

Knowledge Organiser Key Stage 3

Subject : Science

Year: 7

Topic Title: Energy

Key Facts

1. Symbols and Units

- a. Energy has the symbol E. The standard unit for energy is **joules (J)**
- b. Time has the symbol t (not capital T). The standard unit for time is **seconds (s)**
- c. Power has the symbol P. The standard unit for power is **watts (W)**
- d. Power is **rate of transfer of energy**. Calculate power using $P=E/t$

2. There are five main energy **stores**

- a. Kinetic energy is the energy an object has because it is **moving**.
The faster an object is moving, the more kinetic energy it has.
- b. Gravitational potential energy is the energy an object has because it can **fall**.
The further the object could fall, the more gravitational potential energy it has.
- c. Elastic potential energy is the energy an object has because it has been **stretched** or **squashed**.
The more it has been stretched or squashed, the more elastic potential energy it has.
- d. Thermal energy is the energy an object has because of its **temperature**.
The hotter an object is, the more thermal energy it has (but even objects which are cold to us like ice cubes have some thermal energy).
- e. Chemical energy is the energy an object has because of what it is made from.
Some chemicals are used as **fuels** for vehicles (such as gas or petrol) or fuels for us (food and drink).

3. There are four ways that energy can be **transferred**

- a. mechanically (when a force causes an object to move)
- b. electrically (when a potential difference causes charges to move)
- c. by heating (when there is a difference in temperature)
- d. by radiation (when waves transfer energy e.g., by light or sound waves)

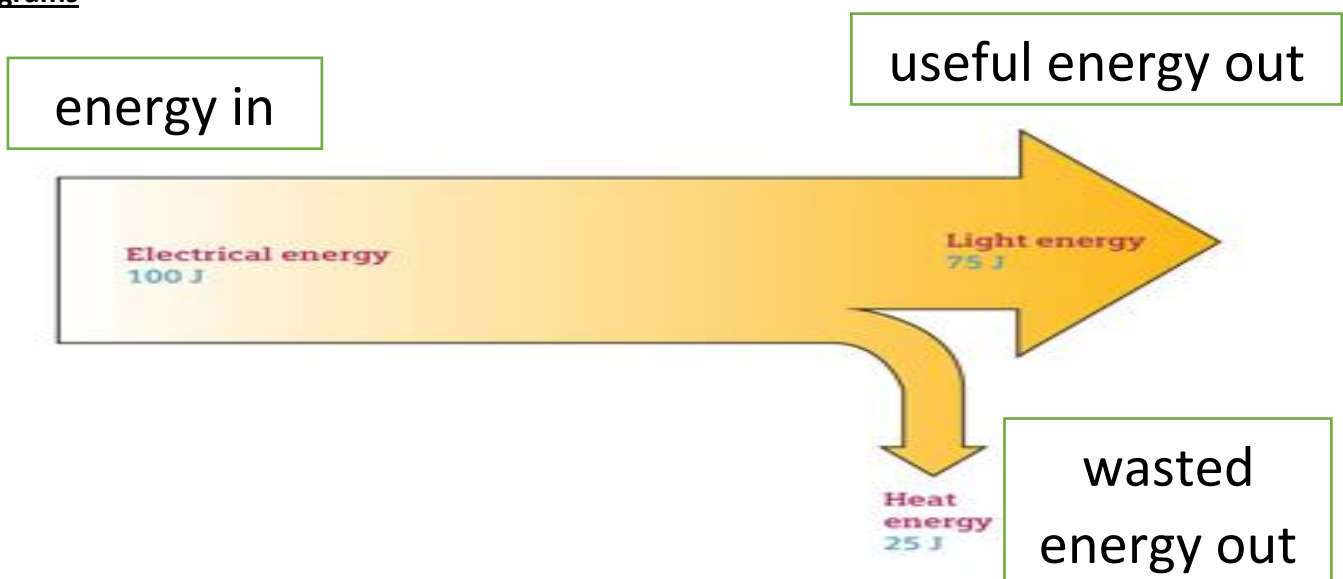
4. Energy supplied to your house costs money.

- a. first work out how many **kW** of energy has been transferred (1kW = 1000W)
- b. next work out how many **hours** this power has been transferred for
(1 hour = 60 minutes = 3600 seconds)
- c. multiply kW x hours to work out the energy transferred in **kWh**.
kWh is a **non-standard unit** for energy used on your electricity and gas bill.

Key words & definitions

1. **The law of conservation of energy** - energy **cannot** be created or destroyed, only transferred or stored
2. **Conduction** - thermal energy transfer through a solid by vibrating particles
3. **Convection** - thermal energy transfer through a fluid (solids + gases) by moving particles
4. **Radiation** – thermal energy transfer from by waves of energy
5. **Fuel** – chemical energy source (usually for burning)
6. **Appliance** – a device or piece of equipment (often electrical) designed to perform a task
7. **Renewable** - energy source that can be continually replaced (e.g., wind, solar, tidal, hydroelectric, wave, geothermal)
8. **Non-renewable** - energy source that cannot be replaced (e.g., coal, oil, gas, nuclear fuel)
9. When energy is transferred, **work is done**. Work done has the same unit as energy – **joules (J)**
10. **Work done = Force x distance**

Diagrams



Potential misconceptions to avoid / errors students often make

- a. **Never say that energy is used!** If an energy store has lost energy, this energy has been transferred to another store – often the thermal store of the air
- b. Energy cannot be used, but it can be **useful** – what is useful energy depends on what you want from the appliance e.g., you want a fan to move (kinetic) but not get hot (thermal)
- c. Energy tends to spread out and become less useful e.g., hot objects eventually cool down