# PHYSICS — Energy 1 — KS3

| Bunsen Burner Skills | Energy as a Quantity | Energy Stores | Energy Transfers and Conservation | Efficiency | Power | Energy Costs | Energy Resources |
|---|---|---|---|---|---|---|---|

## Key Words

| Key Word | Definition |
|---|---|
| **Conservation of energy** | The total input energy into a process equals the total energy output. |
| **Efficiency** | The proportion of useful output energy to total input energy |
| **Power** | The rate of energy transfer |
| **Renewable** | An energy resource that can be reused or replenished as it is used. |
| **Global Warming** | The warming up of Earth's atmosphere due to green-house gases (e.g. carbon dioxide) |

## Misconceptions

- Red flames are hotter than blue flames
- Light and sound are energy stores
- Power and energy are the same thing
- Greenhouse gases are produced from nuclear power.

## Key questions

- How do we describe changes in energy stores?
- What is the difference between power and energy?
- What are the advantages and disadvantages of different energy resources?
- How do we use a Bunsen burner safely?
- Why are efficiencies never greater than 1?

# Physics — Energy as a quantity — KS3

## Energy as a quantity

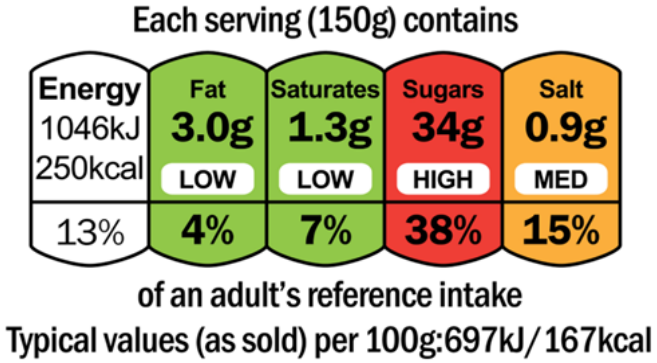
**Energy** is needed to do **work.**

**Work** can be considered to be anything from moving something to changing the temperature of something.

Energy is measured in Joule (J)

Energy is stored in food in the form of chemical energy.

We can find out how much energy is in our food by looking at food labels. It helps us to make healthy choices in our diet.




**Investigating the amount of energy in food**

We can also determine the energy content of some foods by **burning** them and seeing how much the heat released increases the temperature of a set volume of water.

## Equations Covered

$$\text{Efficiency} = \frac{\text{Useful energy output}}{\text{Total energy input}} \text{ or } \frac{\text{Useful power output}}{\text{Total power input}}$$

$$\text{Power} = \frac{\text{energy transferred}}{\text{time}}$$

CONVERT
FORMULA
INSERT VALUES
FINE TUNE (condensing or rearranging)
ANSWER (with units)


Set out calculations using CFIFA to maximise marks:

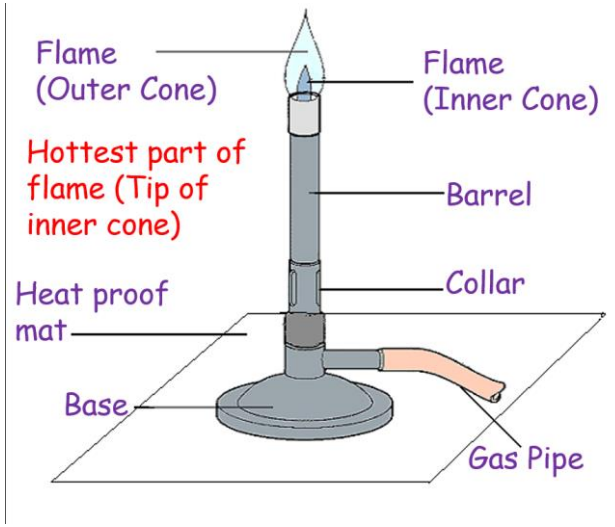
| | |
|---|---|
| **C**onvert | Have standard units been used? Clearly show how you convert them e.g. x100, ÷ 1000 |
| **F**ormula | Write the formula (equation) either in words or symbols, e.g. P = E x t or Power = energy / time |
| **I**nsert | Insert the values from the question replacing the parts of the formula above e.g. 10 = E x 5 |
| **F**ine tune | Show any rearranging needed (write whatever you put into your calculator e.g. 10/5 = E) |
| **A**nswer | Give your answer with the units |

## Bunsen Burners

Safety:

- Always use a heat-proof mat.
- Tie hair-back
- Stand up
- Move away flammable materials
- The collar should be closed and the safety flame on when not in use.

Note, opening the collar allows more air to enter resulting in a hotter, blue flame.



# Physics — Energy Stores and Transfers — KS3

## Energy stores

**K** kinetic

**G** gravitational potential

**of**

**C** chemical

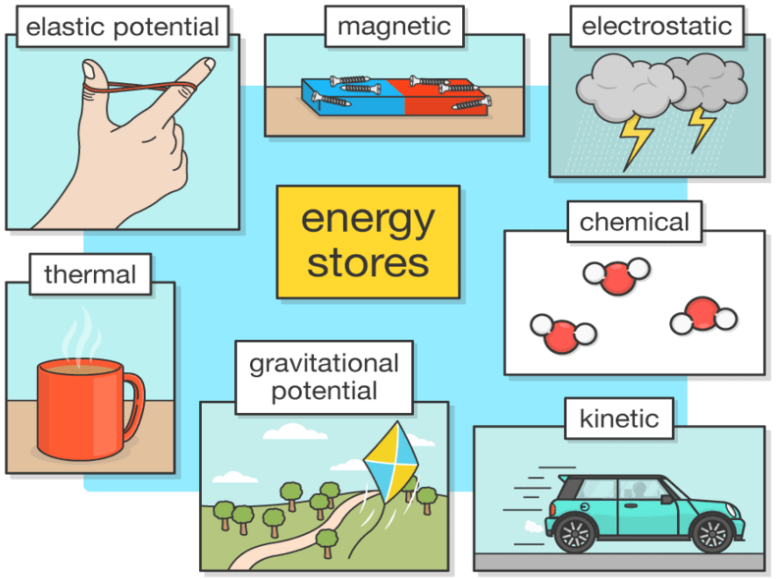
**E** electrostatic

**M** magnetic

**E** elastic

**N** nuclear

**T** thermal




## Efficiency

- Useful energy – Any energy that is transferred into a store that is used for the intended purpose.
- Wasted energy – Any energy that is ***dissipated***.
- Efficiency will always be between 0 and 1.

## Changes in energy

As one store decreases, one or more stores increase (conservation of energy). For a child on a trampoline:

100 J of gravitational potential energy at top of bounce will transfer to 100 J of kinetic energy at bottom and then 100 J of elastic potential energy on the trampoline. Some energy will be dissipated to thermal in surroundings, but total will equal 100 J

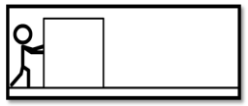
## Conservation of energy

Conservation of energy means that energy is never created or destroyed.

Energy is ONLY transferred between energy stores.


## Energy transfers

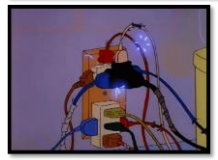
**M** mechanical
(by force)



**R.** radiation
(by light or sound)

**H** heating

**E** electrical



## Energy resources

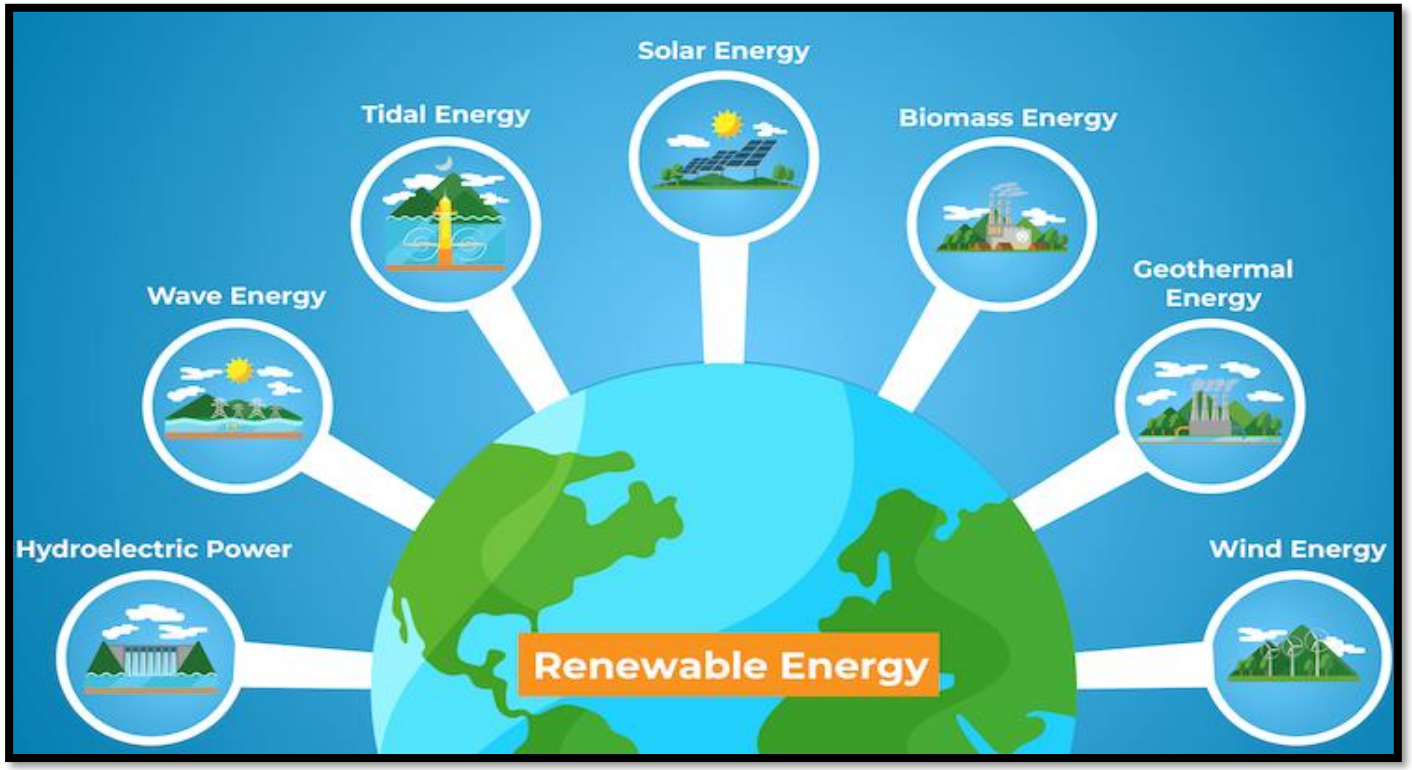
**Renewable** – An energy resource that can be renewed or replenished as it is used.

**Non-Renewable** – An energy resource with a *finite* amount. It will eventually run out when all reserves have been used up.

**Reliability -** Some resources are unreliable, such as solar and wind because it isn't always sunny or windy.

**Greenhouse gases - Oil, coal, and gas** are **fossil fuels**. Burning these gives off carbon dioxide, a greenhouse gas shown to contribute to global warming.

**Nuclear vs. Fossil Fuels**




| | Nuclear | Fossil Fuels |
|---|---|---|
| Renewable or non-renewable? | Non-renewable | Non-renewable |
| Reliable? | Yes | Yes |
| Greenhouse gases? | No greenhouse gases released. Does not contribute to global warming | Releases greenhouse gases so contributes to climate change. |
| Nuclear waste | Nuclear waste is expensive to dispose of. | No nuclear waste |