

# Will Climate Change Cost the Earth?

## An update on the science

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**Wentworth Group of Concerned Scientists**

Nobody set out to destabilise the world's climate. The people who built the power stations and the motor cars were not evil, they were actually the heroes of their generation. Their machines advanced human welfare and created our western civilisation.

However, we have now discovered that the fossil fuels that power the machines are changing our world's weather. To give up the machines means giving away our way of life. It's no wonder people are frightened into inaction.

I believe we can fix this problem, not by turning our backs on the industrial revolution, but by building on what it has created for us. We just need to change the way we power our machines. What we need are economic drivers that will guide our economy into the next great phase of industrial development - that will unleash the technical innovation that we require.

The reasons we have been slow to act on climate change is because people are confused by the science and, until very recently, they have been conned into believing that the economy will fall into a recession and they'll lose their job and their house if we take action to fix the problem.

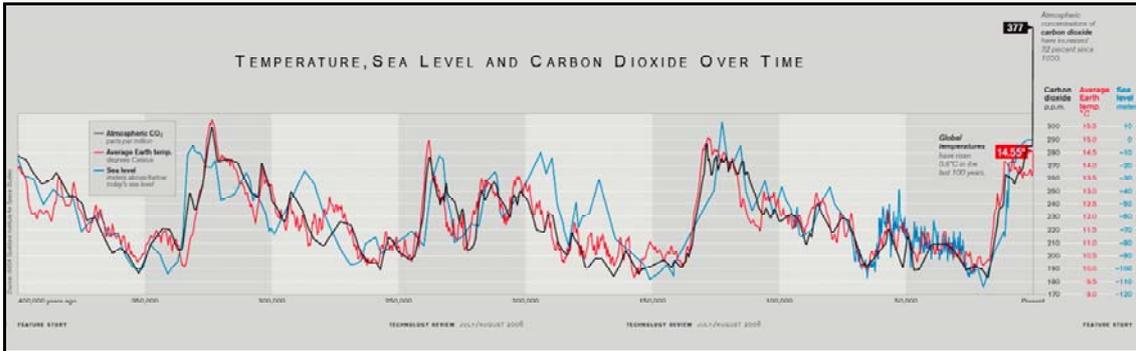
As a consequence, we are unable to form a balanced view of the risk we are taking.

The world's pre-eminent scientists are telling us that we could be facing (best estimate, to use their terms) a 4°C rise in global temperatures by 2100 if we do nothing. Of course, they may be wrong, but the consequences to our society if their analysis proves to be correct are profound.

Let me first put my interpretation on the science. Then I want to address the economics.

The Intergovernmental Panel on Climate Change's (IPCC) best estimate projects our world will warm between 1.8 degrees, even if we act now, and 4.0 degrees by the end of this century if we do nothing<sup>1</sup>. These are truly terrifying numbers.

Yes, the world has gone through many climate shifts in the past. Ice cores in Antarctica dating back 800,000 years show these cycles, and the science on why they occurred is now well understood. For example, 120,000 years ago the earth's temperature was about the same as it is today, but 20,000 years ago it was about 4 degrees cooler<sup>2</sup>.



The other surprising fact that struck me when I read the literature, is that for the past 10,000 years or so – the time when humans created agriculture, developed our cities, built the industrial revolution, the earth has experienced a peak of relatively warm weather.

So the question that has intrigued me is, OK, the world has been 2, 3 or 4 degrees cooler several times over the past million years, but when was it 2, 3 or 4 degrees warmer? That’s what the scientists tell us global warming will cause, and the answer to that question is staggering.

The last time our planet was one degree warmer was about 300,000 years ago, but that pales into insignificance when you discover that the last time our world was 4 degrees warmer than today is not measured in thousands of years or even hundreds of thousands of years. The last time our world was 4 degrees warmer than today was something like 40 million years ago<sup>3</sup>.

If we don’t take action to address climate change now, climate scientists are telling us that our civilisation could be faced with levels of warming in the next 100 years that our planet has not experienced for 40 million years.

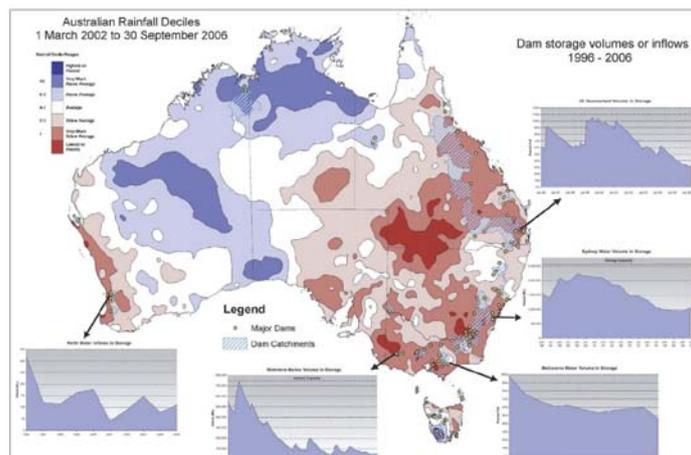
What will our world be like then? The answer is I don’t know, but I can tell you what it was like the last time our world was 4 degrees warmer. Large mammals had not yet evolved, Antarctica was free of ice and covered in rainforest, alligators swam in swamps in the Arctic and sea levels were 70 metres higher than today. It was a vastly different world.

It appears that southern Australia is now experiencing a step change in its weather patterns, and we’re already starting to talk about having to move our farms north.

This change in climate in Australia may be part of a natural cycle or it may be caused by climate change or it might be a combination of both. We don’t know for certain, we can’t know, but what we do know is that our continent has been getting hotter. We do know that the recent decline in rainfall is consistent with what the global climate models have predicted would happen in Australia as a result of climate change, and we do know that science is warning us of further uncertainty as a result of climate change.

Since 1950 Australian average temperatures have increased 0.9°C and most of eastern and south-western Australia has experienced substantial rainfall declines<sup>4</sup>. This has had profound implications for our natural environment as well as our economy.

The best estimate of annual warming over Australia by 2030 relative to 1990 is a further



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increase of about 1°C. Later in this century, the warming is projected to rise by around 1.8°C for the best case scenario and around 3.4°C for a high emissions case, with a 20 to 50% chance of temperature increases exceeding 4°C in inland areas, such as the Murray Darling Basin<sup>5</sup>.

As we have already seen, even the best case scenarios have implications for Australia – for our cities, our coasts, water resources, for the production of our food and fibre and the health of our native landscapes.

We are already going to have to adapt to the consequences of climate change that we have set in motion. But the scale of adaptation we will need to take will depend on the speed at which we act to address the problem.

That's the science as it stands today. The overwhelming consensus of scientific opinion is that the world is warming as a consequence of human activity.

This is no longer a debate on whether man's activities are causing the climate to change, it's now a debate about how to address it. This is the greatest challenge of our generation. It presents us with threats, it also presents us with opportunities. It could herald the end of our civilisation, but it could also drive the next industrial revolution.

So let me turn to the economics.

A year ago, the former Chief Economist of the World Bank, Sir Nicholas Stern released his long awaited report on the Economics of Climate Change<sup>6</sup>. This was a significant milestone in the public debate because, finally, someone looked at the cost of doing nothing, and his conclusions have stunned the business world.

He found that the costs of doing nothing were more than the costs of fixing the problem – far more in fact.

What I want to show you today is that, using conservative economics, addressing climate change is not a conflict between economic growth and the environment. This is a contest of values, on whether we are prepared to take responsibility for the future or whether we simply vacate the space and leave our future to the vested interests of today.

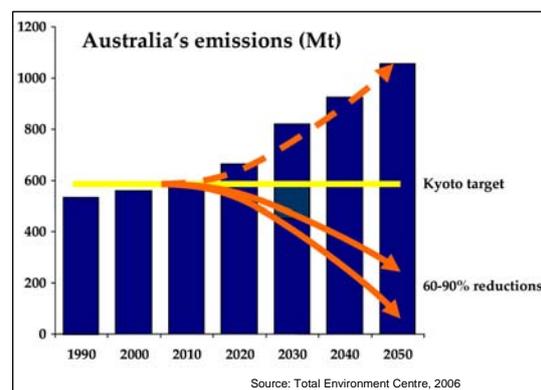
This graph shows what the world's climate scientists tell us we need to do if we are to avert serious damage to the world's climate system.

It's a truly frightening graph.

We need to not just stop the explosive growth in emissions, we actually need to cut existing emissions by at least 60 per cent within the next 40 years.

It's no wonder people are frightened into inaction. To give up the machines means giving away our civilisation.

We don't need to turn our back on the industrial revolution, but we do need to change the way we power our machines.



Let me put the economics, as this issue affects Australia, in proper perspective.

This graph shows you the economic history of modern Australia<sup>7</sup>. It shows the explosion of wealth in Australia since the industrial revolution – how the western world has embraced the democratic capitalist model as the vehicle for human advancement with spectacular success.

By the time Australia had become a nation in 1901, average incomes had reached \$6,000 in today's money.

But that was just the beginning. Just look at the economic growth since world war two.

Today our average income in this country is over \$44,000 for every man woman and child. We are eight times more wealthy than our grandparents, and we live in a world beyond their wildest imagination.

The Intergenerational Report prepared by the Australian Treasury, predicts that, short of any unexpected shocks, this explosion in wealth will continue between now and 2050, in the order of 1.5 per cent of GDP per capita per annum<sup>8</sup>.

If this rate is projected over the following 50 years, at the end of this century, living standards in Australia will rise from \$44,000 per person, to over \$185,000 per person. And as you know, Treasury is a very conservative agency.

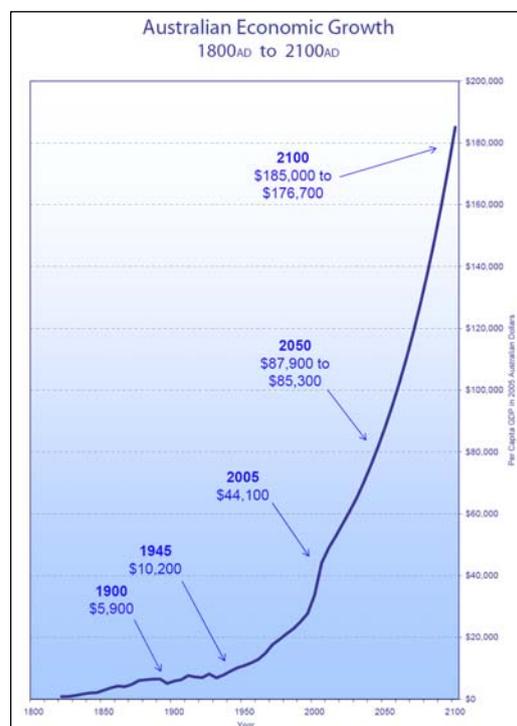
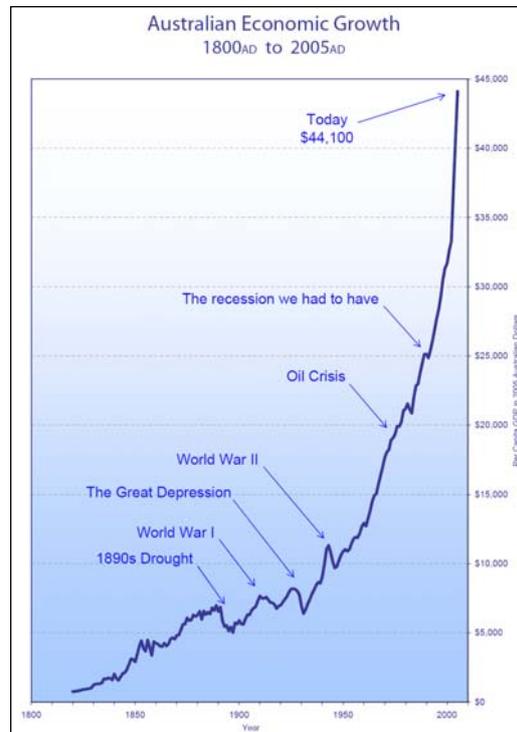
That's right, by the end of this century, over \$185,000 for every man, woman and child in today's dollars.

Now I know what some people in the audience are thinking – yes, we've all seen these hockey stick graphs before - but bear with me. Remember, to economists, the impact of compound economic growth is well know and underpins many of your long range investment strategies - but most people are not financiers.

We all need to reflect on this graph for a moment.

No matter how well you understand economics, the impact of these figures are as unimaginable to us today as it would have been unimaginable for our grandparents, at the turn of last century, to conceive the world they were creating for us. But here's the key – our behaviour today is putting all this at risk ... and for what?

We're putting it all at risk because we believe it is wealth or the environment.



This final graph has left many people stunned.

The blue line is, as I said, projected economic growth based on the Treasury projections. The red line is based on the best available international modelling of the economic impact of deep cuts in global emissions, involving high income countries reducing their greenhouse footprint by at least 60% by 2050<sup>9 10</sup>.

When I first presented my findings last year<sup>11</sup> on how little it would cost to prevent climate change, people were shocked. Not surprisingly, they come to the obvious conclusion: what on earth are we arguing about.

In May this year, the IPCC came out with figures that are quite consistent with these graphs. Stern said it last year and the IPCC said it again; action is affordable.

But the science is warning that we are running out of time.

The world's climate scientists tell us that we need to keep greenhouse gas concentrations in our atmosphere below 450ppm if we are to have a 50% chance of keeping global warming below a critical threshold of 2 degrees. Pre-industrial levels were 280ppm.

It has already reached 380ppm of CO<sub>2</sub>e and this is rising at an accelerating rate of 2ppm per year. In simple terms that gives us less than 35 years before we exceed that critical threshold<sup>12</sup>, but in reality we don't even have that. High levels of air pollution, such as we are experiencing now in Asia, are actually masking the real figure. If you discount 'global dimming' as developing nations mobilise to reduce the human health problems caused by air pollution, we have already crossed the 450ppm threshold.

The debate on the science is over, but the science is now telling us that action is urgent.

Our generation today is presented with a very powerful moral choice, because risking our climate for the sake of an infinitesimally small amount of economic growth is not heroic – it is greed and it puts at risk everything we have built.

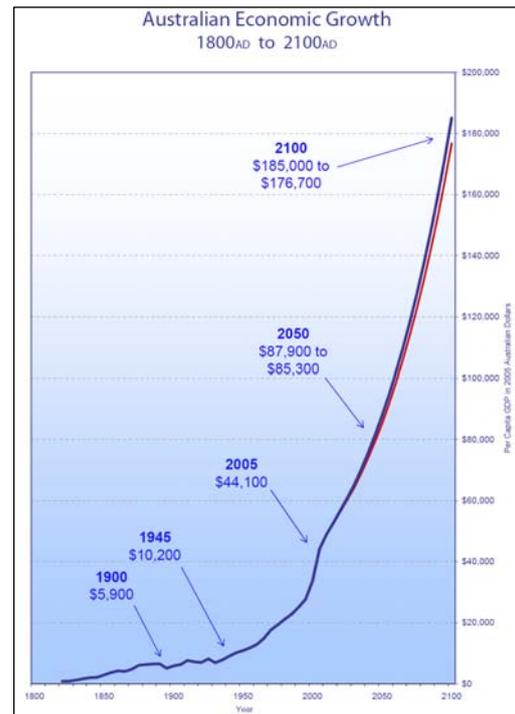
Climate change policy is about risk assessment. Good public policy demands that we assess the risk of inaction against the cost of action.

When our top scientists say their 'best estimate' is a 4 degrees warming and our best economists suggest that a policy response phased in over several decades carries little economic cost, we would be foolish – dare I say reckless – to ignore this advice.

There are many innovative things we can do, but we cannot hope to fix the problem unless our governments put a cap on the level of carbon that's allowed to be emitted.

The longer we leave it the harder and more expensive it will become to fix the problem and the greater the risk of triggering runaway climate change.

The sooner we put a price on carbon pollution in Australia, the sooner our engineers and scientists can help the world get on and fix the problem.



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## Footnote:

The estimated impact of policy action presented in this paper is based on the results from eleven international models, reported by Grubb et al 2006. Nine of the eleven models indicate emission reductions are likely to result a GDP gap -1% or less relative to levels without emissions reductions by 2050. A number of models indicate no impact (a zero GDP gap), and two suggest economic gains, reflected in higher rates of economic growth with emission reductions, due to factors such as enhanced productivity from more rapid turnover of energy-related physical capital. Results from these nine models are more dispersed in the second half of the century, with GDP gaps ranging from +3.5 to -3.0 percent, with most between 0 and -1%. The estimate presented assumes the GDP gap rises to -1.5 by 2100. The impact on Australia is assumed to be three times the world average, implying a GDP of -3% by 2050, rising to -4.5% by 2100. This ratio is more conservative than the impact ratios suggested by ABARE (2006)<sup>13</sup>, which generally indicates impacts on Australia that are around twice the average world impact.

The Stern Report finds that temperature increases are likely to have non-linear impacts on living standards, with increases on 2°C above pre-industrial levels reducing per capita economic income by around 1.5%, and increases of 4°C reducing incomes by around 6%. Applying these estimates to Australia suggests GDP per capita with policy action will be higher than without action from around 2080 – if we assume Australian policy action is three times more costly than the world average. If we assume policy action is 1.5 times as costly, policy action results in higher incomes from 2055.

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- <sup>12</sup> IPCC, 2007: Summary for Policymakers. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*
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