1. Explain how alternative energy production **and** planting trees may help to reduce the rate of climate change.

(Total 4 marks)

2. Explain how the increasing use of fossil fuels and changes in agriculture may have contributed to global changes in temperature.

(Total 4 marks)

3. Explain how volcanic activity and orbital changes may cause long-term climate change.

(Total 4 marks)

4. (i) The cutting down of tropical rainforest is one of the reasons for an increasing greenhouse effect around the earth.

Explain how it has helped to increase the greenhouse effect.

(6)

(ii) Sea defences are one way in which the effects of global warming can be managed.

Name **two** types of sea defence.

(2)

(iii) Choose **one** type of sea defence and explain how it may reduce the effect of global warming.

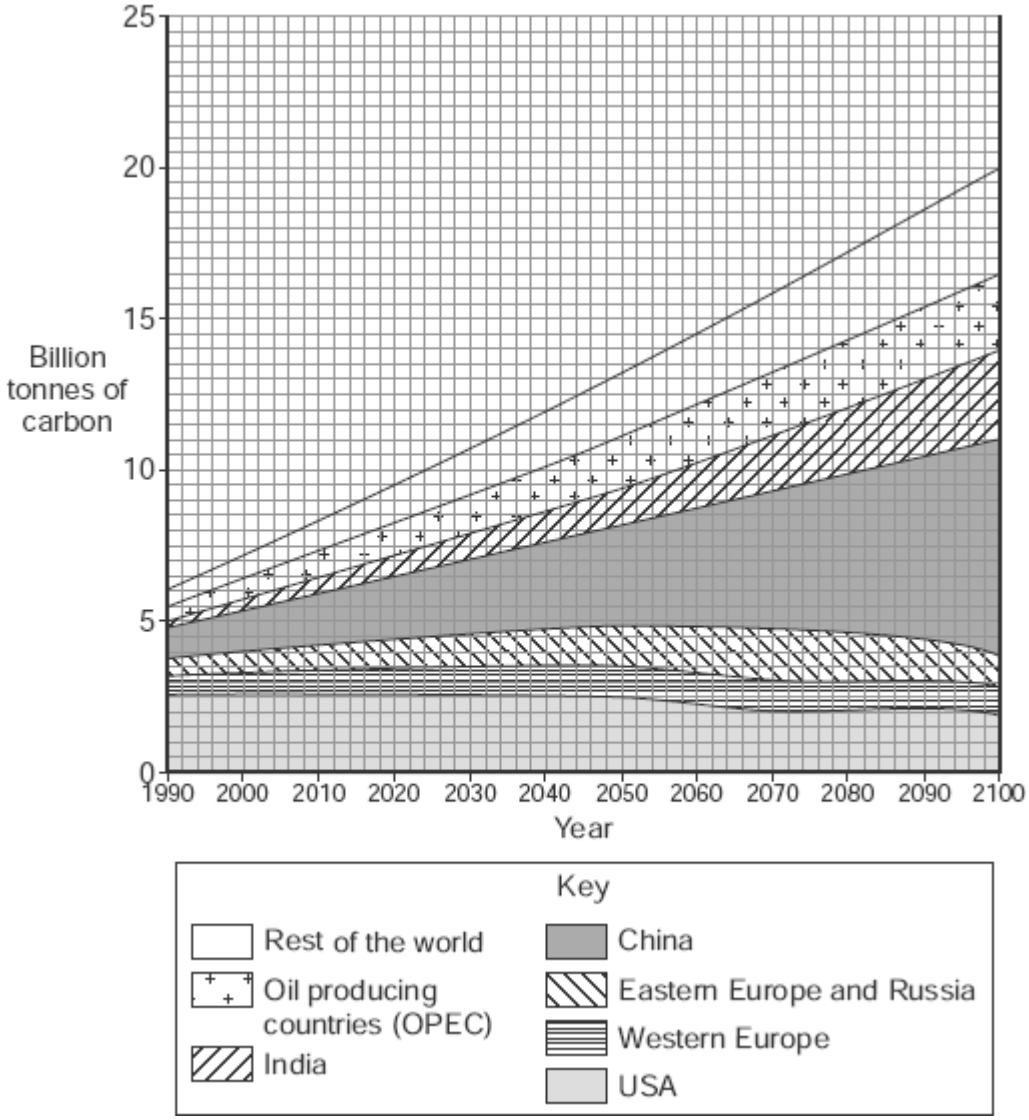
(2)

(Total 10 marks)

5. Rising sea levels are a major consequence of global warming. How may the problem of rising sea levels be managed?

(Total 4 marks)

6. Study the figure below, a compound graph showing the amount of carbon produced in different parts of the world.



(i) Which country will be producing the largest amount of carbon in 2100?

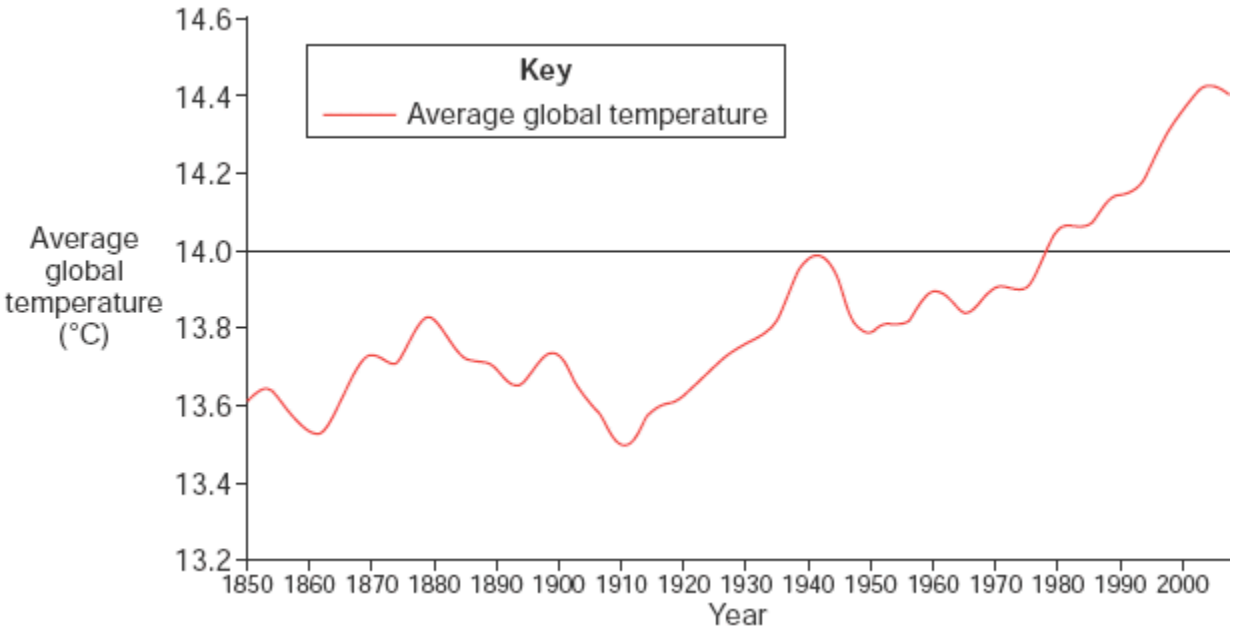
(1)

(ii) Describe the changing pattern of carbon emissions shown in the figure above.

(4)

(Total 5 marks)

7. Study the figure below, which shows changes in average global temperatures from 1850 to 2007.



Describe the changes in average global temperatures shown in the figure above.

(Total 4 marks)

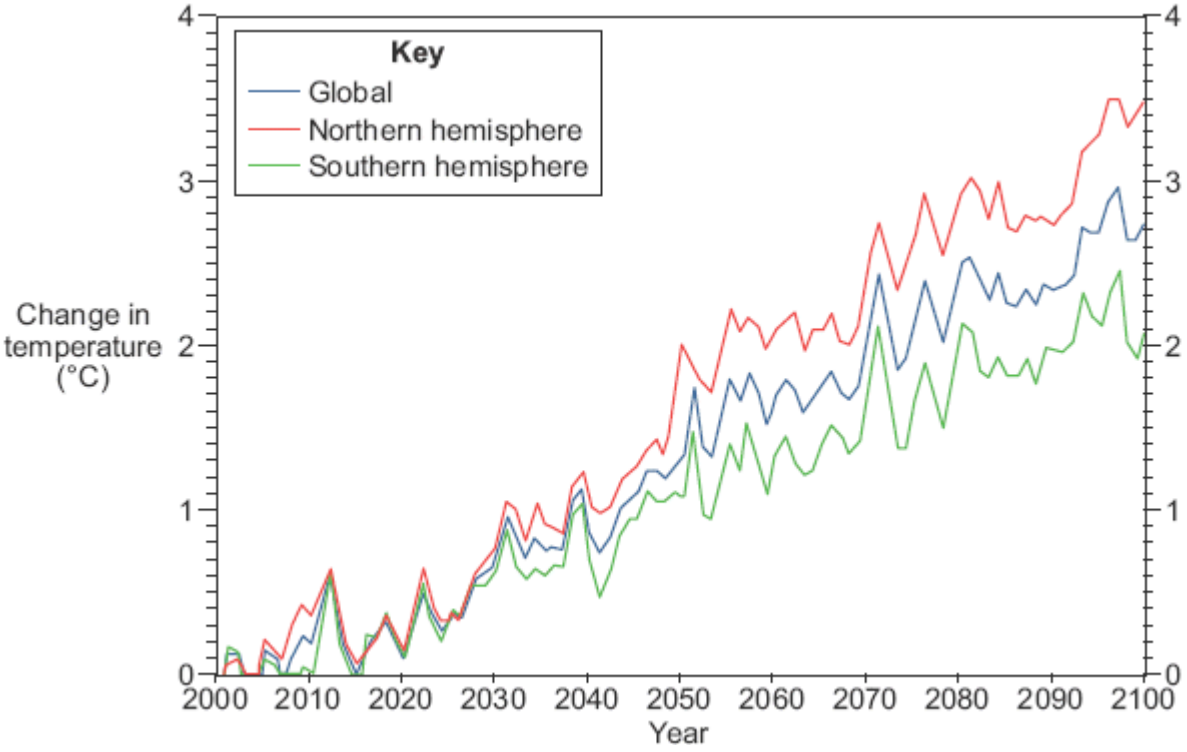
8. Describe what is being done to respond to the threat of climate change at an international level.

(Total 6 marks)

9. Explain how long-term planning can be used to manage the threat from rising sea levels in coastal areas.

(Total 6 marks)

10. (i) Study the figure below, which shows predicted global, Northern hemisphere and Southern hemisphere temperature change from 2000 to 2100.



Describe the trends shown by the graph.

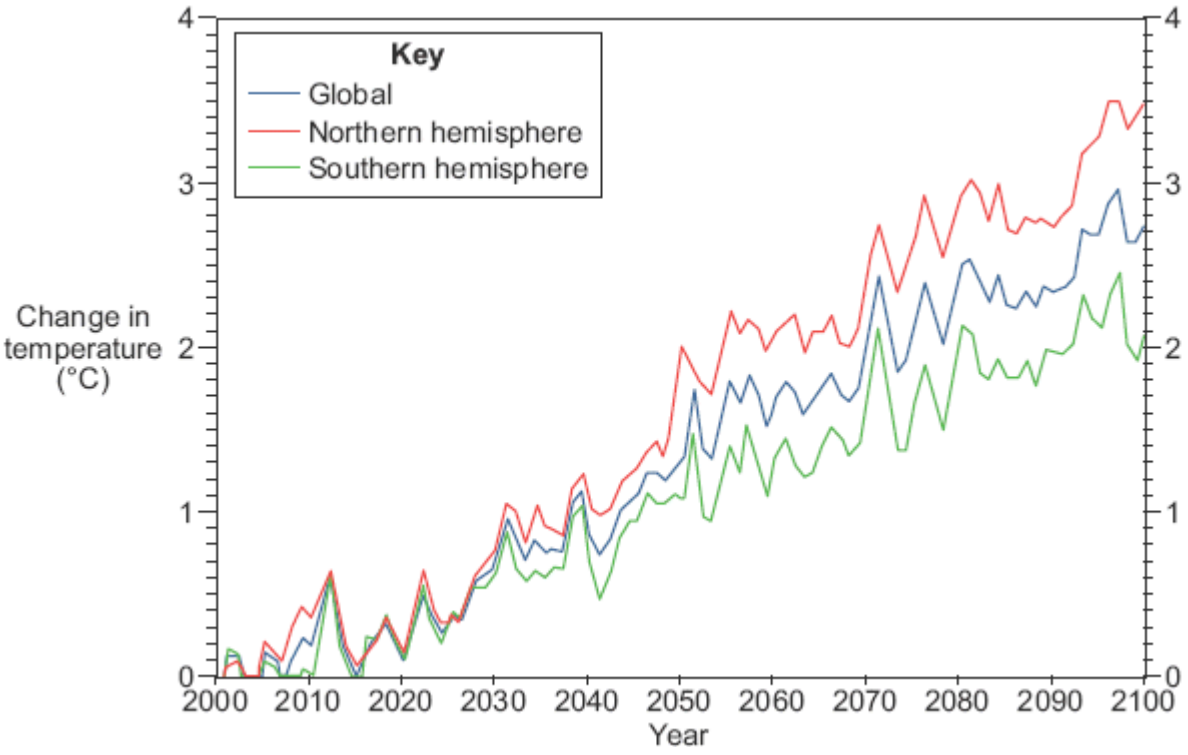
(4)

(ii) Outline **one** possible cause of global climate change.

(2)

(Total 6 marks)

11. (i) Study the figure below, which shows predicted global, Northern hemisphere and



Southern hemisphere temperature change from 2000 to 2100.
Use information from the figure to complete the Fact File below.

Overall trend of global temperatures	
Predicted change in temperature in the Southern Hemisphere between 2000 and 2100	º Celsius
Year when predicted temperature in the Northern Hemisphere will have changed by 2 ºC for the first time	

(3)

(ii) Outline **one** possible cause of global climate change.

(2)

(iii) What evidence is there to suggest that people are not the only cause of global warming?

(3)

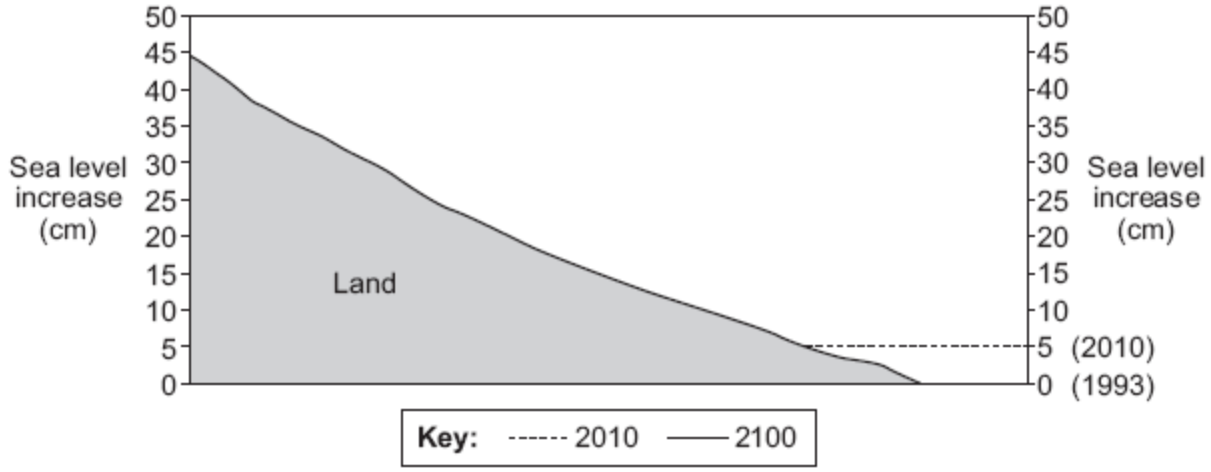
(iv) Describe the possible environmental consequences of climate change for the UK.

(4)

(Total 12 marks)

12. (a) Study the figure below, a diagram showing changing sea levels between 1993 and 2010.

On the figure, show the predicted sea level increase of a further 35 cm between 2010 and 2100.



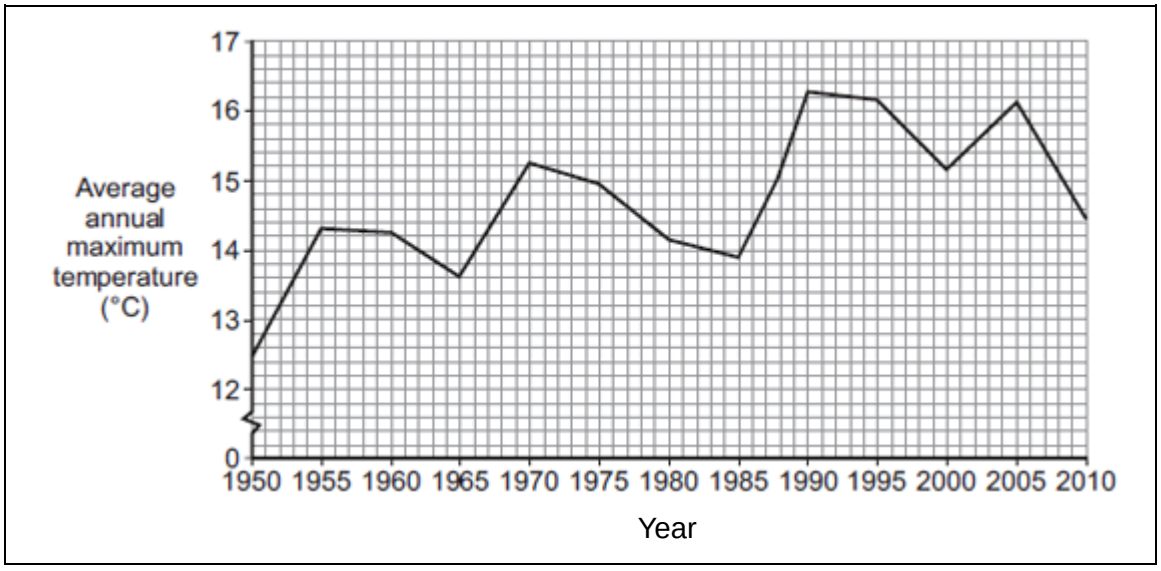
(2)

(b) Describe the possible economic and environmental effects of rising sea level.

(6)

(Total 8 marks)

13. Study the figure below, a graph showing average annual maximum temperatures at Heathrow Airport, London from 1950 to 2010.



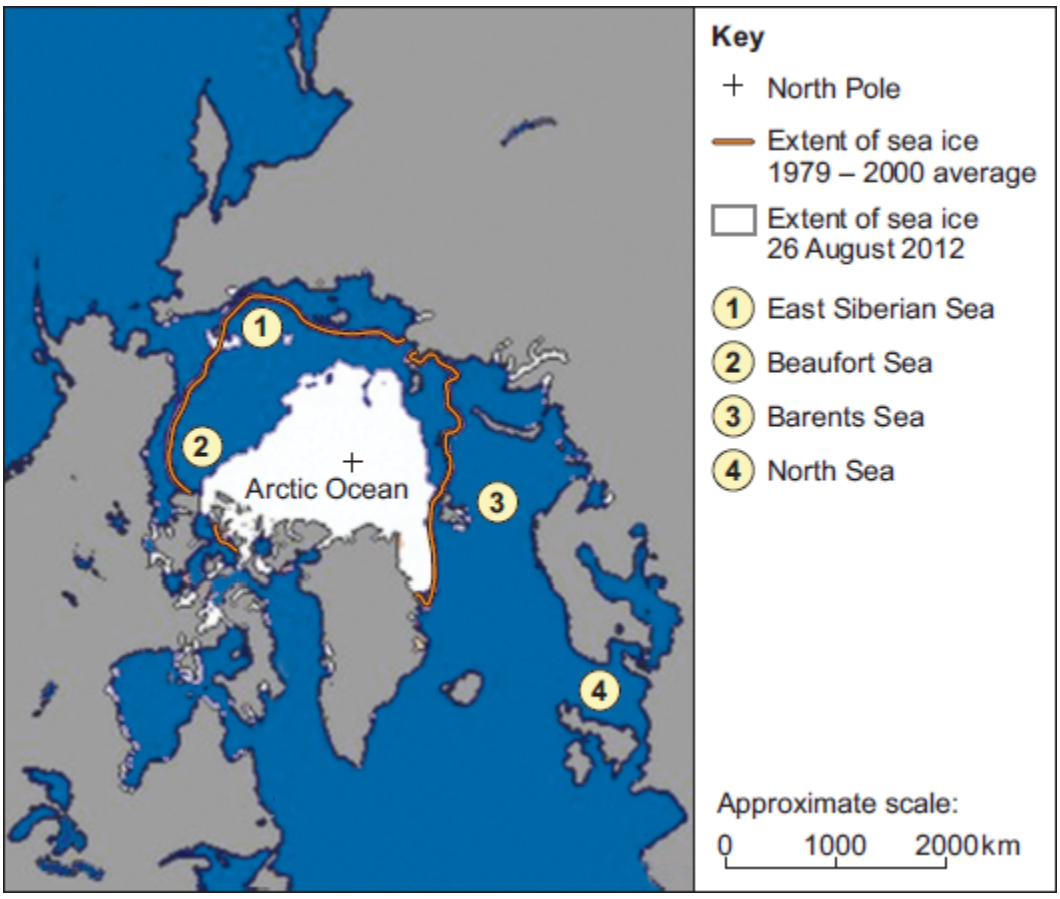
Describe the trends shown in the graph above.

(Total 4 marks)

14. Describe the possible effects of climate change on the UK.

(Total 4 marks)

15.



(a) The map above shows the extent of sea ice in the Arctic Ocean on 26 August 2012.

Describe changes in the extent of Arctic sea ice shown in the map.

(2)

(b) Suggest reasons for the changes in the extent of Arctic sea ice shown in the map above.

(4)

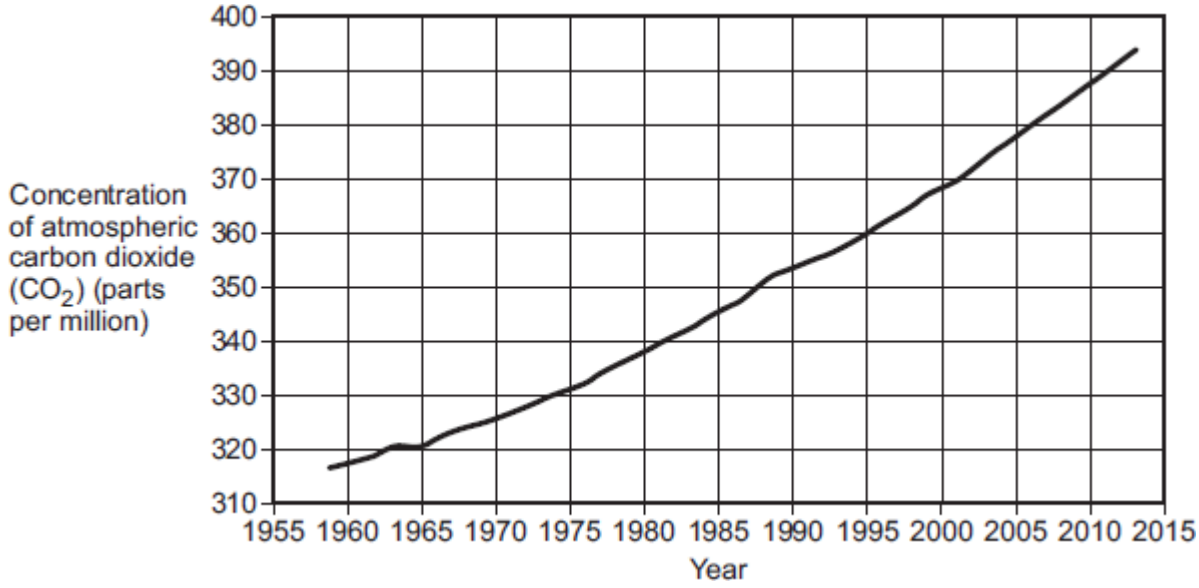
(Total 6 marks)

16.

(a) What is global climate change?

(2)

(b) Study the information below about global warming.



Global warming is perhaps the most serious environmental issue of our time. This is because the world's population is growing rapidly. The graph above illustrates carbon dioxide (CO_2) levels measured annually. Furthermore, methane levels have already doubled, so thickening the 'chemical blanket'.

With the help of the information, explain possible causes of global warming.

(4)

(c) Describe local responses to the threat of global climate change.

(6)

(Total 12 marks)

17. Outline **one** strategy which aims to reduce the rate of climate change (mitigation).

(Total 4 marks)

1.

Level	Marks	Description
2 (Clear)	3 – 4	AO1 Demonstrates accurate knowledge about the mitigation strategy(ies) of alternative energy production and planting trees. AO2 Shows a clear understanding of the way(s) that mitigation strategy(ies) can help to reduce the effects of climate change. Explanations are developed.
1 (Basic)	1 – 2	AO1 Demonstrates limited knowledge about the mitigation strategy(ies) of alternative energy production and planting trees. AO2 Demonstrates limited understanding of the way(s) that mitigation strategy(ies) can help to reduce the effects of climate change. Explanations are partial.
	0	No relevant content.

- **Level 2** (clear) responses will be clear explanation(s) or linked statements. Some accurate use of geographical terms.
- **Level 1** (basic) responses are likely to be simple random statements. Limited subject vocabulary used.
- One factor with a developed explanation can reach bottom of Level 2, but both factors should be considered for top of Level 2.
- No credit for adaptation strategies or for other mitigation strategies.

Indicative content

- The command word is “explain” which requires an account of how and why mitigation strategies of alternative energy production and planting trees are helpful in reducing the rate of climate change.
- Knowledge and understanding of how these strategies work. Both attempt to deal with the source of the problem i.e. to prevent or reduce the release of greenhouse gases which cause climate change.
- Alternative energy production. Renewable energy sources such as HEP, solar, wind and tides do not emit large amounts of CO2. Some are renewable and last into the future. Nuclear is another source with little or no release of CO2.
- Planting trees. Trees act as carbon sinks, removing CO2 from the atmosphere during photosynthesis. They also release moisture into the air, producing more cloud and reducing incoming solar radiation.

AO1 = 2
AO2 = 2

[4]

2.

Level	Marks	Description
2 (Clear)	3 – 4	AO1 Demonstrates accurate knowledge about recent climate change AO2 Shows a clear understanding of the human factors that help to account for changes in climate. Explanations are developed.
1 (Basic)	1 – 2	AO1 Demonstrates limited knowledge about recent climate change. AO2 Demonstrates limited understanding of the human-induced factors that help to account for recent changes in climate. Explanations are partial.
	0	No relevant content.

- **Level 2** (clear) responses will be clear explanation(s) or linked statements. Some accurate use of geographical terms.
- **Level 1** (basic) responses are likely to be simple random statements. Limited subject vocabulary used.

Indicative content

- The command word is “explain” which requires an account as to how and why the human factors of use of fossil fuels and changes in agriculture may contribute to climate change.
- Knowledge and understanding of the greenhouse effect.
- Understanding the contribution of increased use of fossil fuels. Fossil fuels account for over 50% of global greenhouse gas emissions. Burning these releases carbon dioxide into the atmosphere. Fossil fuels are used in transportation, building, heating homes, manufacturing industry, and generating electricity.
- Understanding of the contribution of changes in agriculture. Producing food uses fossil fuels in the production of fertiliser and pesticides, and in transporting. Changing forest cover to farmland also releases greenhouses gases. Increases in meat, dairy and rice production create more methane.
- Expect both factors to be explained for top of Level 2, but a clear explanation of one factor gains access to low Level 2.

AO1 = 2
AO2 = 2

[4]

3.

Level	Marks	Description
2 (Clear)	3 – 4	AO1 Demonstrates accurate knowledge about long-term climate change. AO2 Shows a clear understanding of the natural factors that help to account for long-term changes in climate. Explanations are developed.
1 (Basic)	1 – 2	AO1 Demonstrates limited knowledge about long-term climate change. AO2 Demonstrates some understanding of the natural factors that help to account for long-term changes in climate. Explanations are partial and limited in scope.
	0	No relevant content.

Indicative content

- **Level 2** responses will be developed explanation(s) or linked statements about the natural factors affecting long term climate change, with some accurate use of geographical terms
- **Level 1** responses are likely to be simple random statements, with little development, sequence or explanation. Limited subject vocabulary used.
- The command word is “explain” which requires an account as to how and why natural factors may contribute to climate change
- Knowledge of long term changes in climate since start of Quaternary period. Patterns of alternating cold periods (glacials) and warm periods (interglacials). Up to 10 glacial periods in past million years. Ice age continued until 12000 years before present.
- Understanding the effects of orbital Changes. Changes from a circular to an oval orbit can affect the amount of sunlight the earth receives. It takes 100,000 years for the Earth’s orbit to change from being more circular to an ellipse and back again. This eccentricity cycle coincides closely with the alternating cold (glacial) and warm (inter-glacial) periods in the Quaternary period. These changes are called Milankovitch Cycles. The Earth wobbles on its axis leading to changes in its tilt. When the Earth is more upright, it receives a greater amount of energy from the sun and experiences higher temperatures.
- Understanding of the effects of volcanic activity. Volcanoes can release large amounts of ash. This can reflect the Sun’s rays causing the planet to cool. Over time however, eruptions can release large quantities of greenhouse gases e.g. Carbon dioxide. These gases can trap the Sun’s rays causing the planet to warm.
- Expect both factors to be explained for top of Level 2, but a well-developed explanation of one factor gains access to low Level 2.
- Reject human causes such as the enhanced greenhouse effect / global warming.

AO1 = 2
AO2 = 2

[4]

4. *This mark scheme is from a question paper that assessed a previous specification and has not been edited.*

Click [here] to access a document explaining the differences that might apply to it.

(i) **Level 1 Basic (1-3 marks)**
Generalised statements, separate without any links between the separate factors or lacking the end of the sequence.
Burning + release of CO_2
Removal of trees + less photosynthesis/more CO_2

Level 2 Clear (4-6 marks)
Whole sequence needed.
Burning + release of CO_2
Removal + less photosynthesis/moreCO_2
+ Build up of CO_2/forms layer
+ CO_2 traps heat/longwave radiation
Methane/CO_2 released from rotting vegetation/methane from cattle.

6

(ii) Rock groynes/rock armour, fish tail groynes, rip-rap, flood banks/dykes, revetments, coastal embankments, levees, sea walls, gabions, beach nourishment, plant marram grass, barrages. NOT dams.

2

(iii) Rock armour, rip-rap – protection from/reduces force of waves, fishtail groynes - trapping of sediment/creates beaches, flood banks, embankments – stop flooding of coasts from rising sea levels.

2

[10]

5. *This mark scheme is from a question paper that assessed a previous specification and has not been edited.*

Click [here] to access a document explaining the differences that might apply to it.

Level 1 Basic (1–2 marks)
General statements e.g. sea defences/sea walls will stop flooding, barrages built.

Level 2 Clear (3–4 marks)
Must show how it will reduce the effect of flooding
Sea walls/dykes will prevent water reaching the land/salination of land.
Dykes along rivers will protect low lying land along flood plains embankments.
Barrages can be used when water levels are high.
Revetment, rip rap, rock groynes to reduce power of the waves.
Moving people away from flooded areas.
Houses on stilts.

[4]

6. *This mark scheme is from a question paper that assessed a previous specification and has not been edited.*

Click [here] to access a document explaining the differences that might apply to it.

(i) China.

1
AO3 – 1

(ii) There should be an appreciation of the overall pattern. Generally there has been an overall increase in the amount of carbon produced. China shows the largest increase. Western Europe has remained fairly constant. USA slight decline.

Level 1 (Basic) (1-2 marks)
Simple lifts from the graph without any overall appreciation of pattern. Max L1 if no reference to changes to individual parts.
In 1990 it was 7 billion tons. In 2100 it will be 20 billion tons. It is increasing.

Level 2 (Clear) (3-4 marks)
Linked statements with an appreciation of pattern. There must be reference to individual components on the graph.
Between 1990 and 2100 the output will increase by 13 billion tonnes. China will show a 10x increase. The contribution by the richer countries will lessen and an increasing contribution will come from the poorer countries which are rapidly industrialising.

4
AO3 – 4

[5]

7. *This mark scheme is from a question paper that assessed a previous specification and has not been edited.*

Click [here] to access a document explaining the differences that might apply to it.

Temperatures have clearly fluctuated. The overall trend has been one of increase. This has not been gradual. Until approximately 1977, temperatures worldwide were below the 1961-90 average. They were below to varying extents – the lowest being 13.5 in 1910 and the highest 14.0 in 1940. After 1940, temperatures fell but not to the same level as previously, being about 0.2 to 0.3 lower than average. The rise since 1977 has been stepped and has reached above 14.4. Recently the steepness of the rise has reduced.

Level 1 (Basic) (1 – 2 marks)
Simple, separate listed points.
May be step by step with detail on limited parts.
Evidence may be present, but seen in context of above.
Temperatures start off below average. They drop during the 1850s. It gets a bit warmer during the 1860s and 1870s. Then it goes cooler again during 1880s. From 1910 the temperature gets warmer. It almost gets to the average by 1940. Then it gets colder again. It gets warmer during the 1950s. In 1980 it reaches the average. During the 1980s and 1990s the temperatures are above average.

Level 2 (Clear) (3 – 4 marks)
Points are developed and linked.
Has an overview of trends.
Uses evidence to support trends being observed.
Temperatures fluctuate, but overall they have increased.
They were below the 14 degree average until 1980. Then they went above and have generally increased to about 0.4 above the average. There is a slight decline at the end of the graph. Between 1850 and 1950 temperatures were always below the average, but to varying degrees. It was colder during the 1850s and 1860s and them between 1900 and 1920 than the other years. 1920 was the coldest at about 13.5.

AO1 – 1
AO2 – 1
AO3 – 2

[4]

8. *This mark scheme is from a question paper that assessed a previous specification and has not been edited.*

Click [here] to access a document explaining the differences that might apply to it.

Responses are required at a global/international level. However, within this context, more national/regional strategies may also be appropriate, i.e. a recognition of how targets to reduce emissions may be reached. Thus, switching to renewable sources of energy and relying less on fossil fuels, encouraging conservation of energy, recycling. However, there needs to be some reference to international efforts and recognition of the need for worldwide cooperation if there is to be success – so reference should be made to international agreements such as Kyoto and strategies for looking at worldwide emissions via carbon credits.

Level 1 (Basic) (1 – 4 marks)
Simple statements, perhaps list like at lower end.
Separate ideas.
There will be an emphasis on local strategies and/or basic reference to international strategies.
Wind power can be used more than coal and oil. People can use buses rather than their cars. Make people pay to use cars in some busy areas.

Level 2 (Clear) (5 – 6 marks)
Develops statements and makes links.
Aware how strategies will address climate change.
Response is targeted to question – local strategies.
Will be in the context of a worldwide scenario.
International / global strategies will form a clear part of the answer.
There are agreements between countries to reduce carbon emissions. Many richer countries signed the Kyoto Protocol and agreed targets for their carbon emissions. The G20 London Summit 2009 sought to develop this. All countries have to get together to reduce carbon emissions – pollution spreads out from individual countries. Congestion charging in London tries to get people to use public transport rather than their cars and so reduce pollution. Switching to renewable sources of energy such as wind and water means that less coal and oil will be used, reducing carbon emissions. Countries can reach their targets by doing these things.

AO1 – 3
AO2 – 3

[6]

9. *This mark scheme is from a question paper that assessed a previous specification and has not been edited.*

Click [here] to access a document explaining the differences that might apply to it.

Level 1 Basic (1–4 marks)

Max – 2 marks	3-4 marks
Some understanding of planning for the future	Some link between planning and decision making
Names Shoreline Management Plans (SMP) or Integrated Coastal Zone Management (ICZM) with basic development	Describes elements of SMP or ICZM in relation to planning
Names engineering methods (sea walls, rip-rap etc),no real development	Describes engineering methods
Names Managed Retreat with basic descriptive points (‘managed retreat protects areas from flooding’)	Describes managed retreat

Level 2 Clear (5–6 marks)
Clear links between planning and decision making.
Explains how SMP or ICZM can be used for the future management of coastal areas.
Explains how engineering methods can reduce the threat of coastal flooding.
Explains how managed retreat can protect areas from flooding.

[6]

10. *This mark scheme is from a question paper that assessed a previous specification and has not been edited.*

Click [here] to access a document explaining the differences that might apply to it.

(i) The clear trend is for temperatures to increase. There is also clear fluctuation.
Global temperatures increase by 2.7°C; the Northern Hemisphere has the higher increase of 3.5°C and the Southern Hemisphere the lesser increase of 2.1°C.
The lines follow each other at different levels after 2030.
Initially, the lines are very similar, almost the same, but separate when temperature increase goes above 1°C in 2030. The more rapid rise seems to be between 2030 and 2050 when the temperature change doubles from 1 – 2°C.

Level 1 Basic (1-2 marks)
Simple statements.
May be very general or very detailed description.
May identify a trend/s.
Temperatures go up. They go up in the world and Northern and Southern Hemisphere. The world increases by 0.2°C by 2010 and has gone down to 0.1°C by 2020. It then goes up to 0.6°C by 2030 etc.

CMI annotation

- ***L1 Simple statements – partial, piecemeal***

Level 2 Clear (3-4 marks)
Statements are developed and linked.
Trends are clearly identified.
Evidence is used to support points.
Global temperatures by 2.75°C. Increases are greater in the Northern Hemisphere after 2030, when temperatures everywhere have increased by 1°C./The trends fluctuate with rises and falls occurring every so many years e.g. the start of decades 2040 and 2050 and 2070. Increases in the two hemispheres diverge and there is a predicted difference of 1.5°C by 2100.

CMI annotation

- ***L2 Describes trends and offers evidence in support***

4
AO1 – 2
AO3 – 2

(ii) 1 for basic statement and 1 for elaboration. Cause may be natural or human. E.g. Changes in way earth orbits around the sun (1) will lead to closer proximity and so greater warmth (1); Burning of fossil fuels such as coal and oil (1) leads to the release of carbon dioxide (1) which is a greenhouse gas (1) and significance of this (1).
1×(1+1)

2
AO1 – 2

[6]

11. *This mark scheme is from a question paper that assessed a previous specification and has not been edited.*

Click [here] to access a document explaining the differences that might apply to it.

(i) Overall trend of global temperatures - **Increasing / fluctuating / rising**;

Predicted change in temperature in the southern hemisphere between 2000 and 2100 – **2.0° - 2.1°**Celsius;

Year when predicted temperature in the northern hemisphere will have changed by 2°C for the first time – **2050**

3
AO2 – 1
AO3 – 2

(ii) 1 for basic statement and 1 for elaboration. Cause may be natural or human, e.g. Changes in way earth orbits around the sun (1) will lead to closer proximity and so greater warmth (1); Burning of fossil fuels such as coal and oil (1) leads to the release of carbon dioxide (1) which is a greenhouse gas (1).
1×(1+1)

2
AO1 – 2

(iii) There have been times when the Earth has been much warmer in the past, before the population was very large and fossil fuels were burnt. Medieval times (1000 – early 1400s) were warmer – warmer than now. Reference to natural causes – e.g. forest fires; animals – cattle etc and methane.
3×1 or 1+(1+1)

3
AO1 – 2
AO2 – 1

(iv) Environmental effects are likely to refer to impact on climate – such as southern Britain getting warmer, the UK experiencing more extreme weather – windier – gales, wetter – floods, drier – drought. Impact on things that will grow – deciduous trees may struggle in drier conditions, crops grown may change – oranges in southern areas and vines will become more common. Coastal flooding is likely to feature with vulnerable areas being along The Wash and the Humber and the Thames estuaries.

Level 1 (Basic) 1-2 marks
Simple statements, perhaps list like at lower end.
Separate ideas – may be only one effect.
General points.
It will get warmer. There will be more rain. Some plants may die and others will be able to grow, like oranges and grapes.
The coast will flood.

CMI annotation

- ***L1 Simple separate ideas, describes environmental effects***

Level 2 (Clear) 3-4 marks
Develops statements and makes links.
Will refer to more than one effect.
Response is targeted to question – reference to the UK is clear.
Low lying coastal areas will flood. Some areas will be really likely to flood, such as areas around The Wash, and the Thames estuary. Weather may be more extreme – there will be more gales and rain and flooding of rivers will be more likely to occur.

CMI annotation

- ***L2 Develops and links ideas relating to environmental effects***

4
AO1 – 2
AO2 – 2

[12]

12. *This mark scheme is from a question paper that assessed a previous specification and has not been edited.*

Click [here] to access a document explaining the differences that might apply to it.

(a) Sea level should be drawn as a solid line to match the key and be in line with 40cm scale line (i.e. add 35 to the 2010 figure).
2 × 1

AO1 – 1
AO3 – 1
2

(b) Economic effects include risk of loss of farmland, settlements such as Kings Lynn, the threat to the coastal tourist industry and areas such as the Norfolk Broads with its lucrative sailing. The cost of protection is likely to rise as areas seek to prevent flooding – the Thames Barrier will need replacing ultimately.
Environmental effects include the flooding of large areas of mudflats, salt marsh – which provide unique habitats. Rates of coastal erosion will increase and settlements will be further threatened – Happisburgh.

Level 1 (Basic) (1–4 marks)
Simple, separate statements, perhaps list-like identification at lower end.
Will describe effects at top end.
Lots of places will be flooded. People will lose jobs as tourist areas are lost. More sea walls will be needed and barriers.

Level 2 (Clear) (5–6 marks)
Develops and links statements.
Refers to both economic and environmental.
Clear, purposeful description.
There are many economic and environmental effects. Economically, settlements will be threatened, even London where 1.25 million people work in flood risk area. The cost of protection will be high with the Thames Barrier needing to be replaced. Environmentally, many coastal areas will be threatened – with salt marshes and mudflats that provide habitats for different plants and animals and birds under threat. Rates of coastal erosion will increase and further threaten vulnerable settlements, such as Happisburgh.

AO1 – 3
AO2 – 3
6

[8]

13. *This mark scheme is from a question paper that assessed a previous specification and has not been edited.*

Click [here] to access a document explaining the differences that might apply to it.

The graph shows that temperatures have overall increased by about 2 degrees from 1950 to 2010. The increase has not been a steady one, but there have been fluctuations. The highest temperatures were in 1990s – in excess of 16 degrees. Recent trend has shown fluctuation and decline.

Level 1 (Basic) (1–2 marks)
Describes information on graph – partial.
Notes overall increase, but may be step by step or stage by stage.
Temperatures have increased from 1950 to 2010. They started off at their lowest and then increased, then dropped and increased again in 1990s.

Level 2 (Clear) (3–4 marks)
Complete description of trends.
Sees fluctuating change and supports with evidence.
Temperatures show an overall increase of approximately 2 degrees. However, this has fluctuated being lowest at the start with about 12.5 degrees and then fluctuating until 1990s. This decade had the highest temperatures – over 16 degrees and there has been a slight decrease in this century.

AO1 – 1
AO2 – 1
AO3 – 2

[4]

14. *This mark scheme is from a question paper that assessed a previous specification and has not been edited.*

Click [here] to access a document explaining the differences that might apply to it.

Economic effects – likely to include loss of earnings, loss of businesses / livelihoods, e.g. as ice melts and skiing cannot occur; impact on farming – different crops grown as climate changes, e.g. parts of southern England growing more crops linked to Mediterranean areas such as vines, olives. Health could be affected as a social impact of diseases such as malaria may become common; people may be affected by the heat. Environmental effects – likely to refer to impact on climate – such as southern Britain getting warmer; the UK experiencing more gales, floods, drought. Impact on things that will grow – deciduous trees may struggle in drier conditions, crops grown may change – oranges and vines in southern areas will become more common. Coastal flooding is likely to feature with vulnerable areas being along The Wash, and the Humber and the Thames estuaries.

Level 1 (Basic) (1–2 marks)
Simple statements, perhaps list-like at lower end.
Separate ideas – may be only one effect.
General points.
It will get warmer. There will be more rain. Some plants may die and others, like oranges and grapes, will be able to grow. The coast will flood.

Level 2 (Clear) (3–4 marks)
Develops statements and makes links.
Will refer to more than one effect.
Response is targeted to question – reference to the UK is clear.
Low lying coastal areas will flood. Some areas will be really likely to flood such as areas around The Wash and the Thames estuary. Weather may be more extreme. There will be more gales and rain and flooding of rivers will be more likely to occur.

AO1 – 3
AO2 – 1

[4]

15. *This mark scheme is from a question paper that assessed a previous specification and has not been edited.*

Click [here] to access a document explaining the differences that might apply to it.

(a) There has been a marked reduction in the amount of ice cover / gone down by about a third / half. This is especially apparent in the Beaufort Sea and East Siberian Sea. About 500km has been lost in the Beaufort Sea (in a line from the North Pole).
2 × 1

AO2 – 1
AO3 – 1
2

(b) The amount of ice reduced due to melting caused by increasing temperatures. The reasons for increasing temperatures should be considered and are likely to relate to global warming – as a result of an increase in greenhouse gases due to increased use of fossil fuels for industry, transport etc. and the impact of this. The impact of deforestation and burning wood may also be considered, as may natural reasons such as volcanic eruptions which increase the amount of carbon dioxide and affect the tilt of the Earth to the sun.

Level 1 (Basic) (1 – 2 marks)
Begins to explain. Statements are simple and separate.
The ice is melting. People are using more oil and coal and this causes the ice to melt. It is getting warmer.

Level 2 (Clear) (3 – 4 marks)
Explanation is clear.
Statements are developed and linked – reasons linked to the reduction in ice.
The climate is getting warmer and as a result the ice is melting. This is likely to be because of global warming. As people burn more and more coal in power stations and use petrol in cars, there is an increase in the amount of carbon dioxide in the atmosphere. This is a greenhouse gas which reduces the loss of heat from the atmosphere. Thus, it warms and the ice melts.

AO1 – 2
AO2 – 2
4

[6]

16. *This mark scheme is from a question paper that assessed a previous specification and has not been edited.*

Click [here] to access a document explaining the differences that might apply to it.

(a) Global climate change is universal / worldwide alterations in aspects of the climate – such as (long term) temperature, rainfall patterns, changing weather patterns over a long period of time. 1 mark for addressing the global aspect and 1 mark for addressing the climate change aspect.

AO1 – 2
2

(b) The extract refers to the increasing population worldwide which leads to an increase in demand for energy – including fossil fuels – compounded by the development of industry and in poorer areas such as China as they try to get richer and use a lot of coal to generate electricity. This increases carbon dioxide levels in the atmosphere – they have gone up by about 20% in 40 years on the graph and this means that the short wave radiation can enter but less of the long wave radiation can escape leading to a build-up of heat and an increase of temperatures.

Level 1 (Basic) (1 – 2 marks)
Lists / describes information from the graph/extract.
Relies heavily on extracting relevant parts from the source.
There is an increasing world population. Poorer countries are developing more factories and towns. They use more fossil fuels.

Level 2 (Clear) (3 – 4 marks)
Uses information from the graph/extract – will consider 2 causes.
Explains how features identified such as increased population, increased carbon dioxide leads to global warming.
World population is going up so there is a growing demand for energy. Countries are also developing manufacturing industries and these too demand electricity – usually from fossil fuels. This leads more carbon dioxide in the atmosphere and an increase in temperatures as the gas acts like a blanket and prevents heat from escaping so warming the earth up.

AO1 – 1
AO2 – 2
AO3 – 1
4

(c) The specification refers to the following local responses – transport strategies, taxation, congestion charging, conserving energy and recycling. There is a wide range here and reference to bus and cycle lanes, park and ride, use of public transport (buses, trams and underground / trains) is to be expected together with congestion charge in London, tax on petrol / diesel and road tax. Means of conserving energy are equally broad from low-energy light bulbs and insulation, to re-using bags, reducing packaging and recycling items such as glass, cans and garden waste.

Level 1 (Basic) (1 – 4 marks)
Simple statements, perhaps list-like at lower end.
Separate ideas. Generic descriptions of extreme weather possibly linked to UK up to 2 marks.
People can get a bus. They can use low-energy light bulbs and not use plastic bags from supermarkets.

Level 2 (Clear) (5 – 6 marks)
Develops statements and makes links – two responses needed.
Response is targeted to question – with an understanding of how the response links to the problem of global warming.
The congestion charge in central London puts people off using cars as it costs £10. This will mean there is less carbon dioxide going into the atmosphere as there are fewer cars on the road. People may decide to go on buses instead as they are more frequent and more stops have bus shelters – a bus can carry over 60 people at once so that emissions are less. At home, people can recycle things like glass bottles / jars and cans so that fewer of these need to be made and the demand for electricity / energy / fossil fuels is reduced.

AO1 – 3
AO2 – 3
6

[12]

17.

Level	Marks	Description
2 (Clear)	3 – 4	AO1 Demonstrates specific and clear knowledge of how the rate of climate change can be reduced. AO2 Demonstrates some understanding of mitigation in relation to reducing the rate of climate change.
1 (Basic)	1 – 2	AO1 Shows limited generic knowledge as to how the rate of climate change can be reduced with basic points not fully developed. AO2 Shows limited understanding and making general observations as to how the rate can be reduced.
	0	No relevant content.

Indicative content

- At Level 2, some appreciation that mitigation involves managing causes.
- General points about reducing the burning of fossil fuels in transport or the production of electricity.
- Specific ideas about how reducing the use of fossil fuels can be achieved. This might be considered in relation to energy generation, more efficient homes and vehicles or using less energy in industry.

AO1 = 2
AO2 = 2

[4]