

A ten minute guide to global warming

10 impacts - what climate change is doing to people and the planet, now

Climate change is underway. As yet the impacts haven't been dramatic in the rich north of the world, but people are dying in the poorer south. And today's impacts are small compared to what could happen in the future. That is why it's important to raise public awareness. Today, only 8% of Britons say climate change is a big issue for the country, compared to over 20% who are concerned about unemployment, crime and immigration.

- 1) Global warming is real. The Intergovernmental Panel on Climate Change (IPCC), which draws on the work of over 1,000 researchers worldwide, says "Warming of the climate system is unequivocal". Rarely are scientists that certain about anything.ⁱ
- 2) The ten hottest years on record have all been between 1997 and 2008.ⁱⁱ The 17 hottest have all occurred in the last 20 years.ⁱⁱⁱ
- 3) Every year it's estimated climate change leads to over 300,000 deaths, 325 million people being seriously affected, and economic losses of US\$125 billion.^{iv}
- 4) The poorest suffer most. For example, 20 million people across East Africa are facing shortages of food and water as a result of years of drought and crop failure.^v
- 5) The number of weather-related disasters (storms, hurricanes, floods, heat waves, droughts) has more than doubled over the last 20 years. The world experiences over 400 weather-related disasters per year.^{vi}
- 6) Himalayan glaciers that feed great rivers such as the Indus, Yangtze and Mekong are retreating fast, threatening the water supplies of two billion people. Since the USA's Glacier National Park was established in 1910, more than two thirds of its glaciers have disappeared.^{vii}
- 7) The Arctic has lost around a third of its ice since 1980^{viii} and the sea level rose about 20cm in the 20th century.^{ix}
- 8) Species such as Costa Rica's golden toad and Australia's white possum are already believed to have become extinct as a result of climate change.^x
- 9) All regions of the UK have experienced increases in average temperatures between 1961 and 2006, typically between 1.0 and 1.7°C.^{xi}
- 10) In summer 2003, a heat-wave led to 70,000 more deaths than would normally be expected across 12 European countries.^{xii}

10 statistics - numbers that explain the problem

Understanding climate change means looking at a few numbers. These show the scale of what has happened and what we need to do to stop it.

- 1) The Earth is surrounded by a blanket of greenhouse gases, mainly carbon dioxide. In 1750, when the industrial revolution started, this blanket's thickness was 280 parts per million (that's 280 parts of carbon dioxide to every million parts of air).
- 2) Today the carbon dioxide level is 385ppm.^{xiii} That's the highest concentration in human history.^{xiv}
- 3) Each year we add 1 or 2ppm to the level by burning fossil fuels and cutting down forests. Yearly emissions of greenhouse gases, mainly from fossil fuels and deforestation, have shot up from 29 billion tonnes in 1970 to around 50 billion now.
- 4) There is a wide consensus among scientists that the average global temperature rise needs to be kept around 2°C on pre-industrial levels to stop the worst effects of climate change.
- 5) To keep the rise to around 2°C, the IPCC says we need stabilise the level of carbon dioxide at 400ppm or below – just 15ppm above today's.
- 6) Some believe 350ppm is the maximum safe level – ie below where we are now! If so we need to cut emissions very fast and then let the earth reabsorb carbon.
- 7) Even to hit 400ppm, the IPCC says developed countries need to cut emissions by 25 to 40% by 2020 – and 80% by 2050. The world as a whole needs to cut emissions 50% by 2050.
- 8) The EU's target is to cut emissions 20% by 2020 on 1990 levels. The UK is aiming for a 34% cut by 2020 on 1990.
- 9) Hans Joachim Schellnhuber, adviser to the German Chancellor, says that to hit the 2°C target, each person on earth should only produce about 110 tons of carbon dioxide between 2010 and 2050. On average western Europeans emit about 11 tons per year, so their 40 year "budget" would be used up within 10 years.^{xv}
- 10) Whatever the precise target, the world needs to make big emissions cuts fast. For many individuals and organisations, a cut of 10% in a year is achievable.

10 forecasts - what climate change means for the future

These projections are scientists' best estimates, based on current knowledge. The severity of impacts depends on how high the temperature gets. Action to cut emissions and keep temperatures down will reduce these impacts. The biggest direct effects are in the developing world and these will have consequences for richer countries such as refugees seeking new homes and appeals of humanitarian aid.

- 1) By 2020 crop yields in Africa could halve and up to 250 million people are projected to suffer water shortages.
- 2) By 2050, up to 250 million people could become refugees as a result of climate change.^{xvi}
- 3) Over 2.8 billion people – about a third of the world population – face a major direct risk from climate change because they live in areas of the world prone to more than one of its manifestations: floods, storms, droughts or sea level rise.
- 4) Sea levels could rise nearly a metre in the 21st century ^{xvii} This would displace 24 million people in Bangladesh, India and Indonesia and inundate 80% of the Maldives. ^{xviii}
- 5) If temperatures rise more than 3.5°C, more than half the world's species could become extinct.^{xix}
- 6) If temperatures rose over 4°C, some scientists believe 'tipping points' would be crossed that trigger devastating changes as the death of the rainforests, melting of permafrost and eventual melting of polar ice caps, threatening life on a vast scale.^{xx}
- 7) A temperature rise of 6°C, which the IPCC has said is possible if nothing is done, could disrupt the flow of warm water in the North Atlantic Ocean, reducing temperatures in North-western Europe to those of Hudson Bay in Canada.
- 8) Health impacts of climate change are expected to include malaria, malnutrition, infectious, respiratory and skin diseases.
- 9) By the 2080s, southern England could have 40% less rain in summer and the western UK could have 30% more.^{xxi}
- 10) BUT... by 2050, if the world halves its emissions by transforming its economy, switching to clean energy and restoring eco-systems, it will have overcome its greatest threat and secured a sustainable future for generations to come.

10 priorities - ways to create a cleaner, better future

The way to minimise climate change is very simple – to reduce emissions of carbon dioxide and other greenhouse gases. We can do this by simply using less energy or by using low carbon energy such as wind power or electric vehicles. It's also important to look after the world's carbon sinks – forests and soils that absorb carbon as part of the natural cycle. We can all make a contribution, but governments have to act decisively to ensure that green energy is rewarded and carbon emissions penalised.

Things we all can do

- 1) Avoid wasting energy, for example by better insulation
- 2) Cut energy consumption, turning down radiators, switching off appliances
- 3) Use buses, trains, bicycles or feet instead of cars and planes
- 4) Reuse and recycle more – so that new stuff doesn't have to be made using more energy
- 5) Campaign for politicians to introduce green policies

Things governments must do

- 6) Make pollution pay – by putting limits, prices or taxes on carbon emissions
- 7) Encourage clean energy – through subsidies, quotas, research funding and other measures
- 8) Stop forests being cut down and restore eco-systems
- 9) Put more resources into public transport
- 10) Co-operate with each other, for example by enabling fast growing countries like China to use clean power

10 myths answered

Climate sceptics are vocal and many people still believe the threat to the planet is exaggerated. Here are some common claims and the facts that respond to them.

It's getting cooler now. Not in the long term it isn't. 17 of the hottest years on record were in the last 20. Sure, 1998 was the hottest year ever but all the years from 2000 to 2008 have also been in the top 14 warmest years on record.

It's all natural variability. The earth's climate does vary, influenced by many things, such as changes in its orbit, volcanic eruptions, and changes in the sun's energy. But the last 250 years have seen a one-off pattern. CO2 concentrations have increased by 30% due to human-induced emissions from fossil fuels – and the temperature has risen. In fact climate change is defying natural variability. The La Niña cooling phenomenon began to develop in early 2007, but despite this, 2007 was one of the ten warmest years since global records began.

It's all down to the sun. Direct satellite measurements show no major change in solar heating over the last three decades. Changes in solar activity do affect global temperatures, but research shows that, over the last 50 years, rising greenhouse gas levels have a much greater effect than changes in the Sun's energy.^{xxii}

Temperatures plummeted in 2008 – they are going down. There was a major drop in temperature in January 2008, but the underlying trend is still up.

Scientists are divided. Some scientists question climate change but they are a relatively small minority. The IPCC involves 800 authors reviewing the work of thousands. Academies of Science from all major economies support the consensus. Leading governments now accept climate change is real.

Temperature rises drive up CO2 rather than vice-versa Both happen and feed off each other. CO2 causes temperature rises and warming causes oceans to emit CO2. This feedback system should make us more worried, not less.

Global warming is good news for the UK's weather More sunny days will be outweighed by the disasters unfolding elsewhere in the world – drought, disease, flooding and refugees – and the knowledge we are more responsible than those in the frontline.

Nature emits more CO2 than us. The CO2 that oceans and vegetation emit is balanced by the CO2 they absorb. Human emissions since the industrial revolution have upset the natural balance, taking CO2 to levels not seen in human history.

It got warmer before 1940 when there was less CO2 Early 20th century warming was in large part due to solar activity and few volcanoes. However, these factors have played little in the warming since 1975. Solar activity has been steady since the 50's. Volcanoes have been more frequent and if anything, have had a cooling effect.

It's cold! Global warming doesn't mean every place on Earth is warming but that the average global temperature shows a long-term warming trend.^{xxiii}

NOTES

- ⁱ Intergovernmental Panel on Climate Change
http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf
- ⁱⁱ US National Aeronautical and Space Administration (NASA)
http://www.nasa.gov/topics/earth/features/2008_temps.html
- ⁱⁱⁱ US National Aeronautical and Space Administration (NASA)
http://www.nasa.gov/topics/earth/features/2008_temps.html
- ^{iv} Global Humanitarian Forum http://ghfgeneva.org/Portals/0/pdfs/human_impact_report.pdf
- ^v Oxfam http://www.oxfam.org.uk/oxfam_in_action/emergencies/east_africa.html
- ^{vi} Global Humanitarian Forum http://ghfgeneva.org/Portals/0/pdfs/human_impact_report.pdf
- ^{vii} WWF <http://assets.panda.org/downloads/glacierspaper.pdf>
- ^{viii} US National Snow and Ice Data Centre http://nsidc.org/arcticseaicenews/faq.html#really_declining
- ^{ix} Nature magazine, Siddall et al <http://www.nature.com/ngео/journal/v2/n8/abs/ngео587.html>
- ^x <http://www.brighthub.com/environment/science-environmental/articles/19448.aspx>
- ^{xi} DEFRA <http://ukclimateprojections.defra.gov.uk/content/view/512/506/>
- ^{xii} WHO <http://www.euro.who.int/Document/E91865.pdf>
- ^{xiii} NOAA ftp://ftp.cmdl.noaa.gov/ccg/co2/trends/co2_mm_mlo.txt
- ^{xiv} http://www.oar.noaa.gov/climate/t_observing.html
- ^{xv} Spiegel online <http://www.spiegel.de/international/germany/0,1518,646506,00.html>
- ^{xvi} Christian Aid http://www.christianaid.org.uk/whatwedo/issues/climate_change.aspx
- ^{xvii} Nature magazine, Siddall et al <http://www.nature.com/ngео/journal/v2/n8/abs/ngео587.html>
- ^{xviii} WWF <http://assets.panda.org/downloads/glacierspaper.pdf>
- ^{xix} Intergovernmental Panel on Climate Change
http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf
- ^{xx} Oxfam <http://www.oxfam.org/sites/www.oxfam.org/files/bp130-suffering-the-science.pdf>
- ^{xxi} DEFRA
http://ukclimateprojections.defra.gov.uk/images/stories/projections_pdfs/UKCP09_Projections_V2.pdf
- ^{xxii} Lancaster University research quoted at <http://news.bbc.co.uk/1/hi/sci/tech/7327393.stm>
- ^{xxiii} <http://www.skepticalscience.com/argument.php>