The proof of climate change and the inevitability of 2°C.

Prepared by Dr John James for
Climate Crisis Coalition

The benign climate that has allowed the human race to multiply, develop and prosper has remained more or less unchanged for 10,000 years. Its stability accounts for the entire span of civilised human history.\(^1\)

Since the 1780s the average global temperature has risen 0.78°C from a one-third increase in atmospheric CO\(_2\).\(^2\) To this should be added methane and other gasses,\(^3\) and the additional impact of water vapour.\(^4\)

**For the following reasons a 2°C rise is now inevitable:**

Were we to stop all emissions immediately, temperature would continue to rise without any more input from us from latent heat\(^5\) and aerosol dimming.\(^6\)

Latent heat commits the planet to about 0.45°C more;\(^7\) Aerosols shield us from a further 20%.

Together these are holding back the full impact of the CO\(_2\)-e in the atmosphere by twenty or thirty years. The increase so far reflects only what has been emitted up to the later 1970s.

The calculation is simple: Were we to instantly stop all emissions, stop everything today, average global temperature would continue to rise as follows:

Current temp + latent heat + dimming = 0.78 + 0.45 + 20% = 1.5°C.

This is double the increase of the past two centuries.

It is therefore **inevitable**, from what we have already emitted, that food production will decline, droughts will spread and species will become extinct. There will be more hunger, less available fresh water, the seas will rise and vast numbers of refugees will be on the move.\(^8\) These conclusions are supported in the May 2007 Bangkok IPCC report.\(^9\)

In addition, it leaves a margin of only 0.5°C before we reach the critical threshold.\(^10\) Above 2°C it is believed that global heat would start to trigger the release of the greenhouse gases now stored in the oceans, in trees and in the soil.\(^11\) Once started the process is unstoppable and could further increase average global temperature by 6°C or more.\(^12\)

**How close are we to a 2°C rise, and when will we get there?**

2°C is closer than most are prepared to admit. Considering that no one knows for sure what temperature would trigger the tipping points, we are already in a zone of absolute risk.

Over the past three years the average annual increase in CO\(_2\) has been nearly 3 ppm, about twice what it was twenty years ago.\(^13\) The annual rate is still rising from new coal-fired plants in all countries, especially China,\(^14\) from more vehicles and logging and mega-bushfires.

In the next ten years global emissions will add enough to make a 2°C rise inevitable, and with it catastrophic climate change over the following decades. The passing of this threshold will be of the most enormous significance. We will have entered the era of dangerous climate change where neither we nor our children can count on a safe future.
**The tipping points:**

The research of the past five or so years shows that nearly all earth’s systems known to effect climate change have begun the process of positive feedback. There are certain points "of no return" after which unstoppable heating will become irreversible. A report in May 2007 shows this has already started.\(^\text{15}\)

The evidence is that these events occur very rapidly, often in less than a decade.\(^\text{16}\) The major tipping points are:

1. Glaciers collapse\(^\text{17}\) and raise sea levels enough to inundate world sea ports\(^\text{18}\) and reflect less heat into space.\(^\text{19}\) Earthquakes will follow as the weight comes off the land.\(^\text{20}\)
2. Methane clathrates held under the sea begin to burp.\(^\text{21}\)
3. Permafrost thaws and releases vast quantities of methane.\(^\text{22}\)
4. Forests and soils no longer absorb carbon, but become emission sources.\(^\text{23}\)
5. Logging and bush fires increase the carbon load.\(^\text{24}\)
6. Drought degrades the Amazon forest, so releasing its carbon.\(^\text{25}\)
7. Disastrous weather and heat could bankrupt the insurance industry,\(^\text{26}\) and with it one foundation of personal and commercial security.
8. Decline of cold fresh water from the Arctic\(^\text{27}\) alters the Gulf Stream.\(^\text{28}\)
9. Hotter oceans absorb less carbon,\(^\text{29}\) and acidification is killing the fisheries.\(^\text{30}\)
10. Drought, heat, pests and disease disrupt global food supplies.\(^\text{31}\)
11. The human tipping point: culture shock,\(^\text{32}\) refugees,\(^\text{33}\) wars\(^\text{34}\) for water, land, food and shelter and the probable death of billions.\(^\text{35}\) Nukes could worsen climate.\(^\text{36}\)

There would be minimal economic downturn if we prepare how to change our ways now.\(^\text{37}\)

**Present policies:**

The current consensus is politically driven, and is irrelevant. Most concerned politicians and green groups are satisfied with demanding we cut existing emissions by 60 percent or so in the next 40 years. The above calculation shows we need to achieve much more than that in the next ten.

Emission trading and carbon taxes are based on the assumption that the rich can go on living as we do with minimal adjustments to the system. The rush to ‘clean coal’ and sequestration follows the same rationale.\(^\text{38}\) Long-term these are useful only if we have a survival strategy already in place.

The market-based approach diverts investment from renewable technology. It maintains our standard of living while continuing to use fossil fuels to maintain our consumerist society.

**Conclusion from the above argument:**

To keep below that threshold the world needs to cut emissions by 10 percent every year over the next 10 years, starting now. The major items needing attention are (in order) coal, vehicles, cement, aeroplanes, and shopping malls. Most people don’t yet recognise the importance of the last three. And this makes no mention of emissions from the military.

In the final analysis this comes down to transforming our consumer society. If we would all buy less and travel less, we would emit less.\(^\text{39}\) This is why the public has to be involved.
Since these changes are revolutionary, and are pointless without some global consensus, we need to assume that some nations will not change in time, and that we should prepare on our own.

Part of this would be to cut emissions by a significant amount every year for the next decade, by reducing personal consumption and by strongly encouraging renewable technologies.

**Preparing for our national security:**

Since neither we nor the world will change from coal in time, sequestration and nuclear and renewables are less important than planning how this country and her people can cope as the climate becomes seriously worse. For that we need to prepare our governments, public opinion and community infrastructures to deal with it.

We believe Australia is one of the few countries that could survive the coming disintegration as we can seal our borders, have plentiful resources and an educated citizenry.

The following are a few of the consequences to Australia of rapid climate change. Risk assessment would need to include the following:

**Sea level rise:** docks flooded, reduced trade, oil, import or export of food
- Waterfront houses, roads, sewage, communication, fresh water, infrastructure
- Internal distribution of food, essential services, power.

**Violent weather:** cyclones down the east coast, prolonged heat waves, hail and drought.

**Fire and flood:** hospitals, repairs, insurance, mortgages, disaster management.

**Diseases migrate south:** Ross River, malaria, cholera, West Nile, available hospitals.

**Internal refugees:** housing and resettlement, petrol, law and order, community structures.

**External refugees:** military, diplomatic, Fortress Australia, peace keeping, war, nukes.

**Culture shock:** public transport, travel to shops and work, change jobs, mortgages
- lower standard of living: new technologies, changed life styles, reduced advertising
- An unaware public will be less able to face it, and may polarise.
- Local manufacture: electric cars, busses, trains, power tools, white goods

**Develop a national resilience to a total shift in life expectations**

**Ethics:** immigration, rationing, mandatory ad draconian political control.

We recommend the immediate establishment of a national Risk Assessment Council that would appoint Expert Committees to assess each of these issues and prepare preliminary recommendations. Since time is of the essence all committee investigations should be completed in the first six months.

As one purpose should be to prepare citizens for the changes that are coming and to support their confidence in the willingness of government to protect and nurture them, all steps in these investigations should be made public.

Australians should be educated in the risks of climate change so they may be as prepared as possible in their private and commercial lives, and do so with the confidence that government is facing the issue and determined to deal with it for the common good.
The terms used in this report are CO\textsubscript{2} for carbon dioxide, the major greenhouse gas after water vapour; CO\textsubscript{2}-e for the equivalent in CO\textsubscript{2} of all greenhouse gases including methane and fluorocarbons; Bts for the weight of greenhouse gases in the atmosphere as billion tonnes metric; Mts for a million tons and ppm for the ratio of the number of greenhouse gas molecules in the air as parts per million. See WRI report for an excellent summary.[6]

The foundations for this information are the 2007 IPCC,[b] Stern[d] and SEG reports.[d] There is widespread criticism that the IPCC report represents the minimal politically acceptable consensus. None of the tipping points discussed in the text were factored in, though a couple were mentioned. A survey of 1600 climate scientists reported almost half had experienced “Political interference … in climate science is no longer a series of isolated incidents but a system-wide epidemic.”[e][f][g][h]

**The Consequences of Each Step in Temperature Rise**

In March last year it admitted that “a limit closer to 450 ppm or even lower, might be more appropriate to meet a 2°C stabilisation limit.”[d] Yet the target has not changed. The EU is also aware it is using the wrong figures, and in 2005 found that “to have a reasonable chance to limit global warming to no more than 2°C, stabilisation well below 550 ppm CO\textsubscript{2}-e may be needed.”[h]
There has been a 3–7 °C rise in local temperatures in the Arctic and Siberia, higher than anywhere else. Peat bogs are turning into a broken landscape of mud and lakes, some more than a kilometre across. Over the past 4 or 5 years this has started to melt. As it thaws it will release billions of tonnes of methane, a greenhouse gas 21 times more potent than carbon dioxide. [a] Recent research shows the rate is five times higher than estimated. [b] The Arctic permafrost contains some 450 Bts of methane, while the Siberian yedoma stores a further 500 Bts. [c] This is a third


The annual increase is now 1.9 ppm/a from 45 Bts/a CO2. The Arctic Mount Zeppelin station has monitored a 48% increase in the rate of emissions over the past 25 years, www.sft.no/publikasjoner/overvaking/1970ta/1970.pdf; US EIA.


Climate Change and National Security

Dr John James Climate Crisis Coalition 26 April 2007, page 5
www.planetextinction.com
31 Global agriculture is already in crisis from drought, flood, habitat destruction, overharvesting, pollution, collapse of bee colonies and alien species. Rice yields have dropped 10% over the past 50 years. Many computer models have determined that there is a 50% chance the current will collapse with higher temperatures with a devastating effect on bordering states. In the warming after the last Ice Age, the ice dam holding back a vast lake in North America burst. The fresh water rushing into the Atlantic appears to have shut down the THC, European temperatures fell 5°C.

29 Arctic sea ice has reached its smallest size ever. A US Navy survey suggests there will be no sea ice left in the Arctic summer by 2016. US National Snow and Ice Data Centre, Colorado.

28 The Atlantic conveyor belt brings warm surface water to northern Europe and returns cold, deep-ocean water southwards. The flow has slowed 30% in the past 50 years. Many computer models have determined there is a 50% chance the current will collapse with higher temperatures with a devastating effect on bordering states. In the warming after the last Ice Age, the ice dam holding back a vast lake in North America burst. The fresh water rushing into the Atlantic appears to have shut down the THC, European temperatures fell 5°C.

26 The CSIRO predicts large storms will be battered with massive 100-year storms, destroying properties and eroding the coastline, 110-metre storm surges, double the bushfires and rainfall down 40%. Average Sydney temperatures will soar by 5°C. Droughts will occur nine out of every 10 years, forcing water consumption down by about 60%. Globally, disaster losses increased from $71 billion in the 1960s to $608 billion in 1990s, and this trend is expected to continue. Insurance premiums are an indication of the cost of climate change.

24 Logging and deforestation contributes between 18% and 25% of global carbon emissions, some 2 Bt/year. This is second only to the burning of fossil fuels. In one day deforestation releases the same amount of CO2 as 8 million people flying from London to New York. Some 1.6 billion trees are logged each year over 7.3 million hectares. Indonesia is the third-largest emitter of greenhouse gases, followed by Brazil, behind only the United States and China. Tropical rain forests store 430 Bt CO2/year more than all we have put into the atmosphere in 200 years.

23 One quarter of our carbon emissions are now being absorbed by the soil and one quarter by the oceans. Over the past 25 years 13 Mt/a of carbon held in UK soils has been released. There is some 300 times as much carbon trapped in the soils as we release each year from burning fossil fuels. Globally, soil could be releasing 7 Bt CO2/a as heat speeds up the metabolism of the microbes in the soil. With more heat this could increase temperature rise by a further 40%.

21 Oceans now hold about 40,000 Bt CO2, while the soil holds 1,500 Bt (plus 950 in permafrost) and vegetation 650.

20 As oceans take up CO2 the pH falls, and when low becomes too acid for shells to form. Has indicated that global warming is damaging the soil's ability to absorb carbon, creating a "compost effect" that would lead to CO2 levels rising to more than three times current levels. The 2003 heat wave in Europe damaged the woodlands, causing them to release CO2, the opposite of the assumptions built into computer models that treat forests as carbon sinks. At 1°C temperature rise tree start being the source, not the sink.

19 While tropical forests do cool the planet, those in northern regions will increasingly heat it from the albedo effect, with the result that forests become net warming agents. This is already happening, see note 15.

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14 In current conditions the Amazon is near its critical resiliency threshold. The Amazon is threatened by clearing (1% at the moment), and at double that research shows that it is likely to destabilise. Also, tests show that after three years of continuous drought the tree cover just falls over. The Amazon rainforest would be lost when clearing (17% at the moment), and at double that research shows that it is likely to destabilise. Also, tests show that clearing (17% at the moment), and at double that research shows that it is likely to destabilise. Also, tests show that after three years of continuous drought the tree cover just falls over.

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by the end of the century when global population is expected to be 9-14 billion. The magnitude of the impacts is already overwhelming some areas such as the Sudan. One third of land-based species are now facing extinction and 90% of the top predator fish have vanished. This is one of the hugest extinctions in earth’s history. The area under drought has doubled between 1970 and the early 2000s. Diseases such as malaria, diarrhoea and cholera are all associated with heat.

32 Massive change and threats to life bring compassion and strengthen communities, but it also brings rage, grief and shock. These inevitable human responses highlight the importance of developing an informed public that understands that government is not only concerned, but proactive in creating viable solutions.

33 Christian Aid predicts that a billion people will become refugees over the next 50 years from lack of water, conflict, large-scale developments and environmental degredation. People who were once able to provide their own food will now have to be fed by the rest. In addition population set to grow over 40% in the next forty years, and most of them will be living in giant cities in the poorer countries. Megacities on the coast would spill their population into the countryside, disrupting already-critical food production. "Owing to the confluence of nuclear proliferation, migration into megacities and the centralization of economies within these cities, human society is extremely vulnerable,"[c]

34 Scarcity of land, water and other natural resources is a major cause of conflict. Increased severe weather along coastal areas, glacial melting and sea-level rise, will lead to mass migration that will exert huge pressure on resources in neighbouring countries, many of which area already vulnerable to violent conflict. The Pentagon Report stated "As famine, disease and weather-related disasters strike... many countries' needs will exceed their carrying capacity. This will create a sense of desperation, which is likely to lead to offensive aggression." International Alert has identified 61 countries that are unstable and/or have recently been fighting. Half a dozen of these have nuclear potential. Two-thirds of global arms exports are sent to these unstable countries.[d]

35 The following is a calculation of the realistic demographic cost of global warming:

| Total 2007 greenhouse emissions | = 46 Bts CO₂-e/a (Stern). Total 2007 world population | = 6.6 billion people. Average 2007 per capita emissions | = 7 tonnes CO₂-e/a. The range is 26.5 tonnes for each Australian to less than 1 tonne in the poorer countries. If half the world raised their standard of living and produced Australia’s per capita emissions the total would be 82 Bts CO₂-e/a. |

This level of emission is unsustainable, yet it is where everyone is heading.

Many propose we reduce emissions to 60% of 1990 levels by 2050 to stabilise the climate, which was then 38 Bts CO₂-e/a (Stern). A 60% reduction = 15 Bts CO₂-e/a. Forecasted world population in 2050 is 9 billion. This computes to average emissions target of = 1.7 tonnes CO₂-e/a per person. For Australia this would mean a fifteen-fold reduction - impossible without revolution, though a six- or seven- fold reduction may be possible if people realise the situation.

Alternatively, we might ask how many people could the world sustain at our lifestyle: our emissions (26.5 tonnes pp/pa) divided into a global emissions target of 38 Bts = 570 million people (=15/26.5)? This is equally impossible. Since both scenarios for higher world living standards and higher population have impossible outcomes, and as there are few credible or ethical compromises, the consequences would most likely be disastrous.

36 Nuclear weapons continue to spread to countries at severe climate-risk. The disruption following even small wars would bring mass starvation. Were nukes used, fall-out would be like the impact of a major volcanic eruption. In the past these have produced a year or more without summers. Nuclear winter could endanger the entire population of the earth.

37 Many analyses have been made of the positive economic value of rapidly adapting to climate change. Among many: The Australian Business Roundtable on Climate Change (involving Westpac and Origin Energy), Peter Cosier to the Wentworth Group, various insurance groups, the Allianz and Powering Australia’s Future by Australian Business Council for Sustainable Energy.

38 See Mark Diesendorf and CEEM submission. For one of many criticisms of carbon quotas see here.

39 For more information on suggested micro-changes see George Monbiot’s Heat, Paul Brown’s The Last Chance for Change and James Lovelock’s The Revenge of Gaia and details on the pages of our site www.planetextinction.com.

40 Infrastructure and Climate Change Risk Assessment for Victoria, March 2007, CSIRO, Maunsell & Fox.