

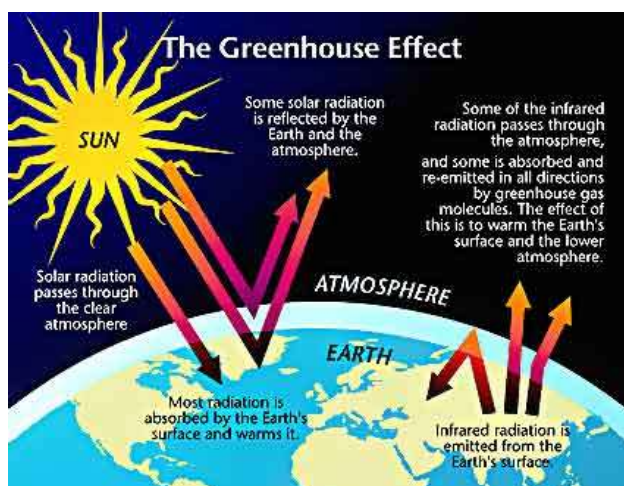
# Global Warming Analysis

## National Curriculum

Geography – knowledge and understanding of places; knowledge of patterns and processes; understanding environmental change and sustainability.

## Teacher's Notes

Solar radiation passes through the atmosphere and is absorbed by the surface of the earth. Some solar radiation bounces off the upper atmosphere and is reflected back into outer space. Some of the radiation which is absorbed by the earth is re-emitted as infra-red radiation. Some of this infra-red radiation escapes from the atmosphere into outer space. Some is absorbed by green house gases and re-emitted in all directions. This warms the lower atmosphere and the surface of the earth.



Source: [www.truthmove.org/content/global-warming/](http://www.truthmove.org/content/global-warming/)

In the Polar Regions where the ice has remained undisturbed for thousands of years, the amount of carbon dioxide can be measured. When snow falls it traps air and as the snow turns to ice these air pockets give a unique insight into the atmosphere at the time of the snow deposition. The ice is sampled by drilling an ice core. The deepest ice-core ever recovered is 3,623m from a Russian station in East Antarctica. Scientists have found that the ice core covers a period from 417,160 – 2,342 years BP (before present).

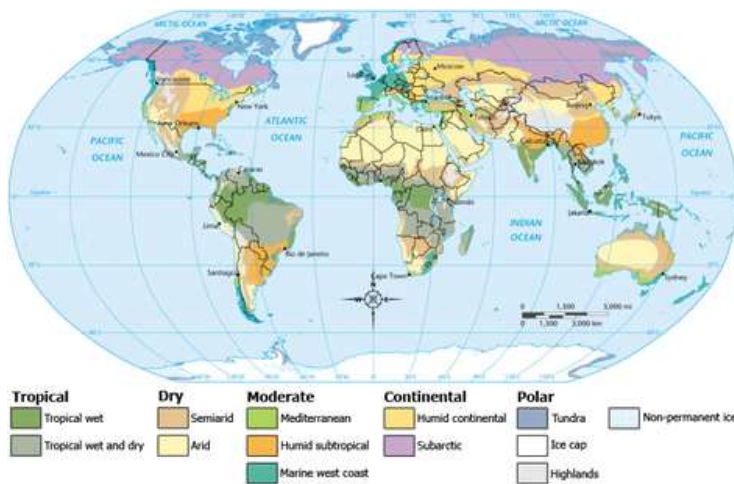
The amount of carbon dioxide and other greenhouse gases present has been measured using ice cores and scientists have found that CO<sub>2</sub> has increased by 40% since the beginning of the Industrial Revolution. "9 of the ten warmest years since records began in the 19<sup>th</sup> century have all occurred since 2000" (Bob Ward,

Grantham Research institute on Climate Change.  
<http://www2.lse.ac.uk/GranthamInstitute/Home.aspx>)

Scientists think that if we do nothing about the amount of carbon dioxide we are producing, the temperature of the world may increase by 6 degrees by the end of the century. This does not seem very much. Instead of a hot summer's day in the UK registering 25 degrees Celsius, it might be 31 degrees. Unfortunately a rise of this magnitude would have dire consequences for our climate.

It would lead to permanent ice melt at the North Pole. The Arctic does not have a land mass beneath it; it is made up entirely of sea ice. If the temperature in the northern hemisphere rose by as much as 2 degrees Celsius, this ice would melt and the subsequent rise in sea level would be devastating for those living in low lying areas.

The Gulf Stream currents in the Atlantic have a seasonal push north in the summer. This brings with it associated air masses which sit as high pressure over the UK and make our summers dry and warm. A rise in temperature may affect this northerly push of the Gulf Stream leading to warmer but wetter summers as the Azores High fails to establish over the UK.



The term 'climate' refers to weather patterns over a long period of time. When we measure the weather we look at temperature, humidity, atmospheric pressure, wind and rainfall, usually over a brief time - perhaps only a day, a week or a month. 'Climate' looks at the weather record over many years.

Source: [http://en.wikipedia.org/wiki/File:ClimateMap\\_World.png](http://en.wikipedia.org/wiki/File:ClimateMap_World.png)

England temperature records can be found at:  
<http://www.metoffice.gov.uk/hadobs/hadcet/>

Global temperature graphs can be found at:  
<http://www.cru.uea.ac.uk/cru/info/warming/>

## **Activity- answers**

### **Resources**

Copies of the graph.

Copies of work sheets p7 and p8

Graph paper

### **Timing**

45 mins-1 hour

### **Outcomes**

The students will develop their data handling skills using actual data from the Met Office and Government Offices. More able students will understand that the bar graph shows the temperature above and below the annual average temperature. Other students will be able to read the information from the graph.

### **Differentiation**

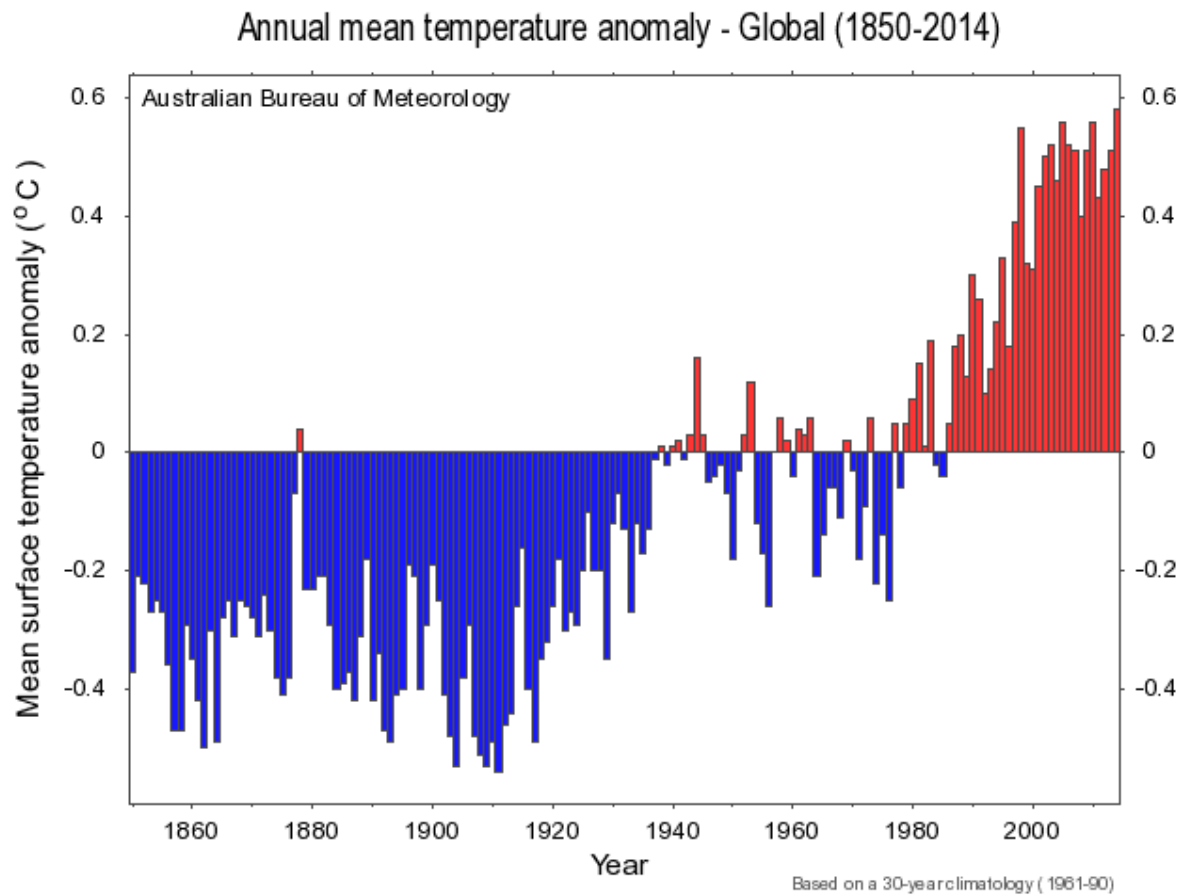
More able students will see the relationship between what we do in our own lives and the effect we have on climate change. The average student will realise that we need to reduce our carbon footprint but not necessarily why.

More able students may be able to explain what they found out from the table exercise.

### **Aim**

- To make students aware that global warming is a real phenomenon.
- To use actual data to show the rise in global temperatures.

**Task 1** Involves a graph that shows the mean temperature anomalies from 1850 until 2014. This is the difference above or below the mean temperature for each year. The students are asked a series of questions about the graph.



**Answers**

A) What are the intervals on the graph?

*The intervals are yearly*

B) Which years are closest to the norm? 1936 1937 1939 1982

C) What do you notice about the temperatures since 1986?

*Since 1986 the mean temperature anomaly in the UK has been positive i.e. hotter than before 1986.*

D) When was the coldest year?

*The coldest year was 1911*

A) When was the hottest year?

*The hottest year was 2014*

**Task 2** Use the table below to make a bar graph showing the **total** amount of carbon dioxide in tonnes, produced by each person across all the regions in the UK.

**Table 1**

Per capita emissions

(tonnes carbon dioxide per resident)

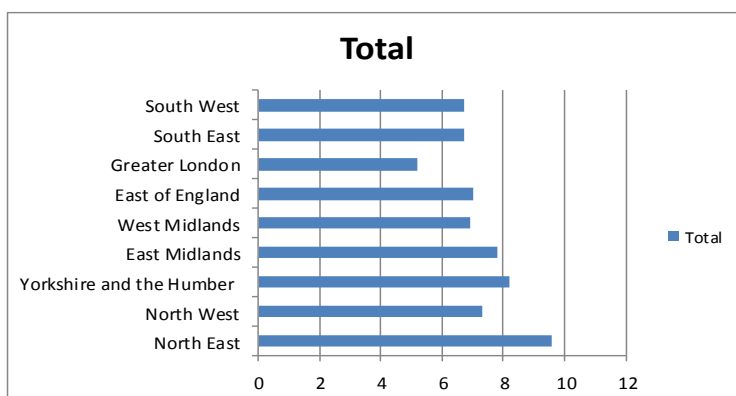
Government Office Region	Industrial, commercial	Domestic	Transport	LULUCF*	Total
North East	6.7	2.3	1.7	-1	9.6
North West	3.2	2.2	1.9	0	7.3
Yorkshire and the Humber	3.9	2.3	2	0	8.2
East Midlands	3.2	2.3	2.3	0.1	7.8
West Midlands	2.5	2.2	2.2	0.1	6.9
East of England	2.4	2.2	2.3	0.1	7
Greater London	2.3	1.9	0.9	0	5.2
South East	2.2	2.2	2.2	0	6.7
South West	2.3	2.2	2.1	0.1	6.7

- LULUCF is Land, Land-Use Change and Forestry

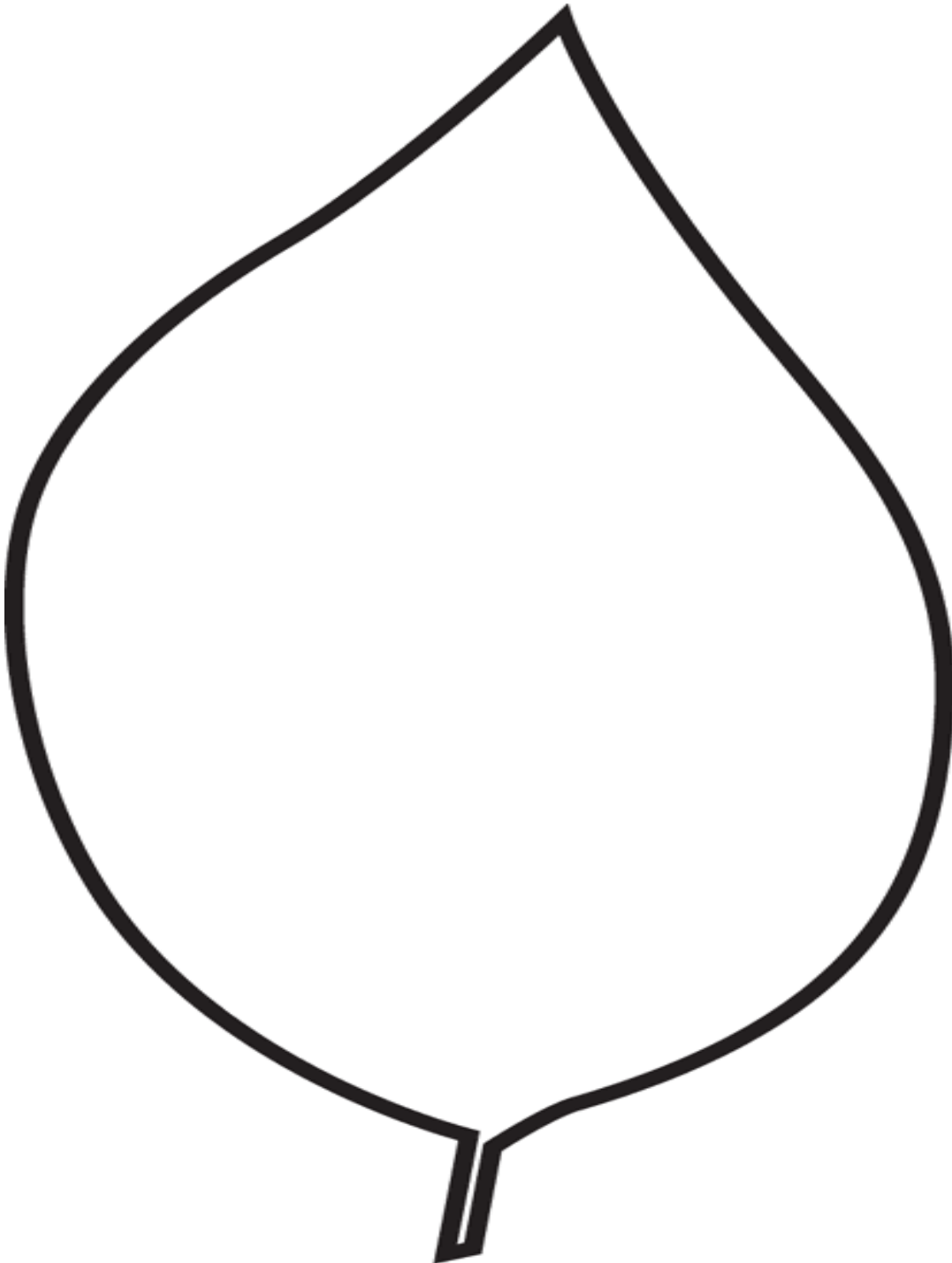
Source: DECC

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/322819/20140624\\_Statistical\\_release\\_Local\\_Authority\\_CO2\\_emissions.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/322819/20140624_Statistical_release_Local_Authority_CO2_emissions.pdf)

The graph should look like this:

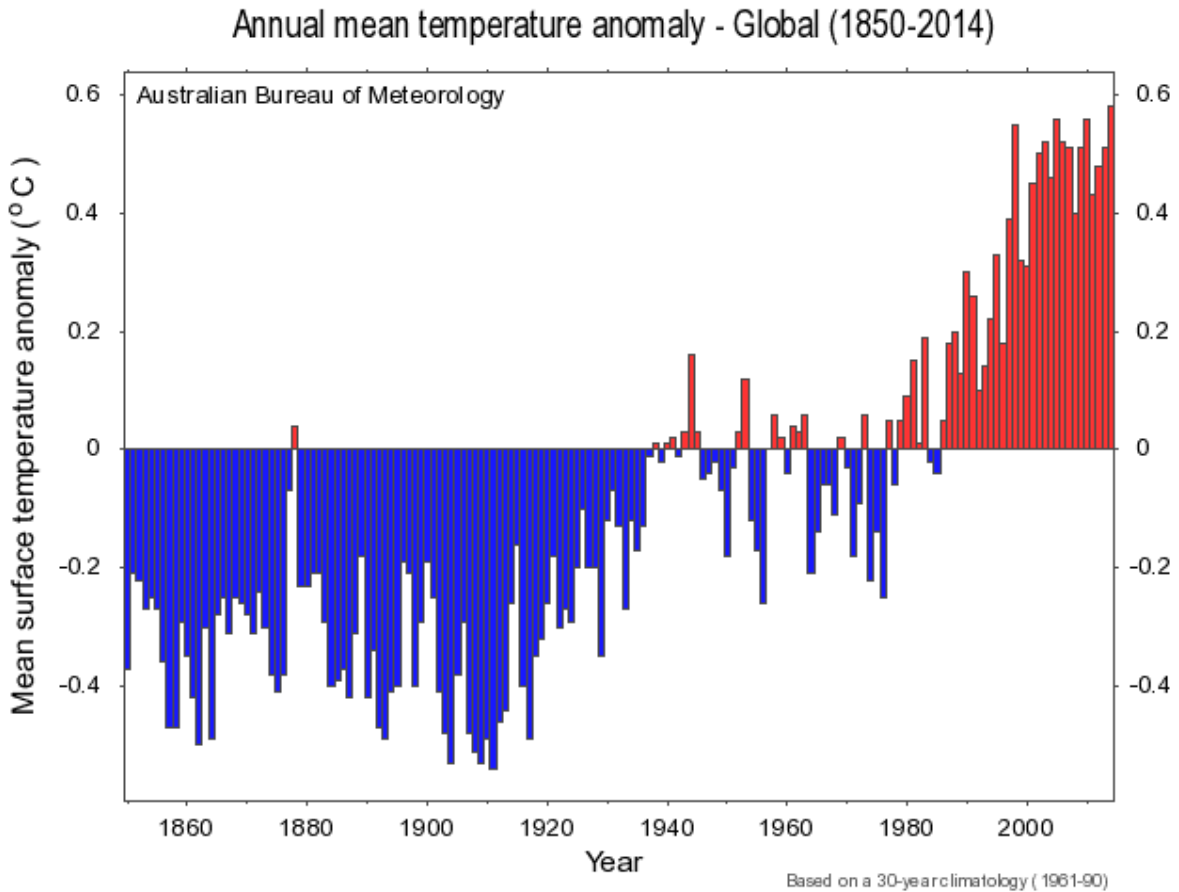


**Task 3:** The students are asked to make a pledge to reduce their carbon footprint. This could be done on post-it notes to add to a wall display or on a leaf (template provided).



# Global Warming Analysis: WORKSHEET

1. Look carefully at the graph. This shows the mean temperature anomalies above and below the average temperature.



A) What are the intervals on the graph? .....

B) Which years are closest to the norm? .....

C) What do you notice about the temperatures since 1986?

.....  
 .....

D) When was the coldest year? .....

E) When was the hottest year? .....

- Use the table below to draw a bar graph showing the **total** amount of carbon dioxide in tonnes, produced by each person across all the regions in the UK per year.

Per capita emissions  
(tonnes carbon dioxide per resident)

Government Office Region	Industrial, commercial	Domestic	Transport	LULUCF*	Total
North East	6.7	2.3	1.7	-1	9.6
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East of England	2.4	2.2	2.3	0.1	7
Greater London	2.3	1.9	0.9	0	5.2
South East	2.2	2.2	2.2	0	6.7
South West	2.3	2.2	2.1	0.1	6.7

Look carefully at the table and your graph and answer these questions:

- Which region produces the most carbon dioxide per person?

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- Why do you think this is the case?

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- Which region produces the least carbon dioxide per person?

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- Can you give a reason for this?

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