

Energy Key Notes

Fuels & How Humans Obtain Fuel

Fuels are substances that release energy when they burn

Some fuels are better than others - e.g. one fuel may be easier to store, give off more heat and pollute less

Energy is the ability to 'do some work' - everything that happens needs energy (e.g. heating; cooking; lighting; movement of vehicles; and keeping us alive)!

A fuel is something that can release energy, making it useful for us to 'do some work' such as moving a car; running across a field; heating a room; sending a rocket into space...

Energy can be in many different forms, such as light, heat, sound, electrical, kinetic (movement), nuclear etc...

Food is required by the body, along with oxygen, so that cells can *respire*. Respiration occurs in every cell – it is the process of releasing *energy*. Every cell in our body respire, converting this food (glucose) into *energy* (needed for growth; repair; movement etc...)

Different foods have different amounts of energy in them – this is measured in kilojoules (kJ) and calories (cal). This information is shown on the labels of foods, as well as showing you what is contained within them

- Fat
- Carbohydrates (sugar / starch levels)
- Protein
- Vitamins
- Minerals
- Fibre
- Water

Fossil Fuels

The fossil fuels are **coal**; **natural gas**; and **oil**

They formed millions of years ago from the remains of living things

Coal was formed from plants, and oil and natural gas from sea creatures. When the living things died, they were gradually buried by layers of rock

The buried remains were put under pressure and chemical reactions heated them up, gradually changing into fossil fuels

Coal is used in power stations and to heat some homes

Natural gas is the gas we use for cooking and heating, and in Bunsen burners at school

Crude oil is separated into lots of different substances at oil refineries, including camping gas, petrol, diesel and kerosene (jet fuel)

Energy Origins (Renewable & Non-renewable)

Fossil fuels are non-renewable energy resources - once they have all been used up they cannot be replaced

Renewable energy resources can be replaced, never running out

Energy can be transferred from many different resources - in non-renewable resources such as fossil fuels, energy is stored chemically in the fuel, and burning them releases this energy

Energy can also be transferred from renewable resources, such as solar cells, where energy is absorbed from sunlight and turned into electricity

Energy Resource	Advantage	Disadvantage
Solar	Clean Renewable	No electricity produced if there is little light Do not collect much heat energy Expensive, and need a lot of space
Hydroelectric	Clean Renewable	Huge amounts of space needed, and very damaging to the environment
Wind	Clean Renewable	No electricity produced if there is little wind Noisy, ugly, and many are needed for viable amounts of energy production
Geothermal	Clean Cheap Renewable	Only possible in certain areas of the world
Wave	Clean Renewable	Not much energy generated No electricity produced if there is calm water
Tidal	Clean Renewable	Only works on rivers with big tides
Biomass	Renewable	Burning produces gases which cause global warming
Fossil Fuels	Cheap	Non-renewable Produce gases which cause global warming & acid rain
Nuclear	No harmful gases produced	Expensive Non-renewable Dangerous radioactive substances produced

Nearly all the energy we use originally came from the Sun

Heat and light from the Sun provide us with energy directly

Plants also store the Sun's energy through photosynthesis (utilising light to make sugar from carbon dioxide and water)

Coal, oil and natural gas were formed from the remains of dead plants and animals (the energy in these fuels came from the bodies of the plants and animals)

The animals got their energy from the plants they ate, and the plants got their energy from the Sun!

Solar power utilises sunlight directly

Wind is caused by the Sun heating up the Earth (convection currents)

Waves are caused by the build up of this wind

Hydroelectric power relies on water movement (which fell as rain after being evaporated by the Sun's energy)

*Only tidal energy (caused by the Sun and Moon's gravity); nuclear energy (energy stored within uranium); and geothermal energy (heat from the Earth) do not originate in the Sun!