

KNOWLEDGE ORGANISER

WORLD STUDIES

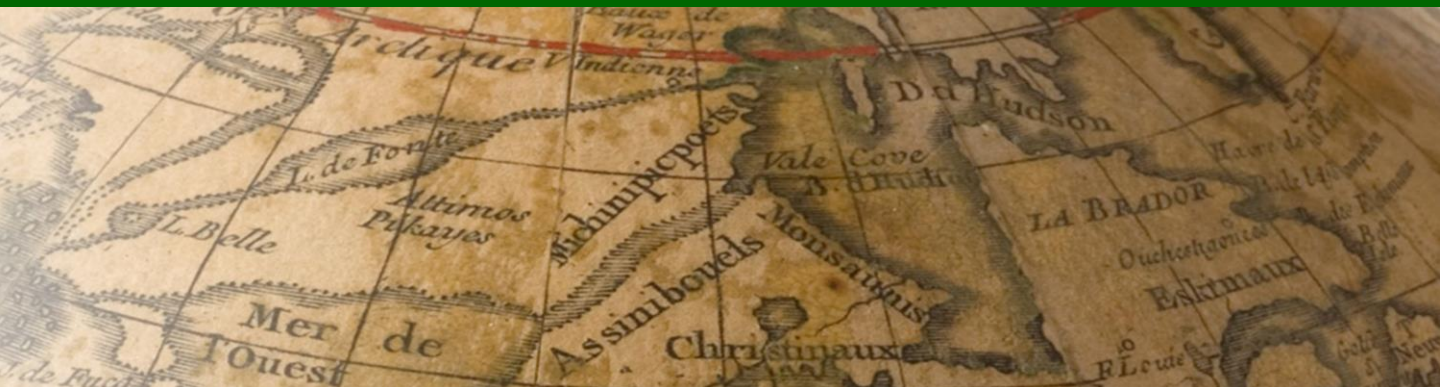
KS4 Geography

Topic 6 – Energy Resource

Management

Name:

Class Teacher:



BIG QUESTIONS:












1. What are natural resources and how are they exploited?
2. How are global resources distributed?
3. How are resources distributed across the UK?
4. What are the global patterns of resource consumption?
5. How effective is the development of non-renewable and renewable energy?
6. How do energy mixes vary across the world?
7. How and why has global energy demand and supply changed over the past 100 years?
8. How can technology (fracking) resolve energy resource shortages?
9. How do attitudes to exploitation and consumption of energy resources vary with different stakeholders?
10. Why do energy resources require sustainable management and how do attitudes to this vary?
11. How has Norway attempted to manage its energy resources in a sustainable way?
12. How has Bhutan attempted to manage its energy resources in a sustainable way?

HOMEWORK







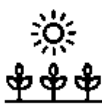





Big Question	Task	Due Date
3	Revise pages	
6	Revise page	
9	Revise pages	
11	Revise pages	
13	Revise pages	

Key terms found in the glossary on page 4 will be tested throughout the unit

GLOSSARY

Key term	Icon	Definition
Atmosphere		Thin layer of gases that surrounds the Earth. It seals the planet and protects us from the vacuum of space
Climate		The average weather conditions in a particular location based on the average weather experienced there over 30 years or more.
Depression		Air is rising, forming an area of low pressure at the surface. This rising air-cools and condenses and helps encourage cloud formation, so the weather is often cloudy and wet.
Drought		A period of unusually dry weather that persists long enough to cause problems such as crop damage and water supply shortages.
Enhanced greenhouse effect		Refers to human activities that are adding to the warming of the atmosphere due to the greenhouse effect—the presence of gases that increases the atmosphere's retention of the heat energy of the sun.
Fossil fuels		Fossil fuels are hydrocarbons, primarily coal, fuel oil or natural gas, formed from the remains of dead plants and animals.
Global atmospheric circulation		The large-scale movement of air by which heat is distributed on the surface of the Earth. The wind belts and the jet streams girdling the planet are steered by three convection cells: the Hadley cell, the Ferrel cell, and the Polar cell.
Humanitarian aid		Humanitarian aid is material and logistic assistance to people who need help. It is usually short-term help until the long-term help by government and other institutions replaces it.
Ice cores		Ice cores are cylinders of ice drilled from ice sheets and glaciers. Layers in ice cores correspond to years and seasons, with the youngest ice at the top and the oldest ice at the bottom of the core.
Irrigation		The supply of water to land or crops to help growth, typically by means of channels.
ITCZ		The Inter Tropical Convergence Zone, or ITCZ, is a belt of low pressure, which circles the Earth generally near the equator where the trade winds of the Northern and Southern Hemispheres come together.

GLOSSARY

Key term	Icon	Definition
Biomass		An energy source from living or recently living plant material
Energy consumption		How much energy is used
Energy mix		The way countries use energy in different proportions
Energy production		How much energy is being made
Fracking		This is the process of drilling down into the earth to a gas-bearing rock. Water, sand and chemicals are blasted at the rock at high pressure which releases the gas inside the rock layers. The gas then flows out through the top of the well.
Hydroelectric power (HEP)		Energy produced by water turning a turbine to produce electricity
Monoculture		The cultivation of a single type of crop
Non-renewable energy		Energy sources that, once they have been used, can never be used again
Renewable energy		Energy that comes from sources that can be reused or replenished and therefore will not run out.
Resource insecurity		Lacking a stable, safe and affordable access to a specific resource
Stakeholder		Someone with an interest in what occurs
Sustainable management		Using energy resources in a way which ensures that they are not exploited and will hopefully be able to meet the needs of future generations.

BQ1 & Q2. HOW CAN NATURAL RESOURCES BE CLASSIFIED AND EXPLOITED?



Abiotic – (non-living things) obtained from the lithosphere, atmosphere and hydrosphere e.g. minerals, soil, sunlight, precipitation.



Biotic – (Living things) Obtained from the biosphere and are capable of reproduction e.g. animals, birds, plants etc.

Non-renewable – Those that cannot be remade because they take millions of years to form e.g. coal and natural gas.



Renewable – These can be naturally replenished in a shorter timescale e.g. wind, solar power.

Resource	Exploitation	What are the impacts of this extraction?
Water	<ul style="list-style-type: none"> ❑ As population increases as does the demand ❑ Can be misused i.e.. for the extraction of minerals. 	<ul style="list-style-type: none"> ❑ Groundwater is being used faster than it can be replaced. ❑ Biodiversity can reduce who rely on groundwater ❑ When minerals are extracted, toxic by-products can be washed into rivers = decreased water quality. ❑ Pressure on water system → increased consumption and water treatment requirements
Food	<ul style="list-style-type: none"> ❑ Farming land becomes overgrazes ❑ Fishing – overfishing in areas means fish stocks cannot replenish themselves. 	<ul style="list-style-type: none"> ❑ Land that is overgrazed = bare soil which is eroded by wind and rain and washed away. ❑ Increased demand for intensive farming practices = increased use of pesticides = eutrophication. UK currently only produces 60% of its food ❑ Overfishing = reduced biodiversity in the oceans and can impact food webs.
Energy	<ul style="list-style-type: none"> ❑ Extraction of fossil fuels that are required for heating, transport and industry. 	<ul style="list-style-type: none"> ❑ Reduction in air quality due to sulphur dioxide, carbon dioxide and carbon monoxide. Acid rain can cause trees to die. ❑ Disruption of indigenous tribes lifestyles ❑ 18 billion gallons of toxic water were dumped into rivers, reducing water quality.
Deforestation	<ul style="list-style-type: none"> ❑ Palm oil – primary ingredient in chocolate, ice cream etc. ❑ Cameroon losing 1% year for timber and farming. 	<ul style="list-style-type: none"> ❑ Cameroon rainforest is home to 8000 species of plant and 250 species of mammals that are at risk. ❑ Soil erosion due to heavy rainfall on cleared land. ❑ Madagascar loses 400 tonnes of soil per hectare/year. = pollution of water supplies

ENERGY HOMEWORK 1: ANSWER THE FOLLOWING

State two characteristics of sedimentary rocks (2)	
Explain what caused the lowlands to form in the UK (2)	
Outline how forestry has changed the lowland landscape of the UK (2)	
How and why does velocity change as a river moves downstream? (2)	
How does channel straightening work to control flooding	
Outline two ways that we can measure the development level of a country (2)	
Name the three components of the Human Development Index (3)	
Name two historical factors that explain the global pattern of development (2)	
Outline two strategies for improving India (2)	
Outline two causes of drought in Ethiopia (2)	
Outline two responses by the government in response to the Californian drought (2)	
Define the term meteorological drought	
Define the term hydrological drought	
How does the ITCZ impact climate?	
Total out of 20:	

ENERGY HOMEWORK 1: CHECK YOUR ANSWERS

State two characteristics of sedimentary rocks (2)	Rounded grains in layers/ contain fossils
Explain what caused the lowlands to form in the UK (2)	<input type="checkbox"/> 75 million years ago Britain covered by tropical sea. <input type="checkbox"/> Marine deposits created the North and South Downs.
Outline how forestry has changed the lowland landscape of the UK (2)	<input type="checkbox"/> Removal of deciduous woodland created moorland, settlements and farmland. <input type="checkbox"/> Replaced with coniferous woodlands – threatening ancient trees.
How and why does velocity change as a river moves downstream? (2)	<input type="checkbox"/> Velocity increases as more tributaries join the main river. <input type="checkbox"/> Less water in contact with the bed and banks as deeper and wider = less friction
How does channel straightening work to control flooding	<input type="checkbox"/> River channel is made deeper, wider and straighter. <input type="checkbox"/> River can hold more water so less likely to flood.
Outline two ways that we can measure the development level of a country	GDP/ Gini coefficient/ corruption perception index/ life expectancy/ % access to clean water
Name the three components of the Human Development Index (3)	Life expectancy/ Gross National Income per capita/ Expected and mean years of schooling
Name two historical factors that explain the global pattern of development (2)	Aftermath of colonisation/ level of governance or political stability.
Outline two strategies for improving India (2)	<input type="checkbox"/> Smart Cities Mission – improves sanitation/health and education/ water supply in 100 cities <input type="checkbox"/> Intended Nationally Determined Contribution (INDC) – clean energy such as solar power 40% by 2030 <input type="checkbox"/> Improving global status – wants permanent seat in the UN security council
Outline two causes of drought in Ethiopia (2)	<input type="checkbox"/> Relies on 2 rainy season – since 1980s the short rainy season has been shorter and the long unpredictable. <input type="checkbox"/> Indian Ocean is warming so loses more moisture in rainfall and dry air replaces it and moves over Africa. <input type="checkbox"/> Desertification – Sahara Desert is spreading.
Outline two responses by the government in response to the Californian drought (2)	<ul style="list-style-type: none"> • State of emergency issued in January 2014 • \$183 m given from federal government funds • \$14 million of federal funds given to farmers to conserve water and improve water management • Public education campaigns i.e. Save our Water
Define the term meteorological drought	Reduced amount of precipitation an area received compared to its average. (most significant cause of drought)
Define the term hydrological drought	Decrease in precipitation can impact on overland flow, reservoirs, lakes and groundwater.
How does the ITCZ impact climate?	Shifts northwards in June, bringing a wet season to the tropical grasslands in the Northern Hemisphere.
Total out of 20:	

BQ3. HOW ARE GLOBAL RESOURCES DISTRIBUTED ?



Soil and agriculture

- Higher precipitation and solar radiation near Equator = very productive = TRF, forestry and plantation agricultural. Soil type = Latosols = infertile.
- 30° N and S of the equator, high solar radiation, very low precipitation = little or no vegetation. Nomadic herding. Soil Type – Desert sandy soils.
- Colder and drier at the poles = low productivity. Tundra/coniferous trees (forestry). Soil type = Podzols.
- 40% of Earth's surface is farmland



Forestry

- Higher precipitation and solar radiation near the Equator = very productive. TRF, forestry and plantation agriculture.
- Colder and drier at the poles = low productivity. Tundra/coniferous trees (forestry). Soil type = Podzols.
- 30% forests (however 80% of forests have been exploited for timber to create farmland)



Fossil fuels and minerals



- Gold and diamonds – areas of volcanic activity
- Iron - China, Brazil, India, Russia and Australia
- Fossil fuels – found in areas made of rocks forms by deposition (sedimentary rocks)



- Oil – main reserves found in the Middle East

Water supply



- Concern that there will not be enough water for a global population of 8 billion by 2025
- High water scarcity in arid countries e.g. Egypt, Morocco

ENERGY HOMEWORK 2: ANSWER THE FOLLOWING

Define the term 'discharge'	
What does a storm hydrograph show?	
Outline two environmental impacts of rapid development in India (2)	
Outline two geopolitical issues facing India (2)	
Outline two characteristics of arid environments (2)	
Define the term 'drought'	
Define the term Milankovitch cycles	
How can volcanism lead to changes in the global climate? (2)	
Describe the distribution of global food resources (2)	
Describe the distribution of global forestry resources (2)	
Describe the distribution of global minerals (2)	
Define the term 'monoculture'	
Define the term ' Renewable energy '	
Define the term ' ITCZ '	
	Total out of 21:

ENERGY HOMEWORK 2: CHECK YOUR ANSWERS

Define the term 'discharge'	The amount of water passing a specific point at a given time, measured in cubic metre per second.
What does a storm hydrograph show?	A graph showing rainfall and river discharge over a specific period of time.
Outline two environmental impacts of rapid development in India (2)	<input type="checkbox"/> Logging and land clearance – deforestation <input type="checkbox"/> India is the 3rd largest emitted of CO₂ <input type="checkbox"/> Less than 1/3rd of sewage is treated <input type="checkbox"/> Around 68% of India is prone to drought,
Outline two geopolitical issues facing India (2)	<input type="checkbox"/> Territorial disputes with India and Pakistan/ India and China <input type="checkbox"/> Signed military pact with Russia <input type="checkbox"/> Policy of non-alignment i.e. doesn't favour Russia or USA.
Outline two characteristics of arid environments (2)	<input type="checkbox"/> Average rainfall between 100-300 mm <input type="checkbox"/> Natural vegetation is grasses, shrubs and trees <input type="checkbox"/> Pastoral farming by nomadic herdsman
Define the term 'drought'	Prolonged period of abnormally low rainfall, leading to a water shortage
Define the term Milankovitch cycles	These cycles are caused by changes in the earth's orbit around the sun, like its shape or eccentricity, its precession or wobble, and the tilt of its axis or obliquity.
How can volcanism lead to changes in the global climate? (2)	<input type="checkbox"/> Release particulate matter/ash into the atmosphere which can block incoming solar radiation through reflection/backscattering . This could lead to cooling <input type="checkbox"/> Sulphur dioxide is converted to sulphuric acid (causing more reflection and cooling)
Describe the distribution of global food resources (2)	<input type="checkbox"/> Higher precipitation and solar radiation near Equator = very productive = TRF, forestry and plantation agricultural. <input type="checkbox"/> 30° N and S of the equator, high solar radiation, very low precipitation = little or no vegetation. <input type="checkbox"/> 40% of Earth's surface is farmland
Describe the distribution of global forestry resources (2)	<input type="checkbox"/> Higher precipitation and solar radiation near the Equator = very productive. <input type="checkbox"/> Colder and drier at the poles = low productivity. Tundra/coniferous trees (forestry). <input type="checkbox"/> 30% forests (however 80% of forests have been exploited for timber to create farmland)
Describe the distribution of global minerals (2)	<input type="checkbox"/> Gold and diamonds – areas of volcanic activity <input type="checkbox"/> Iron - China, Brazil, India, Russia and Australia
Define the term 'monoculture'	The cultivation of a single type of crop
Define the term ' Renewable energy '	Energy that comes from sources that can be reused or replenished and therefore will not run out.
Define the term ' ITCZ '	The Inter Tropical Convergence Zone, or ITCZ, is a belt of low pressure,
<div>Total out of 21: 11</div>	

BQ4. HOW ARE RESOURCES DISTRIBUTED

ACROSS THE UK?



Soil and agriculture

- About 75% of the UK is farmland.
- There is more pasture for grazing animals in the wetter and higher land of the north and west, and more arable farming in the drier south and east.
- One of the most productive arable areas is East Anglia, helped by warm summers and generally flat land.



Forestry

- Much of the UK was once covered by broadleaved and coniferous forests, but today only 12% is woodland.
- About one third is ancient forest. Some of the largest areas of remaining ancient forests are part of the Caledonian Forest in Scotland.

Fossil fuels and minerals



- The geological history of the UK has shaped distribution of minerals and fossil fuels.
- Some of these resources, including iron and coal, helped fuel the industrial revolution, although far less is mined today.
- Oil and gas from the North Sea are important but declining sources of energy.

Water supply



- Water resources are plentiful in some parts of the UK, particularly in the north and west, where annual rainfall is high and population density is lower.
- In the south-east, population density is high, but rainfall is low = serious water stress, and supply is not able to meet demand.
- The UK has implemented a number of strategies to find new water sources, reduce leaks and manage the demand for water.
- One possible solution is to redistribute the uneven supply and demand through water transfer schemes,

BQ5. WHAT ARE THE GLOBAL PATTERNS OF RESOURCE CONSUMPTION?

Food



- The richest such as America consume more calories per day than some of the poorest countries, such as Ghana.
- In some parts of Africa, the average food consumption of less than 2000 calories per day is leading to under-nourishment and under-nutrition.
- The world has the ability to feed all of its inhabitants, but this does not happen because of the greed, uneven distribution and poorer countries' inability to grow sufficient food.
- We have obesity in some countries while others people suffer from hunger.

Energy



- Global energy consumption will increase by 56% in the next 35 years.
- The economic development of China and India will be one of the key factors in the increase as standards of living improve.
- The global distribution of energy is influenced by a number of key factors, including the location of fossil fuel reserves and the ability to harness renewable energy resources such as solar and wind.
- Coal and oil reserves are located in places such as the Middle East where government instability can mean supply of energy is not always straightforward.
- The ability to harness renewable energy, such as solar and wind, will be dependent on the amount of sunlight and wind places receive.



Water

- The amount of fresh water available globally is limited to 3% of the Earth's water (of which 2% is locked in ice caps and glaciers).
- Water is unevenly distributed because of the amount of rainfall places receive and the rate at which water is lost through evaporation and transpiration.
- Some parts of the world, such as rainforests and mountainous areas, receive more than they lose, resulting in a water surplus
- Places such as North Africa, receive little rainfall and have high rates of evaporation and transpiration, resulting in a water deficit.



BQ6. HOW EFFECTIVE IS THE DEVELOPMENT OF NON-RENEWABLE AND RENEWABLE ENERGY?

Coal

Advantages	Disadvantages
<p>Production:</p> <ul style="list-style-type: none">• Found in 70 countries worldwide.• Cheap to mine.• Technically use to mine, so can be used by developing countries. <p>Development:</p> <ul style="list-style-type: none">• Easy to convert into energy by burning it.• Should last for another 250 years.• Used in power stations around the world.	<p>Production:</p> <ul style="list-style-type: none">• Waste heaps are left close to coal mines.• Deep-shaft mining can be dangerous.• Expensive to develop mines and opencast pits <p>Development:</p> <ul style="list-style-type: none">• Acid rain is produced.• Green house gasses are emitted causing air pollution

Wind Power

Advantages	Disadvantages
<p>Production:</p> <ul style="list-style-type: none">• Lowest priced renewable source• Turbines are relatively cheap (1500 for 1 kilowatt) <p>Development:</p> <ul style="list-style-type: none">• Quiet and efficient• Does not give off greenhouse gasses• Can be on land or sea.• Can be built on agricultural land, providing a source of income for the people who own the land.	<p>Production:</p> <ul style="list-style-type: none">• Some green house gasses are given off during production of the turbine and through transportation. <p>Development:</p> <ul style="list-style-type: none">• Needs to be an annual local wind speed of more than 6 metres per second.• Not possible to store the power produced to use on calm days.• They can be non-aesthetically pleasing.• May disturb habitats.

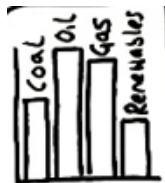
ENERGY HOMEWORK 3: ANSWER THE FOLLOWING

Describe the distribution of the UK's soil and agriculture (2)	
Describe the distribution of the UK's fossil fuels and minerals (2)	
Describe the distribution of the UK's water supply(2)	
Describe the global pattern of food consumption (2)	
Describe the global pattern of energy consumption (2)	
Describe the global pattern of water consumption (2)	
State two advantages of coal (2)	
State two advantages of wind (2)	
State two disadvantages of coal (2)	
State two disadvantages of wind (2)	
Define the term 'energy consumption'	
Define the term 'fossil fuels'	
Define the term 'climate'	
Define the term 'jet stream'	
Total out of 24:	

ENERGY HOMEWORK 3: CHECK YOUR ANSWERS

Describe the distribution of the UK's soil and agriculture (2)	<ul style="list-style-type: none"> About 75% of the UK is farmland. Grazing animals in the wetter/higher north and west, arable farming in the drier south & east.
Describe the distribution of the UK's fossil fuels and minerals (2)	<ul style="list-style-type: none"> Some of these resources, including iron and coal, helped fuel the industrial revolution, Oil and gas from the North Sea are important but declining sources of energy.
Describe the distribution of the UK's water supply(2)	<ul style="list-style-type: none"> Water resources are plentiful in the north and west, where annual rainfall is high and population density is lower. In the south-east, population density is high, but rainfall is low = serious water stress
Describe the global pattern of food consumption (2)	<ul style="list-style-type: none"> The richest consume more calories per day than some of the poorest countries In some parts of Africa, the average food consumption of less than 2000 calories per day
Describe the global pattern of energy consumption (2)	<ul style="list-style-type: none"> Global energy consumption increase 56% in the next 35 years. The development of China and India = increase as standards of living improve. Coal and oil reserves are located in places such as the Middle East = instability
Describe the global pattern of water consumption (2)	<ul style="list-style-type: none"> The amount of fresh water available globally is limited to 3% of the Earth's water Water is unevenly distributed: amount of rainfall and loss by evaporation/transpiration.
State two advantages of coal (2)	<ul style="list-style-type: none"> Cheap to mine. Easy to convert into energy by burning it. Should last for another 250 years.
State two advantages of wind (2)	<ul style="list-style-type: none"> Waste heaps are left close to coal mines. Deep-shaft mining can be dangerous. Acid rain is produced.
State two disadvantages of coal (2)	<ul style="list-style-type: none"> Lowest priced renewable source Turbines are relatively cheap (1500 for 1 kw) Does not give off greenhouse gasses
State two disadvantages of wind (2)	<ul style="list-style-type: none"> <input type="checkbox"/> Green house gasses are given off during production of the turbine <input type="checkbox"/> Needs to be an annual local wind speed of more than 6 metres per second.
Define the term 'energy consumption'	How much energy is used
Define the term 'fossil fuels'	Fossil fuels are hydrocarbons, primarily coal, fuel oil or natural gas, formed from the remains of dead plants and animals.
Define the term 'climate'	The average weather conditions in a particular location based on the average weather experienced there over 30 years or more.
Define the term 'jet stream'	A current of rapidly moving air that is usually several thousand miles long and wide but is relatively thin.
<div>Total out of 24:</div> <div>16</div>	

BQ7. HOW DO ENERGY MIXES VARY ACROSS THE WORLD?



Energy mix – the way that countries use energy in different proportions.

- Reliance on non-renewable sources of energy i.e. coal and oil = 73%
- Shift to more renewables (0% in 1961 to 7% in 2012)
- Increase in natural gas (0% in 1961 and 47% in 2012)
- Decline nuclear production (23% in 2001 to 18% in 2012)
- Progress towards achieving the use of renewable energy sources i.e. target of 15% by 2020.

UK's energy mix

- The UK's energy mix is made up of renewable and non-renewable energy sources.
- Relies mostly on natural gas (approx. 40%) as there is a large, local supply available in the North Sea.
- Historically we consumed large amounts of locally available coal but, reduced this usage as coal produced large amounts of sulphur dioxide that triggered acid rainfall over Scandinavian countries.

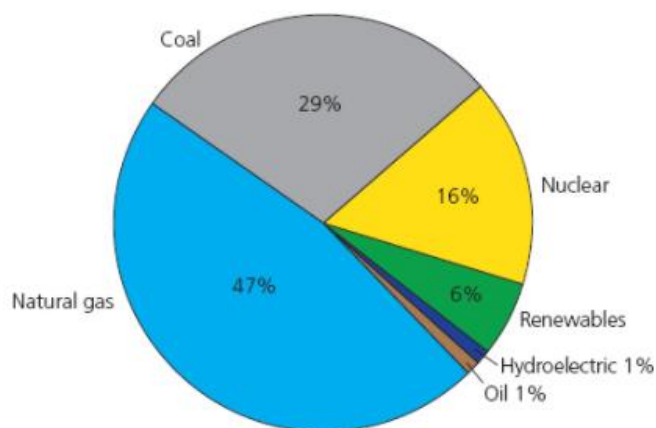
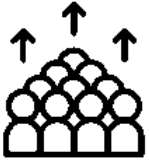


Figure 12.5 Energy sources in UK, 2010.

BQ8. HOW AND WHY HAS GLOBAL ENERGY DEMAND AND SUPPLY CHANGED OVER THE PAST 100 YEARS?

- ❑ Increasing population size as people continue to live longer, especially in developing and emerging nations.



- In 1916 the global population was just under 2 billion, in 2011 it reached 7 billion and by 2025 it should be 8.1 billion.
- The majority of the population growth has been in developing and emerging countries.

- ❑ The world is becoming increasingly wealthy and developed, meaning more money for energy consuming technologies.



- For example, 100 years ago very few people had cars; people heated their homes with coal and only heated part of their house. Nowadays central heating uses energy and in many developed countries own two cars.



- Per capita energy consumption is currently highest in developed countries. People in those countries are more able to afford energy-consuming technologies. These same people also consume more energy by purchasing food that have more food miles (have travelled from further away) and are also more likely to travel internationally.

- ❑ Technological advances over the past 100 years means more energy consumption to power those technologies.



- The increased wealth in the world has allowed the development of new energy sources and has therefore increased the supply of energy.
- As the private car revolution took off in developed countries, the demand for oil increased.
- New technological advances allowed this increase in supply; new reserves of oil and gas were discovered under the sea bed in places such as the North Sea.
- Energy sources such as wind, solar energy and the power of water in both rivers and the sea have all been harnessed as new energy sources due to advances in technology.



BQ8. HOW AND WHY HAS GLOBAL ENERGY DEMAND AND SUPPLY CHANGED OVER THE PAST 100 YEARS?

HEP

<ul style="list-style-type: none"> • Reservoirs can be used for water sports and fishing • Provide a water supply for areas that are located nearby 	<ul style="list-style-type: none"> • Less damaging to the environment as no greenhouse gases are produced
<ul style="list-style-type: none"> • Often people are forced to move because their land was flooded to create the reservoir • Usually in remote areas, so people have to travel a long way to use the facilities 	<ul style="list-style-type: none"> • Large areas are flooded which impacts local habitats and species. • Warning that damming up too much water in the reservoir increases the risk of landslides, earthquakes and long-term damage to the river's ecology (fish etc.).

Wind power

<ul style="list-style-type: none"> • Home owners can have their own wind turbine so will benefit directly from 'free' energy • New wind turbines are quiet and efficient • London Array wind farm will generate enough power for more than 470,000 homes 	<ul style="list-style-type: none"> • Can be put out to sea so are less environmentally polluting • Do not emit greenhouse gases once in use
<ul style="list-style-type: none"> • Can be unsightly • NIMBYism (Not in my back yard) 	<ul style="list-style-type: none"> • Need a local wind speed of more than 6m/second to be viable

Solar power

<ul style="list-style-type: none"> • Have no running costs so are a cheap source of energy • Can be fitted on houses so home owners have their own energy supply. 	<ul style="list-style-type: none"> • Can be fitted on roofs so do not take up extra land space • Do not emit greenhouse gases once in use.
<ul style="list-style-type: none"> • Can be unsightly 	<ul style="list-style-type: none"> • If put in fields, they are using up space that could grow food. • A high amount of land is needed to produce a low amount of energy.

BQ9. HOW CAN TECHNOLOGY (FRACKING) RESOLVE ENERGY RESOURCE SHORTAGES?



Fracking – The process of drilling down into the earth to a gas bearing rock. Water, sand and chemicals are blasted at high pressure which releases the gas inside the rock layers.

Positives



- Reduced dependence on oil from the Middle East (politically unstable region)
- Reduced annual energy bills = more disposable income = growth in economy
- Estimated that the UK has 200 trillion cubic feet of shale gas = could meet UK energy needs for 70 years.
- Creation of jobs and new infrastructure that will come with fracking
- Will generate large amounts of money, including for other services and industries.
- Governments are mainly concerned about energy security as cheaply as possible.



Negatives

- Should be focusing on making energy use more sustainable rather than opening up new reserves of fossil fuels
- Suggested that fracking can cause earthquakes, subsidence, gas leaks and groundwater contamination.



ENERGY HOMEWORK 4: ANSWER THE FOLLOWING

Explain one human cause of flooding (2)	
Name two areas in Bristol that are deprived (2)	
Name two strategies for improving quality of life in Bristol (2)	
Name three physical causes of flooding (3)	
Name two international organisations that India is a member of (2)	
What type of pressure system is a tropical cyclone?	
When did Hurricane Sandy strike Cuba and the USA	
Describe the distribution of the UK's fossil fuels and minerals (2)	
Define the term 'fossil fuels'	
Explain two reasons for changing global energy demand over the past 100 years (2)	
State two advantages of HEP (2)	
State two advantages of solar power (2)	
State two disadvantages of HEP (2)	
State two disadvantages of solar power (2)	
	<p>Total out of 24:</p> <p>21</p>

ENERGY HOMEWORK 4: CHECK YOUR ANSWERS

Explain one human cause of flooding (2)	Urbanisation – rainwater can't infiltrate impermeable surfaces/drains allow water to enter the river more quickly. Deforestation – interception is reduced so runoff increases
Name two areas in Bristol that are deprived (2)	Lawrence Hill and Cabot
Name two strategies for improving quality of life in Bristol (2)	<input type="checkbox"/> Recycling strategy <input type="checkbox"/> Transport – public transport and cycling <input type="checkbox"/> Housing – grants for loft insulation/ shared housing for elderly.
Name three physical causes of flooding (3)	Intense rainfall/ duration of rainfall/ snowmelt/ geology/ relief
Name two international organisations that India is a member of (2)	United Nations and World Trade Organisation
What type of pressure system is a tropical cyclone?	Non-frontal intense low pressure
When did Hurricane Sandy strike Cuba and the USA	October 2012
Describe the distribution of the UK's fossil fuels and minerals (2)	<input type="checkbox"/> Some of these resources, including iron and coal, helped fuel the industrial revolution, <input type="checkbox"/> Oil and gas from the North Sea are important but declining sources of energy.
Define the term 'fossil fuels'	Fossil fuels are hydrocarbons, primarily coal, fuel oil or natural gas, formed from the remains of dead plants and animals.
Explain two reasons for changing global energy demand over the past 100 years (2)	
State two advantages of HEP (2)	<input type="checkbox"/> Reservoirs can be used for water sports and fishing <input type="checkbox"/> Provide a water supply for areas that are located nearby <input type="checkbox"/> Less damaging to the environment as no greenhouse gases are produced
State two advantages of solar power (2)	<ul style="list-style-type: none"> • Have no running costs so are a cheap source of energy • Can be fitted on houses so home owners have their own energy supply. • Can be fitted on roofs so do not take up extra land space • Do not emit greenhouse gases once in use.
State two disadvantages of HEP (2)	<ul style="list-style-type: none"> • Large areas are flooded which impacts local habitats and species. • Warning that damming up too much water in the reservoir increases the risk of landslides, earthquakes and long-term damage to the river's ecology (fish etc.).
State two disadvantages of solar power (2)	<ul style="list-style-type: none"> • If put in fields, they are using up space that could grow food. • A high amount of land is needed to produce a low amount of energy.
Total out of 24:	

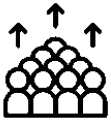
BQ10. HOW DO ATTITUDES TO EXPLOITATION AND CONSUMPTION OF ENERGY VARY WITH DIFFERENT STAKEHOLDERS?

Stakeholder	Local resident	Home owner	UK Government	Energy company	Conservationist	Government minister for energy
Management strategies	<ul style="list-style-type: none"> Can measure their carbon footprint Domestic heating contributes 15% to an individual carbon footprint. Using public transport, car sharing. 	<ul style="list-style-type: none"> Cavity-wall installation Loft installation Double glazing for windows Solar panels on roofs 	<ul style="list-style-type: none"> UK Climate change summit (2015) pledged to limit the increase in global temperature to 2°C and invest in low-carbon energy technologies. 	<ul style="list-style-type: none"> Seek to maintain consistency of supply i.e. fossil fuels due to quick start up time and reliability. Can use renewables for off-peak production. 	<ul style="list-style-type: none"> Green taxes on non-renewable sources 	<ul style="list-style-type: none"> Setting carbon budgets to limit the amount of greenhouse gases the UK is allowed to emit Investing in low carbon energy technologies Reduce demand for energy with smart meters
Own opinion	'I do not want a wind farm opposite my house'	'I try to manage the use of energy sustainably'	'We are upgrading our social housing with insulation and solar panels to help people consume less energy'.	'We try to use HEP to cope with peaks in demand because our coal-fired plants take a long time to 'wake up'.	'If all homes were energy efficient, we would use less energy and more would be available for future generations'.	'There will be none left for future generations. We need to be more sustainable in our approach and manage the resources we have'.

BQ11. WHY DO ENERGY RESOURCES REQUIRE SUSTAINABLE MANAGEMENT AND HOW DO ATTITUDES VARY?

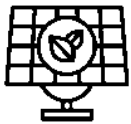


Sustainably managing resources requires utilising the resource in a way that ensures that they are not over exploited and that the needs of future generations are met.



Reasons to manage energy efficiently

1. World's population is growing by 80 million people a year
2. Demand for energy is likely to rise by 50% by 2030
3. Non renewables will run out
 - Oil by 2055 and Natural gas by 2180 and Coal by 2430
4. Renewable energy resources are currently not efficient enough in certain weather conditions to be relied upon
5. Global demand for electricity is expected to rise by 80% between 2012 and 2040



Different attitudes

- ☐ As energy prices continue to rise it is important to rely on other options such as solar and wind to keep energy bills lower.
- ☐ Renewable energy generation will help lower energy costs for people who are in lower income.
- ☐ Coal and gas can help provide cheap energy
- ☐ Renewables are too expensive to rely upon right now
- ☐ As conventional fossil fuels run out we need to look to new technologies such as fracking.

BQ12. HOW HAS NORWAY ATTEMPTED TO MANAGE ITS ENERGY RESOURCES IN A SUSTAINABLE WAY?



- It is the world's **sixth-largest** exporter of oil
- **Second-largest** exporter of gas.
- Sustainable management of oil extraction. For example in most oil fields up to 65% is lost in the process.; in Norwegian oil fields only 54% is lost.



- It is reducing the amount of oil it produces: in 2001 it produced 3.4 million barrels; in 2013 it produced approximately half .
- The revenue it receives from the export of oil is being used to develop the renewable industry in the country.

Renewable energy sources production



- Norway is a mountainous country with reliable rainfall totals.
- 99% of its electricity from renewable sources is produced from HEP



- Has just started to harness wind power.

The management of Norway's energy consumption

1. **Enova SF** is an organisation that is run and funded by the government to promote energy saving in Norway.
2. Target to reduce greenhouse gases by **30%** and increase the renewable energy share of total energy consumption to **67.5%** by 2020
3. The government is improving the national grid to make it more efficient provider of electricity to the country.



BQ12. HOW HAS NORWAY ATTEMPTED TO MANAGE ITS ENERGY RESOURCES IN A SUSTAINABLE WAY?

Industry



- ☐ Grants to install measures of energy recovery or use of waste heat in industrial processes
- ☐ Grants to install renewables such as heat pumps

Households



- ☐ Not allowed to install oil boilers
- ☐ 40-60% of the house has to be heated by means other than electricity
- ☐ Passive and low-energy homes receive loans and grants which are available for energy-efficient measures

Transport



Since 2001 the government has been persuading people to buy electric cars. There are a number of incentives

- ☐ Exemption from the country's high taxes on fossil fuel cars
- ☐ Access to priority lanes reserves for taxis and buses



- ☐ Free parking and charging in public places
- ☐ Exemption from road tolls



- ☐ Car tax is higher on cars that are less fuel efficient
- ☐ Cities that improve their public transport systems get grants from the government

BQ13. HOW HAS BHUTAN ATTEMPTED TO MANAGE ITS ENERGY RESOURCES IN A SUSTAINABLE WAY?



- It is located on the southern slopes of the Eastern Himalayas with rainfall varying from 500 and 5,000mm annually. This has allowed the country to develop **HEP** as an energy source.



- It has no reserves of oil or gas, so oil to power cars is imported.
- About **60%** of the population live in rural areas and use **fuelwood** as their main source of energy.



HEP

- Bhutan is developing its HEP resource as a means of revenue (money): at present it provides **40%** of the government's annual income.
- The Asian Development Bank has provided money to allow the government to build dams and construct the grids needed to both export the electricity but also to improve the electricity supply to rural areas in Bhutan.



- The excess electricity – around **70%** of what is produced is exported to India.
- By **2013** Bhutan has provided electricity to **95%** of its households.
- The other **5%** of households live in remote areas. The government invested in small renewable energy schemes to bring electricity to these remote areas . E.g. 1,896 new solar home schemes.



BQ13. HOW HAS BHUTAN ATTEMPTED TO MANAGE ITS ENERGY RESOURCES IN A SUSTAINABLE WAY?

Fuelwood



- The majority of the population use fuelwood as the main domestic source of energy. This is because it is freely available in the forests.
- The people using it are subjected to damaging smoke inhalation, and it takes hours to collect the wood and to produce energy heat to cook on open fires.



- The burning of wood is a global issue because it releases **greenhouse gases**.
- The government has tried to regulate the amount of fuelwood that people **who do not** have electricity are allowed to **16m³ of fuelwood a year**, and to **8m³** a year if they **do have** electricity.
- Enforcing this is difficult, however, because of the remoteness of the areas.

Government action



- 2013 **Sustainable Rural Biomass Energy (SRBE)** project. This promotes the use of biomass energy for cooking, heating and lighting in rural areas.
- The project has a budget of over **US\$4 million** and should benefit **14% of the rural population with 14,000 stoves installed**.
- The stoves are smoke free so improve health; they also heat up more quickly so less wood is required which saves time and protects forests.



- There will also be a scheme to replenish 100 hectares of forest which have been cut down.
- 2013 **Alternative Renewable Energy Policy**, which aims to promote the use of wind, solar, biomass and micro-hydropower systems.

SAMPLE ASSESSMENT MATERIAL

- 3 People exploit and can change environments in order to obtain non-renewable energy resources such as oil.

(a) Oil is a non-renewable resource. Name **two** other non-renewable resources.

(2)

1

2

(b) Study Figures 3a and 3b in the Resource Booklet.

- (i) Identify the country which had a decrease in oil consumption between 1965 and 2010.

(1)

- ☐ A China
- ☐ B New Zealand
- ☐ C Mexico
- ☐ D UK

- (ii) Calculate the percentage increase in Singapore's oil consumption per person between 1965 and 2010.

(1)

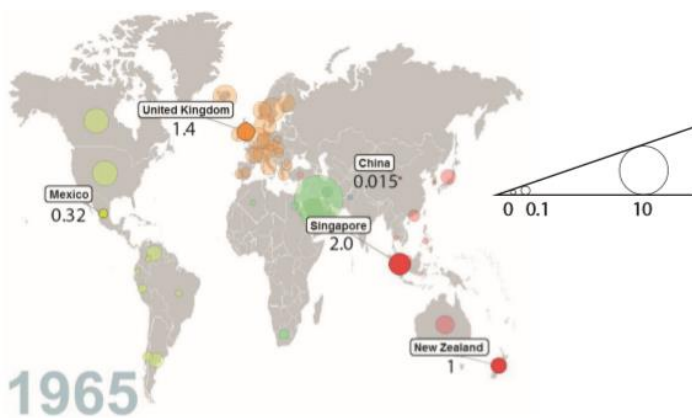


Figure 3a

Oil consumption (tonnes per person) in 1965

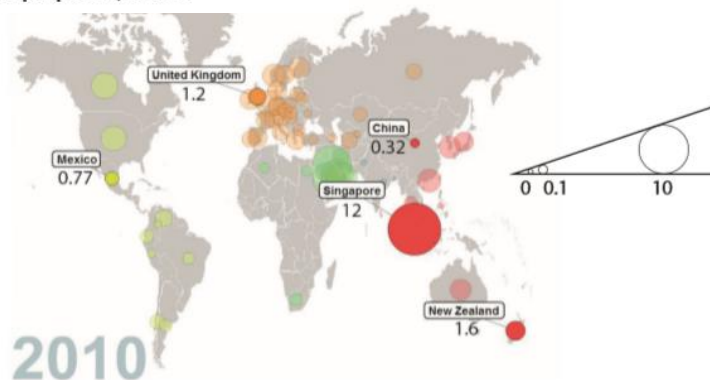


Figure 3b

Oil consumption (tonnes per person) in 2010