

Climate Change Timeline

1827: French polymath Jean-Baptiste Fourier predicts an atmospheric effect keeping the Earth warmer than it would otherwise be. He is the first to use a greenhouse analogy.

1863: Irish scientist John Tyndall publishes a paper describing how water vapour can be a greenhouse gas.

1890s: Swedish scientist Svante Arrhenius and an American, P C Chamberlain, independently consider the problems that might be caused by CO₂ building up in the atmosphere. Both scientists realise that the burning of fossil fuels could lead to global warming, but neither suspects the process might already have begun.

1890s to 1940: Average surface air temperatures increase by about 0.25 °C. Some scientists see the American Dust Bowl as a sign of the greenhouse effect at work.

1940 to 1970: Worldwide cooling of 0.2°C. Scientific interest in greenhouse effect wanes. Some climatologists predict a new ice age.

1957: US oceanographer Roger Revelle warns that humanity is conducting a "large-scale geophysical experiment" on the planet by releasing greenhouse gases. Colleague David Keeling sets up first continuous monitoring of CO₂ levels in the atmosphere. Keeling soon finds a regular year-on-year rise.

1970s: Series of studies by the US Department of Energy increases concerns about future global warming.

1979: First World Climate Conference adopts climate change as major issue and calls on governments "to foresee and prevent potential man-made changes in climate."

1985: First major international conference on the greenhouse effect at Villach, Austria, warns that greenhouse gases will "in the first half of the next century, cause a rise of global mean temperature which is greater than any in man's history." This could cause sea levels to rise by up to one metre, researchers say. The conference also reports that gases other than CO₂, such as methane, ozone, CFCs and nitrous oxide, also contribute to warming.

1987: Warmest year since records began. The 1980s turn out to be the hottest decade on record, with seven of the eight warmest years recorded up to 1990. Even the coldest years in the 1980s were warmer than the warmest years of the 1880s.

1988: Global warming attracts worldwide headlines after scientists at Congressional hearings in Washington DC blame major US drought on its influence. Meeting of climate scientists in Toronto subsequently calls for 20% cuts in global CO₂ emissions by the year 2005. UN sets up the Intergovernmental Panel on Climate Change (IPCC) to analyse and report on scientific findings.

1990: The first report of the IPCC finds that the planet has warmed by 0.5°C in the past century. IPCC warns that only strong measures to halt rising greenhouse gas emissions will prevent serious global warming. This provides scientific clout for UN negotiations for a climate convention. Negotiations begin after the UN General Assembly in December.

1991: Mount Pinatubo erupts in the Philippines, throwing debris into the stratosphere that shields the Earth from solar energy, which helps interrupt the warming trend. Average temperatures drop for two years before rising again. Scientists point out that this event shows how sensitive global temperatures are to disruption.

1992: Climate Change Convention, signed by 154 nations in Rio, agrees to prevent "dangerous" warming from greenhouse gases and sets initial target of reducing emissions from industrialised countries to 1990 levels by the year 2000.

1994: The Alliance of Small Island States - many of whom fear they will disappear beneath the waves as sea levels rise - adopt a demand for 20% cuts in emissions by the year 2005. This, they say, will cap sea-level rise at 20 centimetres.

1995: The hottest year recorded to date. In March, the Berlin Mandate is agreed by signatories at the first full meeting of the Climate Change Convention in Berlin. Industrialised nations agree on the need to negotiate real cuts in their emissions, to be concluded by the end of 1997.

In November, the IPCC states that current warming "is unlikely to be entirely natural in origin" and that "the balance of evidence suggests a discernible human influence on global climate". Its report predicts that, under a "business as usual" scenario, global temperatures by the year 2100 will have risen by between 1°C and 3.5°C.

1996: At the second meeting of the Climate Change Convention, the US agrees for the first time to legally binding emissions targets and sides with the IPCC against influential sceptical scientists. After a four-year pause, global emissions of CO₂ resume their steep climb, and scientists warn that most industrialised countries will not meet Rio agreement to stabilise emissions at 1990 levels by the year 2000.

1997: Kyoto Protocol agrees legally binding emissions cuts for industrialised nations, averaging 5.4%, to be met by 2010. The meeting also adopts a series of flexibility measures, allowing countries to meet their targets partly by trading emissions permits, establishing carbon sinks such as forests to soak up emissions, and by investing in other countries. The precise rules are left for further negotiations. Meanwhile, the US government says it will not ratify the agreement unless it sees evidence of "meaningful participation" in reducing emissions from developing countries.

1998: Follow-up negotiations in Buenos Aires fail to resolve disputes over the Kyoto "rule book", but agree on a deadline for resolution by the end of 2000. 1998 is the hottest year in the hottest decade of the hottest century of the millennium.

2000: IPCC scientists re-assess likely future emissions and warn that, if things go badly, the world could warm by 6°C within a century. A series of major floods around the world reinforce public concerns that global warming is raising the risk of extreme weather events. But in November, crunch talks held in The Hague to finalise the "Kyoto rule book" fail to reach agreement after EU and US fall out. Decisions postponed until at least May 2001.

2001: The new US president, George W Bush, renounces the Kyoto Protocol because he believes it will damage the US economy. After some hesitation, other nations agree to go ahead without him. Talks in Bonn in July and Marrakech in November finally conclude the fine print of the protocol. Analysts say that loopholes have pegged agreed cuts in emissions from rich-nation signatories to

less than a third of the original Kyoto promise. Signatory nations urged to ratify the protocol in their national legislatures in time for it to come into force before the end of 2002.

2002: Parliaments in the European Union, Japan and others ratify Kyoto. But the protocol's complicated rules require ratification by nations responsible for 55% of industrialised country emissions, before it can come into force. After Australia joins the US in renegeing on the deal, Russia is left to make or break the treaty, but hesitates. Meanwhile, the world experiences the second hottest year on record.

2003: Globally it is the third hottest year on record, but Europe experiences the hottest summer for at least 500 years, with an estimated 30,000 fatalities as a result. Researchers later conclude the heat wave is the first extreme weather event almost certainly attributable to man-made climate change. Extreme weather costs an estimated record of \$60 billion this year. 2003 also sees a marked acceleration in the rate of accumulation of greenhouse gases. Scientists are uncertain if it is a blip or a new, more ominous trend. Meanwhile Russia blows hot and cold over Kyoto.

2004: A deal is struck on Kyoto. President Putin announces in May that Russia will back the Protocol - and the EU announces it will support Russia's membership of the World Trade Organization. On 18 November, the Russian parliament ratifies the protocol, paving the way for it to come into force in 2005.

2005: Second warmest year on record. Researchers link warming to a record US hurricane season, accelerated melting of Arctic sea ice and Siberian permafrost, and apparent disruption of the global ocean current that warms Europe. The Kyoto Protocol comes into force. In December, Kyoto signatories agree to discuss emissions targets for the second compliance period beyond 2012, while countries without targets, including the US and China, agree to a "non-binding dialogue" on their future roles in curbing emissions.

Updated January 2006