

9. Energy Transfer

Thermal energy store: Filled when an object is warmed up.

Chemical energy store: Emptied during chemical reactions when energy is transferred to the surroundings.

Kinetic energy store: Filled when an object speeds up.

Gravitational potential energy store: Filled when an object is raised.

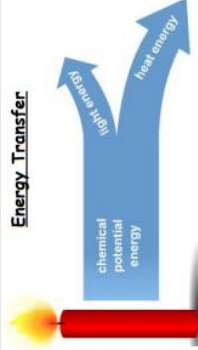
Elastic energy store: Filled when a material is stretched or compressed.

Dissipated: Become spread out wastefully.

Facts

We can describe how jobs get done using an energy model where energy is transferred from one store at the start to another at the end.

When energy is transferred, the total is conserved, but some energy is dissipated, reducing the useful energy.



In this example energy is stored in the candle as chemical energy. When the candle burns the chemical energy is transferred into light and heat energy.

The store of chemical energy decreases and the store of light and heat energy increases.

The heat energy is wasted and is dissipated (spreads out in the surroundings)

10. Energy Costs

Power: How quickly energy is transferred by a device (watts).

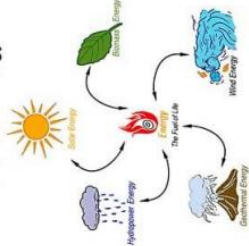
Energy resource: Something with stored energy that can be released in a useful way.

Non-renewable: An energy resource that cannot be replaced and will be used up.

Renewable: An energy resource that can be replaced and will not run out. Examples are solar, wind, waves, geothermal and biomass.

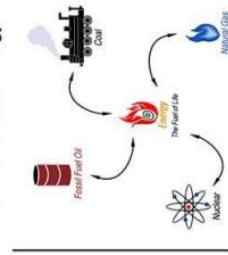
Fossil fuels: Non-renewable energy resources formed from the remains of ancient plants or animals. Examples are coal, crude oil and natural gas.

Renewable Energy



We get energy from many different types of energy resources, including fuels, food and stores of energy such as batteries or the wind. We can divide energy resources into two categories, renewable and non-renewable.

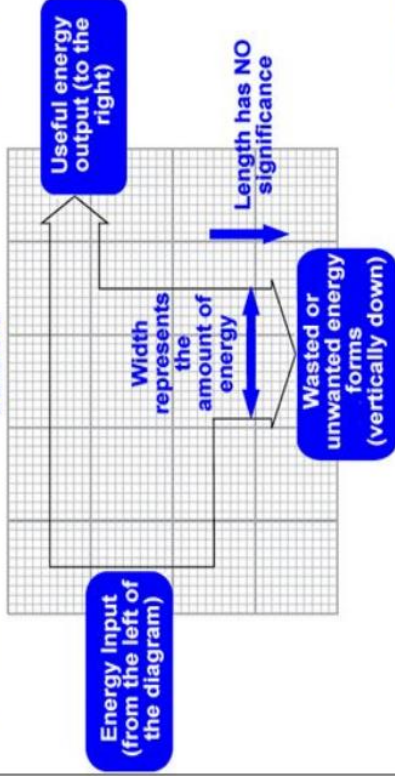
Non-Renewable Energy



Type of energy	Description	Type of energy	Description
Kinetic	The energy in moving objects – also called movement energy	Electrical	Energy in moving charges or static electric charges
Heat	Also called thermal energy	Elastic potential	Stored energy in squashed objects
Light	Also called radiant energy	Nuclear	Stored in the nuclei of atoms
Gravitational potential (GPE)	Energy stored in raised objects	Sound	Energy released by vibrating objects
Chemical	Stored energy in fuels, foods and batteries		

$$\text{Efficiency (\%)} = \frac{\text{Useful energy}}{\text{Input energy}} \times 100$$

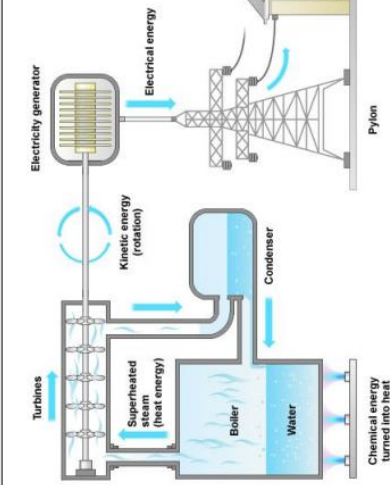
A Sankey Diagram - a 'to scale' diagram representing energy transfers



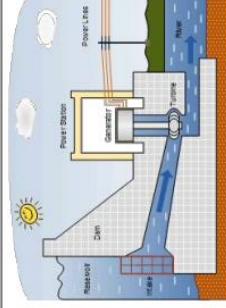
Energy is never made or destroyed, it can only be transferred from one store to another.

When energy is transferred from one energy type to another there will often be wasted energy. This wasted energy is dissipated into the surroundings.

Sankey diagrams can give a graphical representation of the energy transfer, clearly showing how much energy is wasted and how much is usefully transferred.



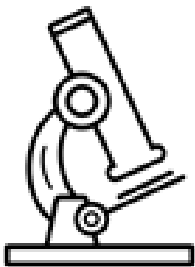
There are problems with burning fossil fuels as fossil fuels are non-renewable (we are using them faster than they can form) and when they burn they produce harmful gasses, e.g. carbon dioxide and sulfur dioxide.



Renewable Energy

Scientists and engineers are working hard to find different ways of making a magnet spin inside a coil of wire(generator). At Fullbrook Wind Farm the wind turns the blades of the wind turbines causing the generator to generate electricity.

Other possibilities are hydroelectric power stations which use flowing water to make a magnet spin inside a coil of wire.



Learning Journey

Physics: Energy



KNOW IT

- [I can measure the energy in food](#)
- [I know that carbohydrates such as sugar give our bodies energy.](#)
- [I know that energy is stored in different ways.](#)
- [I can describe how to transfer elastic potential energy store to kinetic energy store.](#)
- [I know how to use a sankey diagram.](#)
- [I can draw a sankey diagram.](#)
- [I can identify where energy is lost in a sytem.](#)
- [I can describe the main parts of a fuel burning power station.](#)
- [I know a range of renewable sources of electricity.](#)
- [I can give reasons for choosing different renewable enrgy sources related to the conditions.](#)
- [I can calcualte the cost of electricity.](#)



PROVE IT

d of unit test

- DIRT activity – How a power station works
- DIRT activity –

LINK IT

you will have covered some of this knowledge in your KS2 studies including the idea that objects fall towards the Earth when not supported



SAY IT



VOCABULARY	DEFINITION
Power	A measure of how quickly energy can be transferred. Power is measured in watts (also called joules per second)
Energy resource	A source of energy e.g. fossil fuel or the sun
Non-renewable	Energy resources which, once 'used up', cannot be replaced.
Renewable	Energy sources that can be replaced, e.g. solar, wind, wave and tide.
Fossil fuels	Fuels made underground over millions of years e.g. coal, oil and natural gas
Thermal energy store	A device or substance that stores heat energy
Chemical energy store	A chemical that can be used to release energy in a useful form – e.g. batteries, food or coal
Kinetic energy store	An object that is moving stores kinetic energy
Gravitational potential energy store	An object has energy because it is above the earths surface stores
Elastic energy store	An object that stores energy because it is bent or stretched out of shape but will return to its original shape when released e.g. a spring or long bow
joule	The measure of energy. E.g. 1 joule of energy when 1newton of force moves an object 1 meter
solar	Energy from the sun