Knowledge organiser – 3.2 Energy Transfer

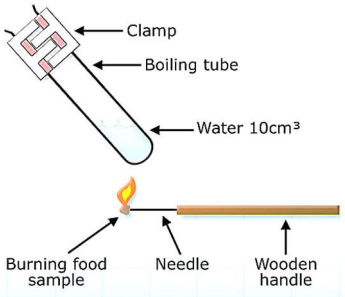
ENERGY IN FUEL

- Energy is stored in food and fuel.
- Energy in fuel is used to heat homes and cook food.
- Fuel it also burnt in power stations to produce current in order for electrical appliances to work at home.

ENERGY IN FOOD

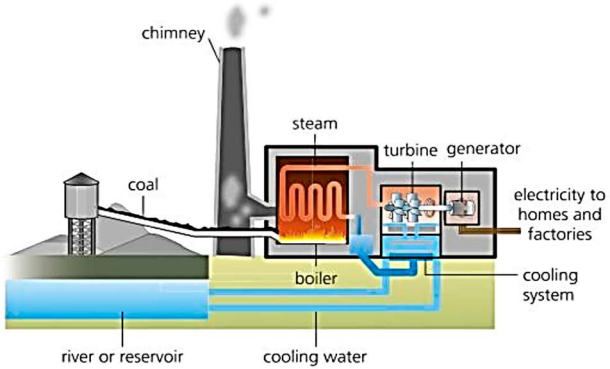
- Different foods are stores of different amounts of energy.
- When you are asleep your body needs energy for keeping warm and breathing.
- Children need more energy than adults so their brain, bones and muscles can grow.
- If you take in more energy than you need, your body will store it as fat to use in the future.

PRACTICAL: Releasing energy in food



Once the food stops burning, the water should be stirred with the thermometer and the temperature recorded. By recording the temperature increase in the water, you can work out how much energy the food contains.

POWER STATIONS burn coal and gas,



1. Fuel is burnt in a furnace to heat water in the boiler.
2. The water turns to steam; this turns a turbine.
3. The turbine turns a generator which generates electricity.

☺ Fossil fuels are reliable and produce lots of electricity.
☹ Release carbon dioxide and contribute to global warming.
☹ Produce pollutants; sulfur dioxide, nitrogen oxides and particulates.

RENEWABLE RESOURCES

Solar	Wind	Geo	Hydro	Bio	Tide

☺ No carbon dioxide released
☺ May be free to use (wind and Sun)
☹ Equipment may be expensive
☹ Can be unreliable (weather/ time of day dependent)

ENERGY STORES:

1. Chemical
2. Thermal
3. Elastic
4. Kinetic
5. Gravitational potential
6. Nuclear
7. Magnetic
8. Electrostatic

*(**Revision tip:** use the first letter of each store to write a mnemonic to help you remember them).*

Energy is transferred by:

1. Heating
2. Mechanically (by movement/ change in position)
3. Electric current
4. Waves (sound & light)

REDUCING ENERGY USE

1. Use fewer appliances.
2. Use appliances with a lower power rating.
3. Use appliances for fewer hours.
4. Insulate the home; this reduces the rate at which energy is transferred to surroundings; reducing need to heat the house.
5. Governments can raise awareness; this will make fuel last longer and benefit the environment.

Energy can be **dissipated/ wasted** due to **friction** (energy transferred to a thermal store / sound) or when objects get **hot** and transfer energy to anything at a lower temperature.
The efficiency of an appliance can be calculated by:

$$\text{Efficiency} = \frac{\text{Useful Energy Output}}{\text{Energy Input}} \times 100\%$$

ENERGY AND POWER

- The power rating of an appliance tells you *how much energy is transferred per second* – **the rate** of energy transfer.
- **Power (W) = energy (J) ÷ time (s)**
- You can calculate the cost of using an appliance at home using the equation: **cost = power (kW) x time (hours) x price (per kWh)**

***NOTE:** You may need to convert units when completing calculations.*

KEYWORD	DEFINITION
Chemical energy store	Emptied during chemical reactions when energy its transferred to surroundings; e.g. burning fuel.
Dissipation	Becoming spread out wastefully to the surroundings.
Elastic energy store	Filled when a material is stretched or compressed; e.g. stretching a spring.
Energy	Energy is needed to make things happen.
Energy resources	Something with stored energy that can be released in a useful way.
Fossil fuels	Non-renewable energy resource formed from dead animals and plants, millions of years ago. E.g. coal, oil and natural gas.
Gravitational potential energy store	Filled when an object is raised; e.g. book on a shelf or when climbing a ladder.
Joules	The unit of energy, symbol J 1 kilojoule (kJ) = 1000 J
Kilowatt hour	The unit of energy used by electricity companies, symbol kWh.
Kinetic energy store	Filled when an object speeds up/ moves; e.g. when a car accelerates.
Law of conservation of energy	Energy cannot be created or destroyed, only transferred between stores.
Non-renewable	An energy resource that cannot be replaced and will be used up, such as coal, oil or gas, or nuclear.
Power	How quickly energy is transferred by a device (watts).
Renewable	An energy resource that can be replaced and will not run out; e.g. solar, wind, waves, geothermal and biomass.
Thermal energy store	Filled when an object is warmed up; e.g. heating water in a kettle.
Watts	The unit of power, symbol W 1 kilowatt (kW) = 1000 W