Zero Emissions Now

A plan to save the Future

by Adrian Whitehead

With thanks to Philip Sutton from the Greenleap Strategic Institute for comments and suggestions.

Climate Change and Global Warming

Human induced climate change is the result of the greenhouse gases, such as CO2 and methane, that we have released into our atmosphere. These gases are heating up our planet. Many of the droughts, fires, floods, coral bleaching and severe storms we have seen over the last decade and a half are due in large measure to human induced climate change.

If we want to return our climate to the relatively stable conditions we have experienced in the past, we will need to reduce concentrations of atmospheric greenhouse gases close to pre-industrial levels. This means reducing our greenhouse gas emissions to as close to zero as possible and sequestering atmospheric carbon as fast as possible. Stabilising our greenhouse gas concentrations at any level higher than pre-industrial will result in an increasingly hostile world for humans to live in and potentially trigger additional massive temperature rises which will threaten billions of people with displacement, hardship, disease and death.

James Hansen, NASA "We're at a point where it really is a crisis. Because the danger is, we are close to passing tipping points. We're close to the point where the rest of the arctic sea ice will disappear quite rapidly. And we're very close to the point where the West Antarctic ice sheet and the Greenland ice sheet could be unstable and begin to disintegrate out of our control."

Zero Emission Network "Target Zero" conference, Melbourne, June 2007

Why "Zero Emissions" and why "Now"?

The above statement by James Hansen makes it very clear that if we are to avoid some of the most catastrophic impacts of climate change such as a 14 meter sea level rise caused by the melting of the Greenland and West Antarctic ice sheets, we must act now! We simply don't have until 2050 or even 2030 to wait to take meaningful and large scale action. We need to reduce atmospheric greenhouse gas concentrations as fast as possible to minimise the chance of such catastrophic consequences occurring.

However we don't need to took into the future to justify taking serious action on climate change as today's impacts, which include species extinction, 150 thousand or more human deaths per year, ecosystem collapse, catastrophic weather events, drowning pacific islands and growing numbers of climate refugees, are already unacceptable and need to be reversed..

Our response whether it is to tackle the immediate impacts or longer term risks must be reduce the emissions we put into the atmosphere to as close to zero as possible whilst simultaneously sequestering atmospheric greenhouse gases using natural and human assisted means to take the total atmospheric CO2 down to safe levels. We need to do this as fast as possible and given that the solutions are available for implementation today there is no reason not too. We call this goal "Zero Emission Minus Fast".

Philip Sutton, "There is too much greenhouse gas in the air NOW! There is absolutely no advantage in having any more in the air, NOW! Our private targets should be to have no future emissions into the atmosphere. That's what we really need."

Melbourne Social Forum, conference, March 2007

Impacts Today - droughts, fires, floods, coral bleaching, severe storms, killer heat weaves, spreading diseases, species extinction - *today's costs are already too high.*
Future Impacts - major agricultural system collapse, millions of climate refugees, drowning of island nations and coastal areas, economic collapse - *this must be avoided.*
Feed Back Loops - natural systems effected by global warming are releasing greenhouse gases, adding to the problem of global warming at ever increasing rates- *this must be reversed.*
Run away Climate Change - critical levels of global warming trigger a further large temperature rise, threatening the survival of humans and natural ecosystems - *this must be avoided at any cost.*

Adopting an appropriate goal

As we understand more about the science behind climate change the more serious the situation looks. On a weekly basis we hear worsening news forcing a continued revision of emissions reduction goals. This raises the question if we are forced to constantly revise our goals have we in fact chosen the right goals in the first place.

What do we want from our goals: 1. reduction of current impacts; 2. best possible chance of avoiding runaway climate change; 3. goals that make economic sense; and 4. a goal that we don't have to constantly revise. Lets take a look at the two of the most common goals. *60% of 1990 levels by 2050* as a goal for Australia is far too little too late and implies we have significant amounts of time to take moderate action. The 60% goal will see us go over 3˚C or much higher.

80% of 1990 levels by 2050 as a goal for Australia, though apparently better, this goal will result in a "too-high" 2˚C temperature rise if only adopted by the rich world. This goal is often said to be based on the work of Meinshausen who calls for a global reduction of 80% by 2050 to hold us below a peak of 2 ˚C and then argues that after 2050 further reductions in emissions should occur to allow the atmospheric CO2 level to stabilise at 400 ppm. Given that Australia is one of the highest produces of CO2 per head both historically and currently, our share of meeting the Meinshousen target would be a 95% reduction of 1990 levels. However this goal is still aiming for too high a temperature (2˚C) and worse still there is even a significant chance (26%+) that the temperature will exceed 2ºC.

So more action is needed. All countries need to achieve zero emissions in the shortest possible time, massive amounts of CO2 have to be stripped out of the air to bring levels down to at least as low as 320 parts per million and possibly lower and the countries with the greatest economic might and largest historical emissions need to shoulder the largest share of the economic cost of these changes.

Risk and Climate Goals

One of the areas tackled very poorly around assessing our response to climate change is the issue of risk. Risk is a value based assessment which combines the likelihood or probability of a given outcome with the consequences of that outcome. We use risk analysis in many aspects of our daily lives. In normal life we usually only accept very low probabilities for activities that have very serious consequences such as death or injury. For example people who under take activities such as cycling or riding a school bus accept a risk level of only a 1 in 100,000 (0.00001% percent) chance of dying per year (Canada).

However with climate change some seem comfortable exposing the whole earth and its' human and non human populations to high probabilities of catastrophic climatic events. For example in 2005 we reached 455 ppm CO2-e (carbon equivalent) which according to the UK Hadley Center, a world leading climate science institute, gives us a probability of 80% chance of going over 2˚C, a 20% chance of going over 3˚C, and 1% chance of going over 5˚C, even if we managed to stabilise our greenhouse gas levels as this point and yet some Governments, Environmental Groups and individuals are proposing to stabilise our greenhouse gas levels near to 455 ppm CO2-e (carbon equivalent) or much higher.

2 degrees is 2 degrees too much

For quite a few years many climate scientists have argued that we can, most likely, avoid dangerous climate change if temperatures do not exceed 2ºC above pre-industrial. This argument was based on the scientific rule-of-thumb that things would probably be safe if we didn't go beyond the normal spread of temperatures that the earth has lived through over the last million years – and the earth had only ever been 2ºC warmer than pre-industrial through all that time. But more recent scientific evidence is showing us that this set of assumptions is unfortunately wrong. Firstly, for the vast majority of the last million years we didn't have a vulnerable population of 6 billion non-nomadic humans to support. Secondly, the earth was a wilderness area for virtually all of this time so other species had a much better chance to survive. Also the natural system had never been loaded with the current level of greenhouse gases or the level of land clearance or the level of air pollution.

What we are finding is that in many cases damaging impacts are occurring at lower temperatures than you would expect from earth history and the changes are happening a lot faster that climate models have been predicting. It is now clear that we are losing all of the Arctic summer ice that was critical for keeping the earth cool and that this will all melt with 'only' 0.8ºC warming. What is even more concerning is that we had probably set in train the loss of the Arctic summer ice once the temperature started to rise over ***0.5ºC*** .We now know that a 2ºC warming is not safe but is a death sentence.

How high would *you* let the temperature rise?

Temperature	*Impact*
1+	Amazon begins to collapse under severe drought and fires; US food producing area in the great plains reduced to desert; sea levels rise dramatically; pacific island states abandoned.
2+	Coral reefs near extinction; seas turning acidic; 7-14m sea level rise; 25% species extinction, global food production in steep decline, fresh water shortages.
3+	25 meter sea level rise, no ice in the northern hemisphere; 40% species extinction.
4+	Deserts in Europe; Mediterranean abandoned, 90% species extinction
5+	No ice on either pole, 60-80 meter sea level rise
6+	95% of species extinct; further temperature increases; human populations collapse.

Global Warming Issues Examined

Avoiding catastrophic climate change and the role of the lag effect

Numerous scientific, environmental and political organisations, including the European Union, have been arguing that the critical level of dangerous climate change that must not be passed is 2º above pre-industrial levels, while others such as James Hansen, director of NASA's Goddard Institute for Space Studies and one of the word leading climate scientists, have argued that the maximum level we should allow global temperature to increase by is 1.7º.

The current global temperature has already increased by 0.8º on average. James Hansen suggests that we are already committed to an extra 0.6º rise due to the thermal inertia of our oceans. The oceans have reduced the immediate effects of the greenhouse gases we have already released, but they are still slowly heating up, resulting in a lag effect in climate change.

Paul Brown, correspondent for the UK Guardian, looks at the issue of the lag effect in his new book 'Global Warning: The Last Chance for Change'. *"Best estimates are that there is a 25-to-30 year time lag between greenhouse gases being released into the atmosphere and their full heat-trapping potential taking effect. That wipes out any feeling of comfort. It means that most of the increase of 0.8˚C seen so far is not caused by current levels of carbon dioxide but by those already in the atmosphere up to the end of the 1970s."* These conclusions mean we have the slimmest of margins to avoid a catastrophic temperature rise.

Avoiding cataclysmic climate change and a runaway global warming event

If we get run away warming with a 6-8º or more increase in temperature, climate change will result in truly cataclysmic impacts on humanity and the environment - impacts that have been likened to the effect of a nuclear war by the UK International Institute for Strategic Studies. This level of warming could be reached if a critical number of positive feedback loops become active and start a chain reaction of greenhouse gas release, temperature rise and further triggering of positive feedbacks. Some of these positive feedback loops include the melting of the North Pole (which may now be as close as 2013), the thawing of permafrost, the drying and burning of the world's forests, gasification of undersea methane and ocean acidification.

The point at which the world passes this critical threshold of greenhouse gas release from positive feedback loops is called the "tipping point". The exact timing of the "tipping point" can only be guessed at, with some scientists such as James Lovelock arguing we have already passed it. Given the uncertainty at which point we will pass the global "tipping point", the logical approach is to reduce our atmospheric greenhouse gas levels as quickly as possible and thus reduce the risk of this event.

Economics

The 2006 Stern report, written for the English government by Sir Nicholas Stern former Chief Economist for the World Bank, made it very clear that not acting on climate change would resulting in impacts worse than the combined effects of WWI and WWII and that by spending as little as 1% of our GDP we could avoid a potential 20% reduction on GDP. At the time Stern wasn't even using data that looked at the now expected 3-4m sea level rise by 2100. If we take a moment and think about the economic losses, let alone the human suffering that would result from a 3-4 meter sea level rise it is easy to see why the cost of not responding to climate change will out weight any cost to act.

The simple truth is that "business as usual" economics will not work to slow human induced climate change. If we are to turn this problem around we will need to suspend elements of normal economics and focus our economy on implementing the solutions, with some industries closed down, some redirected, and new industries growing to replace those no longer needed.

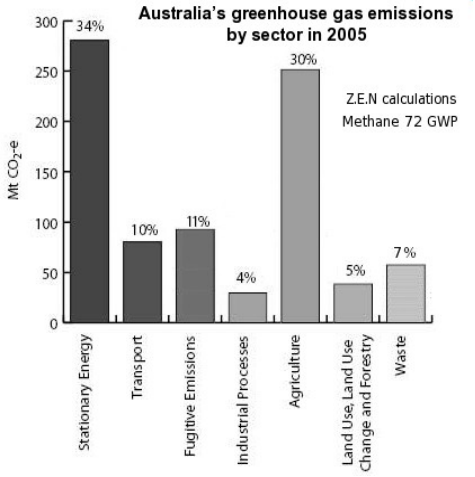
The closest analogy is the transformation of a number of major economies during WWII in a matter of months. Under a fast transition scenario there will be a massive increase in building (rail, renewables, retrofitting) and manufacturing. Employment will be high due to the amount of labor needed to transition our economy to a state of sustainability. In the 1-2 year planning stage carbon taxes, trading, or rationing can start the process of moving away from a carbon economy,.

Methane a hidden problem

The role of methane in effecting global warming has been underestimated due to the methods of accounting use to calculate relative impacts of different greenhouse gases. Methane only exists in the atmosphere an average of 12 years before it breaks down into carbon dioxide and water vapor, yet the standard account procedures calculate methane's global warming potential (GWP) over a period of 100 years. This seriously under estimates the relative impact of methane on global warming in the short term

If we re-calculate Australia's emissions using a 20 year time frame for methane (72 GWP)[1], rather than 100 years (21 GWP)[2] a more accurate picture of the impacts from difference sectors on our GHG emissions emerges. For example the relative contribution of agriculture to our GHG emissions changes form 16% to 30% and livestock from 11% to 25%. See: *http://www.zeroemissionnetwork.org.au/facts-and-figures-agriculture* for the full analyses including original Australian Greenhouse Office graph.

1. IPCC Forth Assessment Report, chapter 2, page 212 2. IPCC guidelines for GHG Inventory Reporting



For more detailed discussion on goals, solutions, and analysis see:
Zero Emission Network - Adrian Whitehead - www.zeroemissionnetwork.org.au
Greenleap Strategic Institute - Phillip Sutton - www.green-innovations.asn.au
Beyond Zero Emissions - Matthew Wright - www.beyondzeroemissions.org
Carbon Equity - David Spratt - www.carbonequity.info
NASA's Goddard Institute for Space Studies - James Hansen - www.giss.nasa.gov

How do we save ourselves?

Agriculture

Agriculture is the biggest greenhouse gas emitter in Australia if you take into account the effects of methane in the short term and agriculture's impact on the transport and stationary energy sectors. The biggest contributor in the agriculture sector is livestock which produce 25% of Australia's total greenhouse gas emissions (methane 72 GWP). By adopting a beef and lamb free diet (including dairy), eating dry land grown rice, using less animal products, buying food grown locally and in season your personal impact can be significantly reduced. Increasing soil carbon and reducing artificial fertiliser use by using techniques such as organic agriculture can reduce emissions on the farm.

Stationary Energy

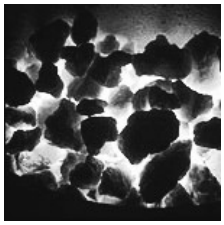
There is massive potential to reduce our energy use through energy efficiency, good design, and behaviour change in every part of our economy. At the same time we can replace our fossil fuel based energy systems using a combination of commercially available and proven renewable technologies, including options such as wind power, solar thermal, solar cells, geothermal and wave power. Renewable systems can supply both our based load and peaking power needs; hydro already supplies peak power, solar thermal energy can be stored and drawn on as needed, and smart meters in homes and businesses can reduce peak demands.

Transport

Zero emission transport is possible. Excellent walking and cycling facilities combined with an extensive high quality public transport system based on renewable powered electric rail are the fundamental elements. Electrified rail would be expanded to rural areas and between major cities for moving people and freight. Freight can even be moved around large cities on the light rail networks. Super fast rail between major population centers can replace most domestic flight needs. Car transport will be limited to electric vehicles and vehicles running on bio-fuels for some rural and remote uses.

Forestry and Woodlands

We are still destroying our native forest for woodchips and timber. When these forests are logged tons of carbon dioxide are released into the atmosphere. Other forests, wood and scrub land is cleared for farm and grazing land. The solution is simple, we should no longer destroy and clear native vegetation and we should replant significant areas of what we have destroyed to absorb atmospheric carbon, preserve bio-diversity, improve our water catchments and help in low level cloud formation.



Absorbing CO2 from the air and cooling the earth

Building soil carbon through techniques such as organic agroculture and other methods can absorb large amounts of atmospheric CO2. Large amounts of carbon can also be absorbed from the air (over decades) by sustainably growing woody and cellulosic material, charring it and then ploughing the char in large quantities into the soil. This is a safe stable store and it also improves agricultural productivity. Cooling can also be helped by replanting native forests in the tropics and temperate areas to absorb carbon recreate conditions for the formation of sunlight reflecting cloud. Other sustainable techniques may be developed.

Systemic Change and Social Equity

We have entered a sustainability emergency that will require a global systemic change and cooperative effort on a massive sale if we are to come through it. The Dutch government has concluded that globally we need to improve our eco-efficiency of most human activities by a factor of 20 to 50 if we are to become sustainable. This means a reduction in material and energy inputs and pollution outputs by 95-98%. Richer countries will need to transfer resources, know how and technology to the poorer countries. Adaptation measures including food provision and population relocation will also need large scale global support.

Government

Much of the changes we need to make are at societal level and will need to be led by government. Governments must be made to take the lead. Consequently it is vital that people vote for the political parties that are taking climate change seriously and are proposing real solutions. At elections get involved in candidate forums and climate rallies. Sadly no major political party is offering any serious solutions, though a number of minor parties have developed strong policy. You can see a good analysis of these policies at www.VoteClimate.org.au, Australia's only dedicated climate election website**.**

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www . Zero Emission Network . org . au