

Energy Sources and producing Electricity - Unit 1

What is meant by the efficient use of energy?	Devices that transfer a large percentage of the input energy into the required output energy.
What do machines and electrical devices do?	Take in input energy in one form and transform (change) it to output energy in another desired form.
Is there such a thing as a 100% efficient device?	No, they never transform all of the input energy to the output form we want or transfer (move) it all to the place we want.
Efficiency is equal to useful energy transferred out/ total energy in. How do we express the answer of this sum?	As a decimal - it is always less than one.
What are the units of efficiency?	None! It is a ratio!
What is a Sankey diagram?	A scale diagram showing useful energy on the right and wasted energy vertically down.
What is payback time?	'Payback' is the time it takes you to recoup the financial outlay you make when you buy a new device. It is the cost of the device divided by the savings you make on energy bills each year
What is the law of conservation of energy?	Energy cannot be created or destroyed. It can only be transformed from one form to another form.
Can you ever get 100% of the output energy type you want?	No, You always get an unwanted form as well as the desired form of energy in the transfer
What is wasted energy?	Energy which is not transferred/transformed in a useful way is classed as 'wasted'.
Where does all energy eventually go to?	Both wasted energy and the energy which is usefully transferred/transformed are eventually transferred to their surroundings
What happens to anything if it is given energy?	It gets warmer.
Energy becomes increasingly spread out and becomes increasingly more difficult to use for further energy transformations. What effect does this have?	You can only make good use of concentrated forms of energy, so it makes using it harder.
Why are electrical devices so useful?	They transform electrical energy to whatever form of energy we need at the flick of a switch.
Why is it is convenient to mass produce devices that use electricity and to have a standard electrical system throughout the country?	So you can transport your devices with you and plug them in wherever you go and use them.
What are the electrical settings for mains in the UK?	230V, 50Hz

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The electricity board does not calculate energy in joules. What unit for energy does it use?	The kilowatt-hour
To calculate the amount of energy transferred from the mains you use the equation: energy transferred (kilowatt-hour, kWh) is equal to power (kilowatt, kW) \times time (hour, h). You will be given the equation, but what mustn't you forget to do?	Ensure the quantities are in the correct units! - time in hours - power in kilowatts (1000 watts)
To calculate the cost of electrical energy used you have to multiply the number of kilowatt hours by the cost of each of them. What do you have to be careful about?	The cost of each unit is in pennies! Make sure you then convert that to pounds and pence.
What two factors affect how much using an electrical device will cost you?	The power of the device and the time you have it switched on.
What is the unit for power?	watts(W)
What is the scientific unit for energy?	joule (J)
What is the National grid?	Electricity is transferred from power station to consumers along the National Grid - a series of transformers and pylons
How can you cut down the percentage of heat energy produced when the power is transmitted along the National grid?	The power is made up the product of current and voltage. Increasing voltage it is sent at reduces current, and hence reduces energy losses as heat energy in the cables.
What is used to cut down the heat losses in the cables of the National Grid?	Step up transformers - to make big voltage and small current for transfer.
What happens to the electrical power when it gets near to the town?	It is 'stepped down' to a less dangerous voltage.
What do we use to make electricity from?	Various energy sources can be used to generate the electricity we need. We must carefully consider the advantages and disadvantages of using each energy source before deciding which energy source(s) it would be best to use in any particular situation.
How is electricity produced in most power stations?	An energy source is used to heat water. The steam produced drives a turbine which is coupled to an electrical generator.
Name the common energy sources which are burned to produce heat.	Coal, oil and gas
What is used as nuclear fuel?	Uranium or plutonium
How is heat produced for nuclear power generation?	nuclear fission - NOT burning - splitting atoms! What can be used to drive turbines directly (without making steam

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	first) - Energy from renewable energy sources like wind, wave, tides and HEP (hydroelectric power)
What can produce electricity without turning turbines at all?	Electricity can be produced directly from the Sun's radiation using solar cells.
How can geothermal energy be used to make electricity?	In some volcanic areas hot water and steam rise to the surface. The steam can be tapped and used to drive turbines. This is known as geothermal energy.
Using different energy resources has different effects on the environment. Name three general types of them.	These effects include the release of substances into the atmosphere (you would have to name the gases/particles), noise and visual pollution, and the destruction of wildlife habitats.
When talking about the advantages and disadvantages of using fossil fuels, nuclear fuels and renewable energy sources to generate electricity you have to consider five aspects what are they?	(1) The cost of building power stations, (2) the start-up time of power stations, (3) the reliability of the energy source, (4) the relative cost of energy generated and (5) the location in which the energy is needed.
What is the cost of building power station?	Massive investment in time, labour and building materials is involved - think geography - includes the substructure like transport links.
What is start-up time?	Once built you cannot get electricity straight away. Nuclear power stations have a long start-up and close-down period. All sorts of equipment has to be installed and checked for safety etc. This is true with tidal barrages etc. too. Coal and oil furnaces cannot just switch off and on - it takes time to get them hot enough to produce the steam at the rate required.
What is meant by reliability of supply?	Some sources depend on the weather conditions - like wind and are not predictable - we cannot make the wind blow harder when we need more electricity - but we can burn more coal and up the output from a coal power station.
Why is carbon dioxide output from fossil fuels a problem?	It is increasing the percentage of carbon dioxide in the atmosphere - disturbing the carbon cycle balance - this is causing the atmosphere to get hotter - because of the greenhouse effect causing global warming.
Explain how the greenhouse effect works.	Infra red energy from the Sun penetrates our atmosphere and is absorbed by the Earth, making it warmer. The Earth then radiates lower energy infra red out into space. The lower energy infra red cannot pass as easily through the atmosphere. Certain gases absorb it and prevent it radiating back out into space. CO ₂ is one of those gases and as we increase the amount of CO ₂ in the atmosphere the planet gets hotter.
Why are sulphur impurities in fossil fuels a problem?	When burnt sulphur combines with oxygen to give sulphur dioxide which then dissolves in water vapour and falls as acid rain.