Chapter 3: Energy resources

Knowledge organiser

Energy resources

The main ways in which we use the Earth's energy resources are:

- generating electricity
- heating
- transport.

Most of our energy currently comes from **fossil fuels** – coal, oil, and natural gas.

Non-renewable energy resources

- not replaced as quickly as they are used
- will eventually run out

For example, fossil fuels and nuclear fission.

Reliability and environmental impact

Some energy resources are more reliable than others. **Reliable** energy resources are ones that are available all the time (or at predictable times) and in sufficient quantities.

Both **renewable** and **non-renewable** energy resources have some kind of **environmental impact** when we use them.

Renewable energy resources

- can be replaced at the same rate as they are used
- will not run out

For example, solar, tidal, wave, wind, geothermal, biofuel, and hydroelectric energies.

Non-renewable energy resources				
Resource	Main uses	Source	Advantages	Disadvantages
coal	generating electricity		• enough available to meet current energy demands	 will eventually run out release carbon dioxide when burned – one of the main causes of climate change release other polluting gases, such as sulfur dioxide (from coal and oil) which causes acid rain oil spills in the oceans kill marine life
oil	generating electricity transport heating	extracted from underground	 reliable – supply can be controlled to meet demand relatively cheap to 	
natural gas	generating electricity heating		extract and use	
nuclear fission	generating electricity	mining naturally occurring elements, such as uranium and plutonium	 no polluting gases or greenhouse gases produced enough available to meet current energy demands large amount of energy transferred from a very small mass of fuel reliable – supply can be controlled to meet demand 	 produces nuclear waste, which is: dangerous difficult and expensive to dispose of stored for centuries before it is safe to dispose of. nuclear power plants are expensive to: build and run decommission (shut down).

Key terms	Make sure you can w	Make sure you can write a definition for these key terms.						
biofu	el carbon neutral	environmental i	impact	fossil fuel	geothermal			
	hydroelectric	non-renewable	reliability	renewał	Die			

		Resource	Main uses	Source	Advantages	Disadvantages
		solar energy	generating electricity heating	sunlight transfers energy to solar cells sunlight transfers energy to solar basting papels	can be used in remote places very cheap to run once installed no pollution/greenhouse	supply depends on weather expensive to buy and install cannot supply large scale demand
		hydroelectric energy	generating electricity	water flowing downhill turns generators	low running cost no fuel costs reliable and supply can be controlled to meet demand	expensive to build hydroelectric dams flood a large area behind the dam, destroying habitats and resulting in greenhouse gas production from rotting vegetation
	urces	tidal energy	generating electricity	turbines on tidal barrages turned by water as the tide comes in and out	predictable supply as there are always tides can produce large amounts of electricity no fuel costs no pollution/greenhouse gases produced	 tidal barrages: change marine habitats and can harm animals restrict access and can be dangerous for boats are expensive to build and maintain cannot control supply supply varies depending on time of month
	Renewable energy reso	wave energy	generating electricity	floating generators powered by waves moving up and down	low running cost no fuel costs no pollution/greenhouse gases produced	 floating generators: change marine habitats and can harm animals restrict access and can be dangerous for boats are expensive to build, install, and maintain dependent on weather cannot supply large scale demand
		wind energy	generating electricity	turbines turned by the wind	low running cost no fuel costs no pollution/greenhouse gases produced	supply depends on weather large amounts of land needed to generate enough electricity for large scale demand can produce noise pollution for nearby residents
		geothermal energy	generating electricity heating	radioactive substances deep within the Earth transfer heat energy to the surface	low running cost no fuel costs no pollution/greenhouse gases produced	expensive to set up only possible in a few suitable locations around the world
		biofuels	generating electricity transport	fuel produced from living or recently living organisms, for example, plants and animal waste	can be carbon neutral – the amount of carbon dioxide released when the fuel is burnt is equal to the amount of carbon dioxide absorbed when the fuel is grown reliable and supply can be controlled to meet demand	expensive to produce biofuels growing biofuels requires a lot of land and water that could be used for food production can lead to deforestation – forests are cleared for growing biofuel crops

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Retrieval questions

Learn the answers to the questions below then cover the answers column with a piece of paper and write as many as you can. Check and repeat.

	P3 questions		Answers
0	What is a non-renewable energy resource?	Put	will eventually run out, is not replaced at the same rate it is being used
2	What is a renewable energy resource?	: paper h	will not run out, it is being (or can be) replaced at the same rate as which it is used
3	What are the main renewable and non-renewable resources available on Earth?	nere F	renewable: solar, tidal, wave, wind, geothermal, biofuel, hydroelectric non-renewable: coal, oil, gas, nuclear
4	What are the main advantages of using coal as an energy resource?	ut papei	enough available to meet current demand, reliable, can control supply to match demand, cheap to extract and use
5	What are the main disadvantages of using coal as an energy resource?	r here	will eventually run out, releases CO ₂ which contributes to climate change, releases sulfur dioxide which causes acid rain
6	What are the main advantages of using nuclear fuel as an energy resource?	Put paper	lot of energy released from a small mass, reliable, can control supply to match demand, enough fuel available to meet current demand, no polluting gases
7	What are the main disadvantages of using nuclear fuel as an energy resource?	here	waste is dangerous and difficult and expensive to deal with, expensive initial set up, expensive to shut down and to run
8	What are the main advantages of using solar energy?	Put pa	can be used in remote places, no polluting gases, no waste products, very low running cost
9	What are the main disadvantages of using solar energy?	iper here	unreliable, cannot control supply, initial set up expensive, cannot be used on a large scale
10	What are the main advantages of using tidal power?	Pu	no polluting gases, no waste products, reliable, can produce large amounts of electricity, low running cost, no fuel costs
1	What are the main disadvantages of using tidal power?	t paper her	can harm marine habitats, initial set up expensive, cannot increase supply when needed, amount of energy varies on time of month, hazard for boats
	What are the main advantages of using wave turbines?	Ū	no polluting gases produced, no waste products, low running cost, no fuel costs
B	What are the main disadvantages of using wave turbines?	Put paper	unreliable, dependent on weather, cannot control supply, initial set up expensive, can harm marine habitats, hazard for boats, cannot be used on a large scale
14	What are the main disadvantages of using wind turbines?	here	unreliable, dependent on weather, cannot control supply, take up lot of space, can produce noise pollution
15	What are the advantages and the disadvantages of using geothermal energy?	Put pap	advantages: no polluting gases, low running cost disadvantages: initial set up expensive, available in few locations
16	What are the main advantages and disadvantages	er here	advantages: can be 'carbon neutral', reliable
-	of using biofuels?	•	that might be needed to grow food
Ð	What are the main advantages and disadvantages of using hydroelectric power?		advantages: no polluting gases, no waste products, low running cost, no fuel cost, reliable, can be controlled to meet demand
			disadvantages: initial set up expensive, dams can harm/

disadvantages: initial set up expensive, dams can harm/ destroy marine habitats