:

*** Sun → Heat → Helps dry clothes**

*** Wind → Movement → Turns turbine to make electricity**

Step 3: Present to Class

Once matched (source—type—use), each group should quickly explain their match to the class, for example, “We are the heat of the Sun and we help to dry clothes.”

Answer: In the Energy Flow Game, students match the source of energy, type of energy, and its use.

Here are some example matches:

- Sun → Heat → Helps dry clothes
- Wind → Movement → Turns turbine to make electricity
- Water → Movement → Runs a water wheel
- Food → Energy → Helps us run and play
- Fuel → Heat → Used for cooking food
- Electricity → Light → Lights a bulb

This activity helps us understand that energy flows from different sources and is used in many ways around us.

Let us reflect

1. What will happen if there is no electricity in your house for a day?

Answers: If there is no electricity in my house for a day, we will not be able to use lights, fans, television, refrigerator, or charge electronic devices. It will be difficult to study, cook, or stay cool.

2. Why is it better to use solar or wind energy instead of coal?

Answers: It is better to use solar or wind energy instead of coal because they are clean sources of energy that do not cause pollution and are renewable.

3. Give two examples where you have seen energy being stored.

Answers: Examples of stored energy:

- Batteries in a torch or toy store electrical energy.
- Food stores energy in our body for later use.

4. What is the one thing you can do at home to save energy?

Answers: One thing I can do at home to save energy is to switch off lights, fans, and electrical devices when not in use.

5. Find out how many kilometres a vehicle travels per litre of petrol or diesel. Ask about different vehicles.

How will you compare them?

Answers: Different vehicles travel different distances using the same amount of fuel.

- For example: A bike may travel about 50–60 km per litre, while a car may travel about 15–20 km per litre.
- We can compare them by checking which vehicle travels more kilometres using the same amount of fuel that one is more fuel-efficient.

6. Look around your home or classroom. List any three objects that use energy and mention their source of energy.

For example: Object; Fan → Energy Source: Electricity

Answer:

Object	Energy Source
• Fan	- Electricity
• Gas Stove	- LPG (Cooking Gas)
• Tube Light	- Electricity
• Refrigerator	- Electricity
• Human (running or working)	- Food

7. Create and share:

(a) Draw or make a simple plan of a 'clean energy home' that uses solar, wind or any such source of energy.

(b) Make 'my energy diary' for one day, record the number of times you have used the electricity fuel and so on.

Answer:

(a) Clean Energy Home:

A clean energy home uses solar panels on the roof to get electricity from sunlight, a windmill in the backyard to produce power from wind energy, and rainwater harvesting to save water. The house uses LED bulbs, solar water heaters, and keeps windows for natural light and air to reduce electricity use.



(b) My Energy Diary (for one day):

Time	Activity	Energy Used	Source of Energy
• Morning	Boiled water for tea	Heat	LPG (Cooking Gas)
• Afternoon	Used fan and light	Electricity	Solar/Electric Power
• Evening	Watched TV	Electricity	Solar/Electric Power
• Night	Had dinner	Heat	LPG (Cooking Gas)

At the end of the day, I can see that I use electricity and fuel many times, so I will try to save energy by turning off lights and using clean energy sources like solar power.