

## Common Misconceptions about Climate Change

**Misconception 1: The climate is changing due to natural variability rather than human activity.**

Earth's climate is constantly changing from natural causes. Current short-term examples include: the cooling of surfaces due to major volcanic eruptions; the warming of the central and eastern tropical Pacific Ocean (El Niño); and changes in the sun's energy output. Recent temperature rises cannot, however, be explained by natural variability alone. Variations in solar output are too small to have a substantial impact. Computer simulations based on natural factors such as volcanic and solar activity do not explain the warming in recent decades. An analysis of air bubbles trapped in ice in Antarctica show that carbon dioxide and methane concentrations are at their highest level in 650,000 years. In 1995, the Intergovernmental Panel on Climate Change (IPCC), a panel made up of the world's leading climate scientists, concluded that "the balance of evidence suggests a discernible human influence on global climate". In 2001, the IPCC strengthened its position, stating "there is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities".

In November 2007, the IPCC released the AR4 Synthesis Report, strengthening its views about the influence of human activity on climate change. The report states that: "Most of the observed increase in globally averaged temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations". In other words, scientists from all over the world are now more than 90 per cent certain that the increases in greenhouse gases in the atmosphere are attributable to human activity, through the burning of fossil fuels for electricity generation and transportation, and from deforestation and agriculture.

**Misconception 2: Climate change is a deeply contested issue among scientists.**

Climate change is a complex issue. There are dimensions of the debate about which there is considerable diversity of opinion. There is, however, widespread agreement among scientists about some fundamental matters:

- a) average global temperatures have increased between 0.4 and 0.8°C over the last 100 years and will continue to increase in the foreseeable future;
- b) global warming is due to both natural processes and human activity;
- c) the current concentration of carbon dioxide and other greenhouse gases is the highest level in hundreds of thousands of years; and
- d) the consequences of climate change are serious and require immediate action.

There is also scientific agreement about the standing of the IPCC. A joint statement from 16 national scientific societies stated that the work of the IPCC "represents the consensus of the international scientific community on climate change science". IPCC reports are furthermore endorsed by governments such as Australia and the US. Only a very small number of scientists now challenge these views. Attention is given to them for two main reasons. First, the media regularly seek opposing views on issues even if the weight of expert opinion is overwhelmingly on one side. Second, large sums are being spent to discredit mainstream science by organisations, such as fossil fuel companies, which see their financial interests threatened.

**Misconception 3: Climate change will bring many benefits.**

Climate change is expected to produce some benefits such as increased plant growth under some conditions. Plants in

colder regions may flourish and increase biomass (accumulation of living material) which can be converted into 'fuel' for industrial uses and help to support living creatures.

This growth, however, depends on the availability of nutrients, soil fertility and sufficient water supply.

The IPCC has predicted that even these modest increases in plant productivity will diminish with rising temperatures. Most scientists believe that global warming will devastate ecosystems and threaten the lives of billions of people worldwide. Even a small increase in the global average temperature could result in increases in extreme weather events, such as heat waves, floods, droughts and hurricanes. Many plant and animal species risk extinction from global warming, including butterflies, frogs, lizards, alpine plants, and some species of mammals. Agricultural production is also likely to be seriously affected.

Increased temperatures are likely to increase deaths from heat waves and infectious diseases such as malaria, dengue and yellow fever, especially in countries with inadequate healthcare facilities. It has been estimated that approximately 200 million people living in coastal cities and areas could be threatened by sea level rise, especially in Vietnam, Bangladesh, China, India, Thailand, Philippines, Indonesia and Egypt. The disappearance of alpine and continental glaciers will not only deplete water supplies for millions of people, but will affect tourism and industry. The glaciers in the Bhutan-Himalaya are, for example, retreating at alarming rates.

## Misconception 4: There are discrepancies in the measurements of climate change.

Assessments of climate change are based on empirical evidence (actual observation) such as measurements of temperature changes, ice core drillings, melting of glaciers and permafrost and changing acidity in the oceans. Data discrepancies are continuously being corrected. A seeming contradiction in research findings was that satellite measurements in the lower atmosphere recorded less warming than measurements at the Earth's surface but when satellite errors were accounted for, the discrepancy was found to be insignificant. A large range of observational evidence overwhelmingly points to global warming.

## Misconception 5: Predictions of climate change are based on super computer modelling of very complex sets of data. This kind of modelling is well known to have serious flaws.

Super computer modelling is used to measure the relationship between increased temperatures and emissions and to make predictions about future climate change. There are a number of different climate models: simple 'zero-dimensional' models which calculate the natural greenhouse effect; 'radiative-convective' models which assess the effects of varying greenhouse gas concentrations on surface temperatures; and 'general circulation' models (GCMs) that model atmosphere, sea surface temperatures, ice and snow covered regions, and land surfaces with vegetation cover. The GCMs simulate the climate's response to solar variability, anthropogenic and natural emissions of greenhouse gases. Climate models have been used by the IPCC to anticipate a warming of between 1.1°C to 6.4°C during the 21st century.

While the amount of projected warming varies between models, all climate models predict a net global warming effect. Furthermore models may underestimate as well as overestimate. To increase their reliability, the models are tested against observed past climate variations (e.g. the last Ice Age) and the models are constantly adjusted to correspond with actual observation.

## Misconception 6: We should wait and see who is right and then act.

The IPCC has developed a number of scenarios (possible models) based on assumptions about human societal behaviour. The most extreme scenario (no action to reduce emissions) assumes that high economic growth will continue, and that humans will continue to use coal, oil, and gas globally for their energy needs. This scenario suggests global temperatures will increase between 2.4°C to 6.4°C, with 4.0°C a 'best estimate' increase.

Even the most hopeful scenario based on low growth in global population and intensive conversion to renewable energies suggests that carbon dioxide concentrations would be substantially higher than pre-industrial levels by 2100, and would continue to rise thereafter. Under this scenario, the IPCC projects a temperature increase of

between 1.1°C to 2.9°C, with a 'best estimate' increase of 1.8°C. Scenarios that include action to reduce global warming by the year 2100 require a dramatic reduction in emissions across the globe (e.g. at least 60-90 per cent relative to 1990 levels). Because greenhouse gases stay in the atmosphere between 50-200 years, future warming will occur even under the stabilisation scenario. The need for action is therefore compelling.

## Misconception 7: If we take premature action we will disrupt the global economy.

Climate change doubters argue that restrictions on the burning of fossil fuels will disrupt the global economy, also arguing that technology will fix the problem (the 'technological fix'). By contrast, other scientists and economists argue that there will be enormous costs from delayed action. The Australian Business Roundtable on Climate Change, including six of Australia's largest businesses from a cross-section of industries, commissioned a study to assess the relative costs of early and delayed action. It found that greenhouse gas emissions will become a 'financial liability' and that climate change would cause a "major disruptive shock to the Australian economy" if action is delayed. An editorial in *The Age* observed that "big business is arguing that there are clear economic as well as environmental benefits if the nation grasps the nettle on climate change....This is a common-sense argument."

The Stern review on the economics of climate change was released in October 2006. The report has particular significance because it was prepared by Sir Nicholas Stern, a world renowned economist. Stern described climate change as "the greatest and widest-ranging market failure ever seen". The report found that if greenhouse gas emissions were stabilised to acceptable levels, it would cost on average 1 per cent of annual global Gross Domestic Product (GDP) by 2050. The report compared this to the cost of business as usual, finding that failing to act would cost as much as 20 per cent of global per capita consumption.

The Australian States and Territories in conjunction with the then ALP Federal Opposition commissioned Economics Professor Ross Garnaut to conduct a review of the impacts of climate change on the Australian economy. The Review released an interim report in February 2008, suggesting that the danger levels of climate change are being reached

more rapidly than previously thought. The Review notes that Australia is exceptionally vulnerable to climate change and must play a leading role in brokering global solutions.

Indeed, the Review's Final Report, released in September 2008, stressed that an international agreement is the only means of addressing climate change. Garnaut considers that an international agreement aimed at a long-term stabilisation of emissions at 550ppm is the most we can hope for. This is despite the fact that such a level entails significant and irreversible environmental damage to Australia.

The current global financial crisis has intensified already existing economic uncertainties, but has not of course diminished the dangers of climate change. The Secretary General of the Organisation for Economic and Cooperation and Development recently stated: 'We must not let the financial and economic crisis distract our attention from moving towards long-term rational climate policies'.

In December 2008, the Australian Government released its emissions trading scheme and climate strategy. This contained a commitment to a medium-term national target to reduce Australia's greenhouse gas emissions by between 5 per cent and 15 per cent below 2000 levels by the end of 2020. The smaller reduction is guaranteed regardless of the actions of other nations, while the larger one is dependant on all developed nations taking on comparable reductions. In *The Age*, Garnaut promptly criticised the Government for the weakness of these targets. He also argued that revenue from the emissions trading scheme would be wasted on the concessions the policy makes towards the main polluters.

## Misconception 8: Climate change won't affect Australia greatly.

Of all developed countries, Australia is the most vulnerable to climate change because of its stressed water resources and susceptibility to floods, sea level rises, drought, tropical cyclones and bush fires. Australia's average temperature has risen 0.7°C over the last century and, relative to 1990, is projected to increase by 0.4-2.0°C by 2030 and 1.0-6.0°C by 2070. Over the past fifty years, rainfall has increased in north-western Australia and decreased in south-eastern and Western Australia. Since the 1970s, there has been a 50 per cent

drop in water supply to the reservoirs supplying Perth and near-record low levels of water storage for much of south-eastern Australia. Climate change is also likely to lead to soil erosion, salinity, coral bleaching, biodiversity loss and ecosystem damage.

**Misconception 9: It is governments and business that need to act. There is little an ordinary citizen can do.**

Individuals, households, communities, institutions, businesses, organisations and governments must all contribute to reducing greenhouse gas emissions. Individuals and households can make a difference through: (1) reduction in energy use (conservation), and (2) use of alternative energy sources. Specific measures include: hybrid cars, more efficient cars, using car pools, public transport and other modes of transport (e.g. bicycles); switching off lights, using more energy efficient heaters, air-conditioning units and other appliances; using energy efficient household devices such as compact fluorescent light bulbs, using efficient insulation and glazing; purchasing 'green energy' from local energy utilities; conserving water; lobbying governments; contributing to public debates and influencing others. Governments can best contribute by providing the right economic incentives.

**Misconception 10: We should take action on climate change only when China and India commit to international emission reduction targets.**

Former Prime Minister John Howard refused to ratify the Kyoto Protocol (the world's international climate change treaty). When Kevin Rudd was elected Prime Minister in November 2007, the first official act of the new Australian Government was to ratify the Kyoto protocol. This isolates the United States of America as the only developed nation not to have ratified the treaty.

China and India will soon become the largest greenhouse gas emitters worldwide but neither country is required to reduce its emissions under the first phase of the Protocol. It is therefore argued by the US that action from developed countries should depend on the participation of these two countries. Developed countries are, however, responsible for the majority of past and current global emissions. (Note that Australia, with a relatively small population,

is one of the two or three highest emitters per capita in the developed world).

By 2030, it is expected that global energy demand will grow by 53 per cent and global carbon dioxide emissions will increase by 55 per cent. It is projected that the largest growth in greenhouse gas emissions will come from developing countries and that, by 2008 or 2009, China will surpass the US as the world's largest carbon dioxide emitter.

But China's total emissions *per capita* at that time will still be very much lower than those of the US, Australia and the rest of the developed world. Furthermore these projections do not take into account the cumulative build-up of greenhouse gas emissions in the atmosphere over time. Between 1850 and 2002 China contributed only 7.6 per cent while the US contributed 29.3 per cent of global greenhouse gas emissions. It is understandable therefore that developing countries expect developed countries to take the lead before they commit to emission reduction targets.

Climate change is a global problem that requires a co-ordinated international response. According to the United Nations Framework on Climate Change, signature parties:

... should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead in combating climate change and the adverse effects thereof.

The climate change challenge requires that *all* countries make significant reductions in greenhouse gas emissions but that the developed countries take the lead to reduce their emissions. New Zealand has introduced the ambitious goal of becoming the world's first greenhouse gas-neutral country, starting with big emission cuts in government and compulsory targets for biofuel use. This is a good example of the leadership needed in Australia and other developed countries, not only to reduce their individual carbon footprints, but also to help developing countries to do the same. Economic analysis concludes that the costs of delaying action on climate change will be substantial compared with the relatively small cost of immediate action.

## Useful sources

The Government's white paper on climate change was released on 15th December 2008:

<http://www.climatechange.gov.au/whitepaper/index.html>

Stern, N.H. (2007). *The Economics of Climate Change: The Stern Review*, Cambridge: Cambridge University Press.

Australian Business Leaders Roundtable on Climate Change, *The Business Case for Early Action*, <http://www.businessroundtable.com.au/pdf/Fo78-RT-WS.pdf>

Prepared by six of Australia's largest business corporations, this report examines the comparative economic benefits of early or delayed action to deal with climate change. The group concluded that "climate change is a business risk and we need to act now".

The Intergovernmental Panel on Climate Change (IPCC): <http://www.ipcc.ch/>

The AR4 Synthesis Report and the reports from the three working groups are all available on the IPCC site.

The Garnaut Climate Change Review:

[http://www.garnautreview.org.au/domino/Web\\_Notes/Garnaut/garnautweb.nsf](http://www.garnautreview.org.au/domino/Web_Notes/Garnaut/garnautweb.nsf)

The Garnaut Climate Change Review was commissioned by Australia's state and territory governments on 30 April 2007. On taking office, Prime Minister Kevin Rudd confirmed the Commonwealth Government's involvement in the Review. The Review presented its Final Report to the Prime Minister of Australia and the eight states and territories on 30 September 2008.

See also Australian Conservation Foundation – <http://www.acfonline.org.au>

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