

— ENERGY & CHANGE

SOURCES OF ENERGY

GRADE 7



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- Energy works in a system.
- Energy can be transferred in the system, but the total amount of energy will remain the same.
- This is known as the **Law of Conservation of energy**.
- Energy can be in the form of potential or kinetic energy.
- There are different types of energy, such as heat, electrical and light energy.
- Energy can change from one type to another, such as, when we switch on an oven, electrical energy goes into the oven through the element and changes into heat energy when the oven is warm.



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SOURCES OF ENERGY

Renewable and Non-renewable sources of energy

- The word **'work'** is used to describe a number of different activities.
- When you sit down at home to do your homework, you can say that you are **'working'**.
- When a person leaves their house in the morning, they might say that they are **'going to work'**.



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- But, in a scientific context, **'work'** has a very precise meaning. The mother, is pushing the trolley.
- In a scientific sense, she is **'working'** the trolley.
- In other words, when you **push or pull** something and make it move you are doing **'work'** on that specific thing.



What is Kinetic Energy?

Kinetic energy causes a **change or movement**.

A moving object can cause a **stationary object to move**.

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Some examples of kinetic energy are:

- a stretched elastic band which is released;
- a weight that falls off a table;
- water stored in a dam falls through a chute to drive a turbine;
- wind blows and turns a wind pump, a motor car turns the wheels;
- the fast-moving water particles in boiling water (also called heat energy).



- Sometimes you **cannot see the movement** caused by kinetic energy, but you will notice a **change in the object**.

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Different types of potential energy

Elastic potential energy

- When we use the word **"potential"** in everyday life, it refers to something that is not happening now, but it is likely to happen in the future, like stretching an elastic band slightly.

- The elastic band now has potential energy.



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- As you keep stretching it, the potential energy increases.
- When you release the elastic band, it no longer has potential energy.
- However, the energy is not lost; it has simply been converted into another type of energy.
- Anything that can be stretched, squeezed (like a rubber ball) or wound up (like the spring of a jack in a box) has elastic potential energy.



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Potential energy in food



- If you hold a loaf of bread or a bag of oranges, you are holding potential energy.
- The food you eat has potential energy that is released in your body when you eat it.
- The energy content in food should be listed on the packaging of the food.
- Look for the table of typical information and then look for the energy value.

Nutrition Information				
Each slice of bread (40g) contains:				
Energy 397kJ 94kcal	Fat 0.9g	Saturated 0.2g	Sugars 1.4g	Salt 0.4g
5%	1%	1%	2%	7%

of an adult's Reference Intake.
Typical values (as sold) per 100g Energy 993kJ/235kcal

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- The unit of measurement for energy is the joule, named after James Prescott Joule, an English physicist who worked in the field of energy and heat.
- The symbol for joule is J. The joule is quite a small unit of measurement and so energy measurements for food are generally given in kilojoules (kJ). One kilojoule is equal to 1000 J.
- By law, a food can only be labelled as "low in energy" if it contains than 170 kJ per 100g (solid foods) or 80 kJ per 100 ml (liquids). A food can only be labelled as "high in energy" if it contains more than 950 kJ per 100g or 250 kJ per 100 ml.



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Energy is needed to make everything work, move or live

- When a locomotive pulls a train, it is doing work on the train to make it move.
- When you kick a ball, you are doing work on the ball to make the ball move.
- When you switch on a light, work is being done to make electricity flow through the bulb.
- When you run, your muscles are doing work to make your body move.



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Now that you have an understanding of what is meant by 'work' let's examine what is meant by the word 'energy'?

- Energy is what is needed to do work – to make things move, to make things change and to make things grow or stay alive.

Sources of energy

- We call something a 'source of energy' when that object or substance has stored energy that is (dormant/sleeping).
- Usually, something has to be done to the 'source of energy' for it to release the energy (make something happen).

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- For example, coal is a 'source of energy' because it has energy that is waiting to be used. Its energy is only released when it is heated enough for it to burn.
- It then releases energy in the form of heat and light.
- Stored energy is called potential energy.



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- **The Sun** contains stored energy as well - energy is stored in the hydrogen gas that makes up most of the Sun.
- This energy is constantly being changed into heat and light energy in a reaction that changes hydrogen into helium. We use helium in hot air balloons and party balloons.

