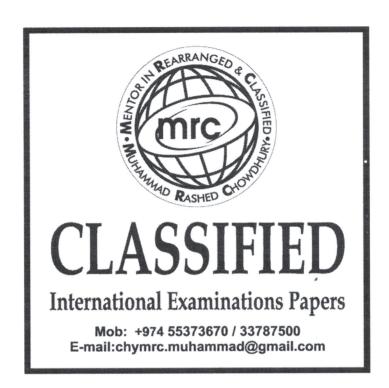
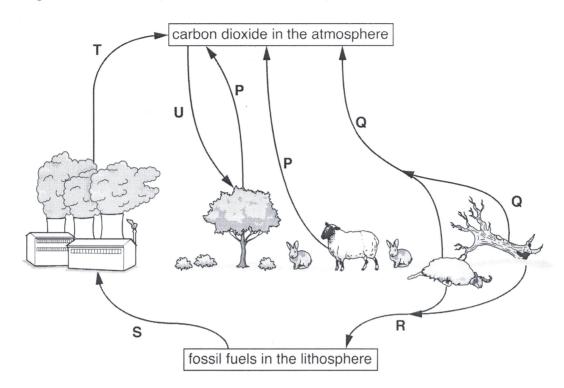
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# **ENVIRONMENT MANAGEMENT TOPIC-FOSSIL FUELS-Formation**

4 The diagram shows some processes in the carbon cycle.

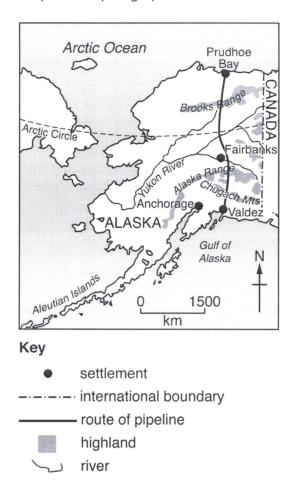


(a) Complete the table using letters  ${\bf P}$  to  ${\bf U}$  from the diagram.

process name	letter
combustion	
decomposition	
fossilisation	,
mining and pumping	
photosynthesis	
plant and animal respiration	

Describe how coal is formed.	
[	3]
Suggest four ways that supplies of fossil fuels could be conserved.	
[	4]
	Suggest four ways that supplies of fossil fuels could be conserved.

(ii) Look at the map below, which shows information about oil in Alaska. Use information from the map to complete the paragraph below.



	In 1968 oil was discovered in northern Alaska. A pipeline was built to transport the	oil.
	The pipeline runs from in the north to	on
	the south coast of Alaska. Here the oil is taken away to markets by supertankers. T	-he
	pipeline crosses the River and passes close to the town of Fairban	ks.
	In total the pipeline is 1241 km long.	[3]
ii)	Suggest why the pipeline was built rather than transporting the oil from the north Alaska by sea in supertankers.	of
		[43

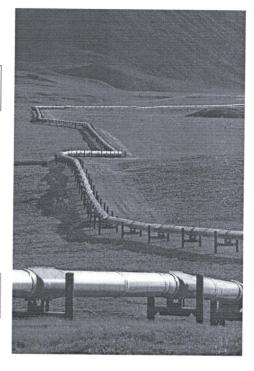
(e) Look at the photograph, which shows an oil pipeline in Alaska, and read the information.

vegetation grows very slowly

caribou breed close to the pipeline

ground below surface remains frozen all year

oil in the pipeline is warm



caribou migrate across the region to search for food

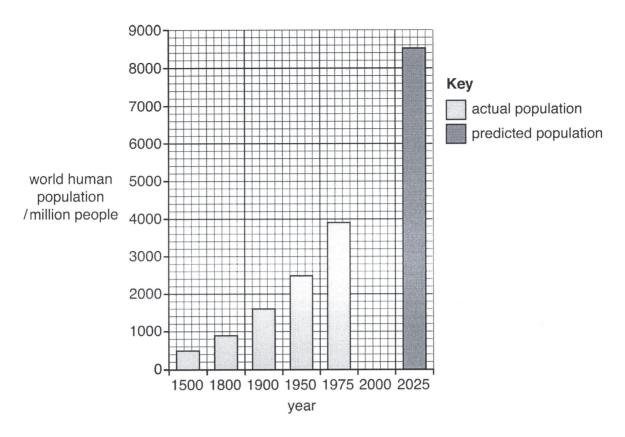
animals, such as bears and wolves, live in the region

pipelines can leak

(')	environment.
	[3]
(ii)	In some places the pipeline was raised above the ground. Suggest <b>two</b> reasons why the pipeline was raised above the ground.
	[2]

(f)	Fossil fuels such as oil have provided much of the world's energy in the past.
	Suggest reasons why some countries are developing alternative sources of energy but othe countries are continuing to rely on fossil fuels.
	[6]

2 (a) Look at the bar graph below, which shows world human population growth.



(i)	The world human population in the year 2000 was 6000 million people.
	Complete the bar graph for the year 2000.

ii) State the predicted world human population for the year 2025.

(iii)	Suggest reasons for the rapid growth of the world human population since the year 1800

[1]

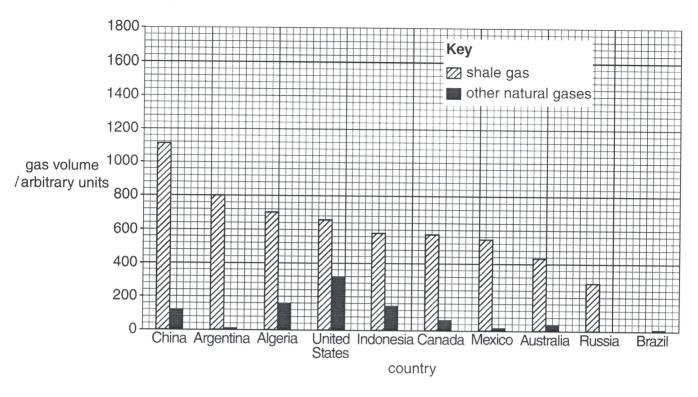
<u>·</u> [5

4	(a)	Coal	is	a	fossil	fuel
---	-----	------	----	---	--------	------

Explain how coal was formed.
[4]

**(b)** The table below and bar graph opposite show the reserves of shale gas and other natural gases in 10 countries.

country	chalo and	other netural games
Country	shale gas /arbitrary units	other natural gases /arbitrary units
China	1115	120
Argentina	800	12
Algeria	707	160
United States	665	320
Indonesia	580	150
Canada	573	68
Mexico	545	17
Australia	437	40
Russia	285	1680
Brazil	240	14



- (i) Complete the bar graph for Russia and Brazil using information from the table and the key.
- (ii) Some countries are starting to extract shale gas.

Australia

**Argentina** 

Which country would have the largest percentage increase in its available gas when it starts to extract shale gas? Circle your choice. [1]

Mexico

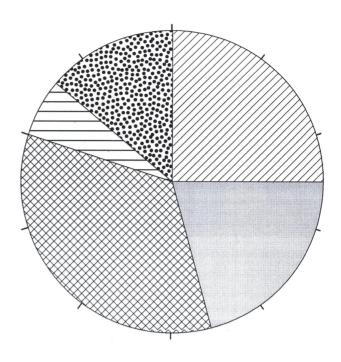
Russia

Brazil

	(iii)	Explain your answ	ver to (b)(ii).		
		•••••	•••••		 [1]
(c)	Foss	sil fuels will eventu	ally be used up.		
	Expl	lain how fossil fuel	s can be made to I	ast longer.	

1 (a) Look at the graph below which shows the percentage of world energy that came from different sources in 2013.

Key	
	coal
	natural gas
	oil
	nuclear power
	alternative sources



(i) State the energy source that was used most in 2013.

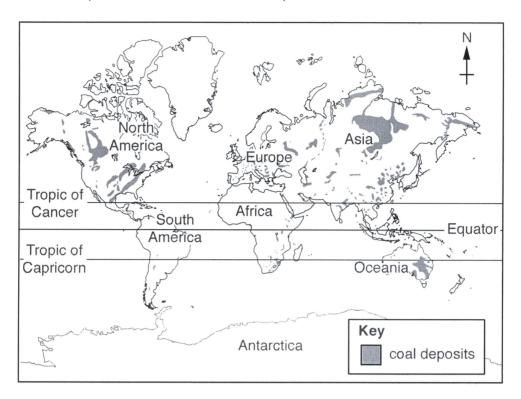
(ii) Calculate the percentage of world energy that came from fossil fuels in 2013.Space for working.

..... % [1]

(iii) Using evidence from the graph, describe the contribution that alternative energy sources made to world energy in 2013.

....[2

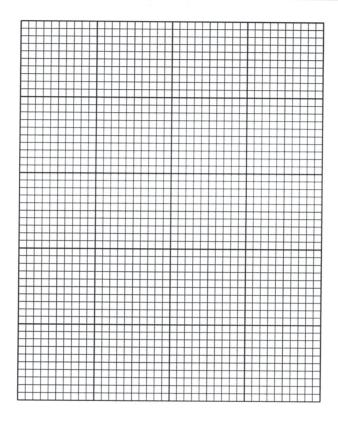
(b) Look at the map, which shows where coal deposits are found in the world.



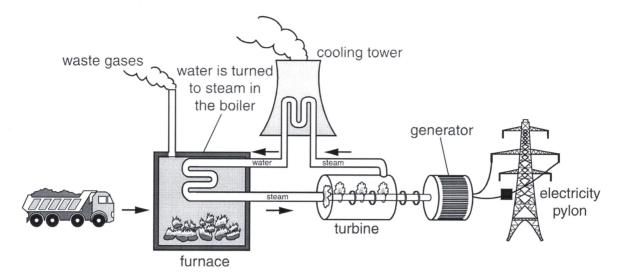
(i)	Describe the distribution of coal deposits shown on the map.
	[3
(ii)	Explain how coal was formed.
	[3

(iii) The table shows information about how fossil fuels are used to generate electricity in the United States of America. Draw a bar graph on the grid below using the data in the table. Label your axes.

fossil fuel	percentage of electrical production
oil	2
gas	25
coal	42



(c) Look at the diagram, which shows a power station that produces electricity using coal.



(i)	Using the diagram, explain how electricity is produced in the power station.
	[3]
(ii)	Suggest the environmental impacts a power station that uses coal might cause.
	[4]

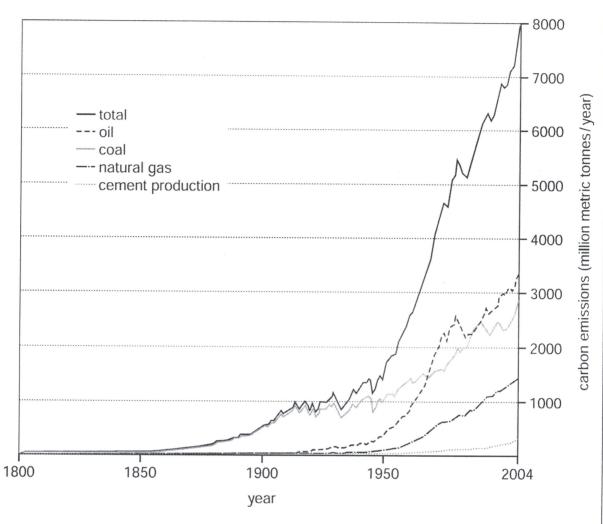
(d) Look at the map below, which shows a world distribution of acid rain.

	Key acid rain
North	
America Europe  Tropic of	
Cancer Africa Equator-	
_ Tropic ofAmericaOceaniaOceania	
O 6000 Antarctica	
(i) Using the map, state the name of <b>two</b> continents which are affecte	d by soid rain
1	u by acid fairi.
0	3

	1	
	2	2]
(ii)	Using the map, identify <b>one</b> continent that is not affected by acid rain. Suggest a reason for this.	n
	continent	
	reason	
	[2	 2]
(iii)	Explain how acid rain is formed.	
	ra	

	(iv)	Explain why international agreements are needed to solve the problem of acid rain.
		[5]
(e)	Sua	gest why countries around the world do not use more alternative energy.
(-)	oug,	goot why obtained around the world do not use more alternative energy.

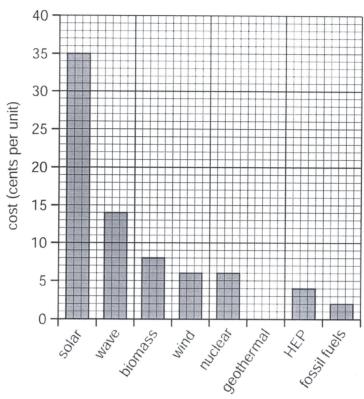
**2** The graph below shows the total global carbon emissions from non-living sources between 1800 and 2004.



(a) (i)	Cement is produced from rocks made of calcium carbonate. What was the total carbon emission in 2004 from cement production?
	[1]
(ii)	When did carbon emissions from natural gas begin?
	[1]
(iii)	Why did pollution from natural gas begin after that from coal and oil?
	[2]
(iv)	Which of the sources of carbon emissions is not a fossil fuel?

**(b)** Carbon, in the form of carbon dioxide in the atmosphere, is a pollutant. For this reason alternatives to fossil fuels are sometimes used. The graph below shows the cost of various alternatives to fossil fuels.





(i)	Geothermal energy costs 5 cents per unit. Complete the graph for geothermal energy. [1]
(ii)	Which of the alternatives to fossil fuels on the graph produces carbon dioxide?
	[1]
(iii)	Using the graph and your own knowledge state and explain the advantages and disadvantages of solar and geothermal energy as alternatives to fossil fuels in the future.
	[2]

**3** The table below shows the location and relative sizes of all the known oil reserves around the world.

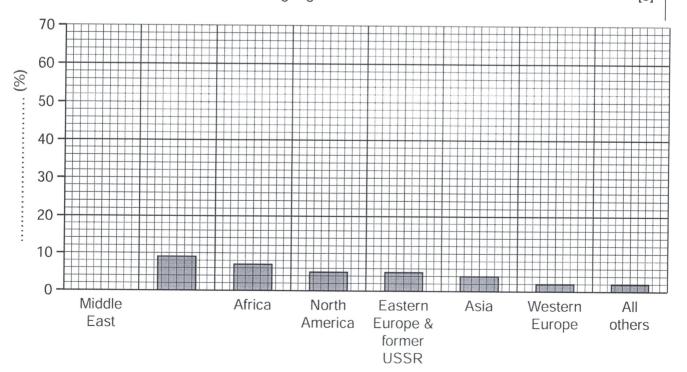
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region	percentage of total world oil reserve
Middle East	
Central and South America	9
Africa	7
North America	5
Eastern Europe and former USSR	5
Asia	4
Western Europe	2
All others	2

(a) (i) Calculate the percentage of world oil reserves in the Middle East.

..... % [1]

(ii) Complete the graph below by adding the data for the Middle East, a suitable title for the Y-axis and the missing region.



country/region

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	(iii)	Give an advant	tage and a disadva	ntage of the majo	ority of oil being located in the
		***************************************		• • • • • • • • • • • • • • • • • • • •	
					[2]
(b)	Oil a gen	and coal are bo erated from coal	th fossil fuels. The i	table below show regions.	rs the percentage of electricity
			country/region	percentage of electricity obtained from coal	
			South Africa	93	
			China	82	
			Australia	80	
			India	75	
			USA	51	
			South Korea	36	
			Europe	30	
			Russia	30	
			Japan	22	
	(i)	What percentag			es <b>other</b> than coal in China?
	(ii)	Suggest why the	ere is such variation	in reliance on co	al.
					[1]
	(iii)	Suggest <b>two no</b>	n-fossil fuel alterna	atives to coal that	these countries may use.
					[2]

2 (a) Look at the graph showing the importance of different energy sources in 2009.

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### World energy consumption by source (2009)

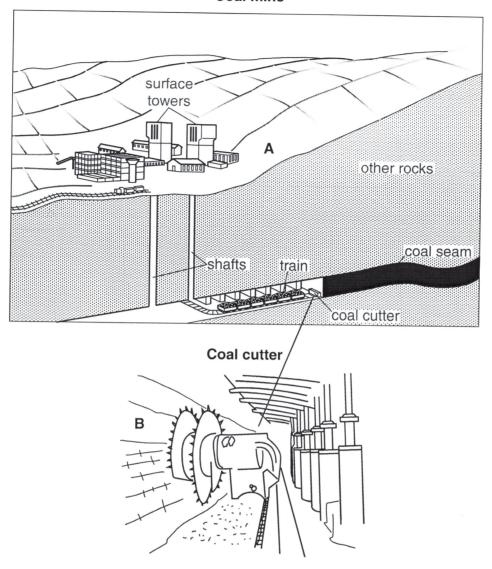
hydro electric and other renewables nuclear biomass and waste oil gas

(i)	On the graph, shade in the sectors showing energy from fossil fuels.	[1]
(ii)	Describe what the graph shows about the importance of fossil fuels for we energy consumption in 2009.	vorlo
		•••••
		[2]
(iii)	Approximately what percentage of total world energy consumption in 2009 ca from coal?	ame
		[1]

(b) Look at the diagrams which show one method used for mining coal.

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#### Coal mine



(i)	What is the purpose of the shafts and towers shown on diagram A?
	[2]
(ii)	Using both diagrams, describe how the coal is being mined.
	[3]

(iii) Would you describe this as an old or a modern coal mine? Explain your a			d or a modern coal mine? Explain your answer.
			[2]
(c)	Min Chi		s newspaper report about what happened in a
		123 workers tra	pped by flooding
	in nave inclusion of pund the world	e vast Wangjialing coal mine orthern China is estimated to e 2.3bn tonnes of coal reserves, uding over 1 billion tonnes roved reserves. Yesterday erground water rushed into mine where 261 people were king. Only 138 managed to ape the flood waters.	25 people died in a coal mine fire in central China. Last November, 108 men were killed when an explosion blasted through a coal mine belonging to another state owned company. 2009 was a bad year; there were two other explosions which killed more than 50 workers.
	China's coal mines are well known for being some of the world's most dangerous. Earlier this month,		Safety standards are often ignored to try to meet the ever rising demand for coal. Coal supplies 70 per cent of China's energy needs.
	(i)	State the four different reasons for in the newspaper report.	the loss of life in China's coal mines, mentioned
			[2]
(ii)		Explain why the dangers of workir mines.	ng in opencast coal mines are less than in deep
			[3]

(111)	Suggest reasons why mining safety is much better in some countries than in others

(d) (i) Coal is often said to be a dirty fuel compared with other fuels. One type of pollution, for which coal fired power stations are blamed most, is acid rain. Name the gases from coal fired power stations which cause acid rain.

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(ii) The map shows acid rain and its effects in part of Europe. It was most serious in the 1970s.

#### Acid rain in northern Europe



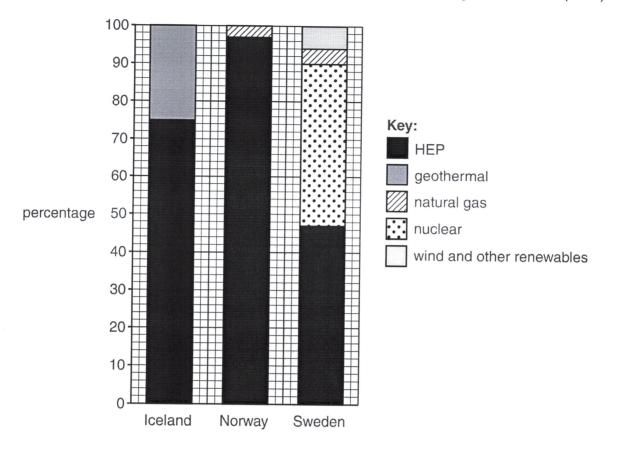
	now does the map show that acid rain can be an international problem?
	[1]
(iii)	Explain fully why the trees in the north of the UK on the map are shown in a different way from those in Sweden.
	[3]

(e) (i)		The problem of acid rain in northern Europe is less now than it was in the 1970 Describe what has been done to reduce the problem of acid rain pollution from confired power stations.	
		[2]	
	(ii)	Why is finding a solution to acid rain and other types of air pollution slower because they are international problems instead of just being a national problem?	

(f) Look at the divided bar graphs showing how electricity is produced in three north European countries. (They are named on the map of acid rain).

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## Percentage of electricity production by source in Iceland, Norway and Sweden (2008)



(i)	How much of Iceland's electricity comes from renewables?
	[1]
(ii)	Look back to the pie graph of world energy consumption in part (a).
	How important are renewables for electricity production in these three north European countries compared with their importance in total world energy consumption?
	[3]

(iii)	Give reasons why types of renewable energy sources, and amounts used, vary greatly between different countries.
	[5]
	[Total: 40 marks]

5		ergy rces.	for use by human communities comes from either renewable or non-renewable
	(a)	The	major non-renewable energy resources are fossil fuels.
		(i)	Name the <b>three</b> main fossil fuels
			[2]
		(ii)	Explain why these are called fossil fuels

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There are two solutions to minimise this problem:

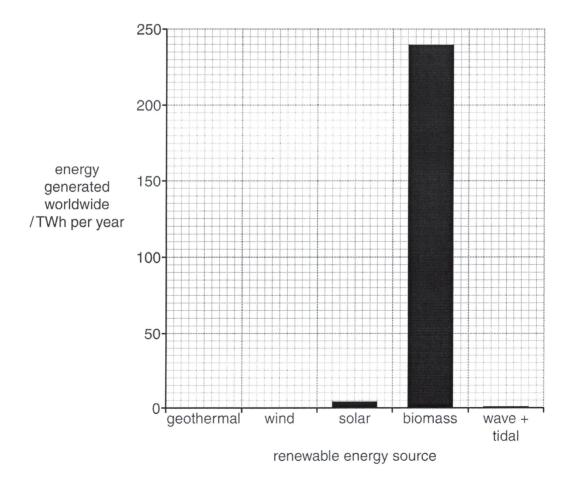
- · increased efficiency in the use of fossil fuels
- new technologies

Some of the new technologies will involve the use of renewable energy sources. The table shows the energy generated from some renewable sources in 2010.

source	TWh per year	
geothermal	60	
wind	130	
solar	4	
biomass	240	
wave and tidal	1	
TOTAL	435	

An estimate of the potential energy generation from these sources is 300 000 TWh per year.

(i) Complete the graph below for geothermal and wind power.

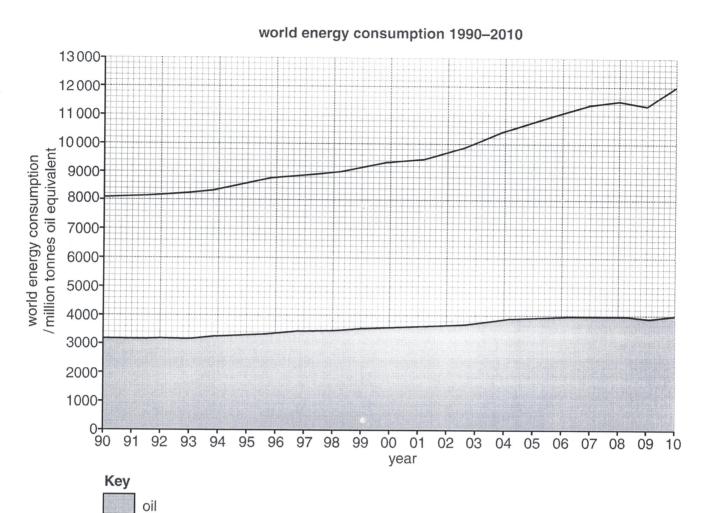


Your answer should give a complete bar graph. [1]

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Calculate, from the information above, the percentage of the estimated potential energy generation that we currently generate from these five energy sources combined.
Show your working.
[2]
Describe and explain ways in which governments can conserve fossil fuels.
[4]
[Total: 10]

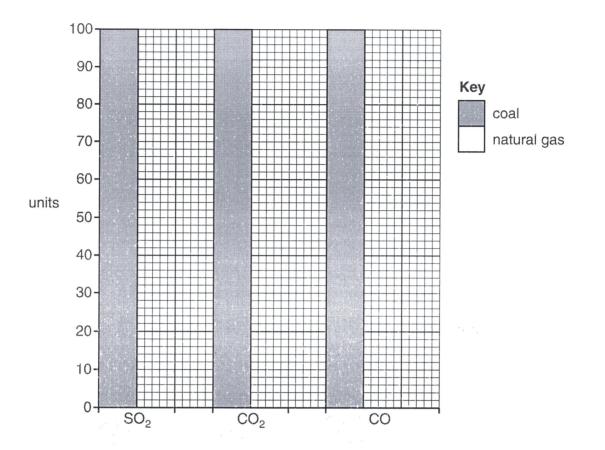
1 (a) Look at the graph below showing total world energy consumption between 1990 and 2010. It also shows the amount that oil contributed to the total.



(i)	Using evidence from the graph describe what has happened to total world energy consumption between 1990 and 2010.
	[3]
(ii)	What percentage of total world energy consumption was from oil in 2010?
	[1]

**(b)** The importance of natural gas as a fuel is increasing. In recent years there has been a 'dash for gas'. More natural gas is being used, especially for generating electricity.

Look at the graph below, which compares emissions from burning natural gas with those from burning coal.



(i) Complete the graph by adding three bars to show these units of natural gas emissions.

natural gas	emissions
SO <sub>2</sub>	1
CO	60
CO	20

[1]

	(ii)	For sulfur dioxide (SO <sub>2</sub> ) and carbo emissions are important for people	on dioxide (CO <sub>2</sub> ), give <b>differer</b> and the environment.	nt reasons wh	ny lowe
		SO <sub>2</sub>			
				•••••	
		CO <sub>2</sub>			
					[4]
(c)	Oil a	and natural gas are fossil fuels; they			
	Loo	k at the diagrams which show the ected to last in 1990 and 2010.	number of years that reserves	of oil and ga	ıs were
		A estimates of reserves made in 1990	B estimates of reser made in 2010	ves	
		gas 2047 oil 2023	gas 2069	oil 2056	
	(i)	Describe what the diagrams show al	bout the accuracy of the estima	tes made in 1	990.
					[2]

	(11)	1990.	ly the estimate	es made in 201	0 were different fro	om those made ir
	(iii)	Eventually the reserve this will happen.				- '
						[3]
(d)		ne 1970s and 1980s n			ay of reducing worl	d dependence on
		il fuels. It appeared to	·	vantages.		
		k at the spider diagrar				
		ource of energy withou orbon dioxide emissior			developed and kn technology	own
		,				
			advantages	of nuclear pov	ver	
	on	ly small amounts of ur	anium		operating costs ar	e low
		sed so could be devel in any country			producing electric many years	
	(i)	Describe the advanta	ges of nuclear	power compare	ed with:	
		fossil fuels				

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[Turn over

		renewable energy sources like solar, wind and wave			
		[4			
	(ii)	In 2010 nuclear power provided seven per cent of world energy. Many people expect this percentage to go down in future years.			
		Give reasons to explain why many people are no longer as hopeful about the future development and use of nuclear power as they used to be.			
		[4]			
(e)	Mar Follo	In Japan in 2010, 30 per cent of electricity was generated in nuclear power stations March 2011, a nuclear power station was badly damaged by an earthquake and flux Following this, Japan has greatly reduced the percentage of its energy generated from nucleon stations.			
	(i)	What do you think was the main reason that Japan reduced its use of nuclear power stations? Explain your view.			
		[2]			

					7				
(	(ii)			s governme from nuclea			when decidin	g how to	replace the
									,
									[4]
(f) By 2015 the price of solar panels will have come down a lot after China significan its production of solar panels. The graph below shows this.							tly increases		
		2							
price p		2							
watt /\$		1 —	×	×					
7 Ψ					×	*	*	×	
		o <del>                                    </del>	2010	2011	2012	2013	2014	2015	2016
					year				
	(i)	Mhat ia th	o ovpostod	doorooo ir	the cost of	eolar pa	nels from 200	0 to 2011	52
	(i)	vviial is lii	ie exhected	ueciease ii	1 1116 6031 01	solal pa	110111 200	5 10 2010	);

Space for your working.

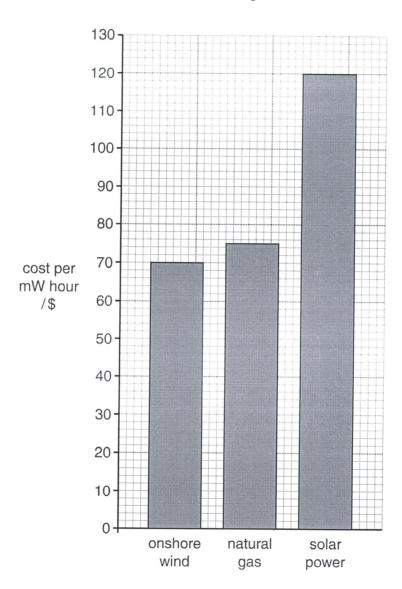
.....\$ per watt [1]

(ii) Using the graph, estimate the likely cost of solar panels in 2016. Space for your working.

...... \$ per watt [1]

Solar panels contain a number of different materials that are extracted from rare minerals. What impact might this have on the sustainability of solar panels?
[0]

(g) The cost of producing electricity from three different energy sources in a developed country in 2011 is shown in the bar graph below. The costs given are for the most modern equipment.

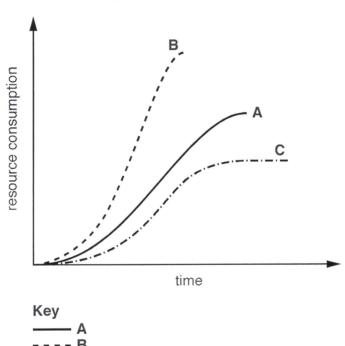


	Using the bar graph and your own knowledge, suggest what hope this gives for the greater use of renewable forms of energy in the future. Explain your answer.
	[3]
(h)	In a developing country there is a great need for electricity. The electricity that is generated often comes from fossil fuel power stations using out of date technologies.
	Suggest why people in developing countries want access to electricity.
	[2]
	[Total: 40]

- 5 (a) In the United States of America ten tonnes of minerals which are not fuels are used per person per year.
  - (i) Circle two minerals which are not used as fuels.

		coal	copper ore	iron	iron ore	oil	[2]
(ii)	Name c	<b>one</b> mineral	that is used as a	fuel <b>and</b> o	describe how i	t was formed.	

(b) The graph below shows three ways in which the use of a mineral can be managed over time.



(i)	On the lines below,	match the letter of the curve with the correct description.			
	rapid consumption				
	conservation				
	conservation plus recycling		[2]		
(ii)	ii) Discuss whether mineral resources can be used sustainably.				
			.[3].		