

Submission to the Garnaut Review Paper 3 by Dr Gideon Polya (10 April 2008).

The Garnaut Review Summary Paper 3 presents the key ideas emerging from the third Garnaut Review public forum held in November 2007. The estimates of sea level rise in Paper 3 and the acuity of the danger to Humanity are greatly UNDER-estimated in relation to the paleo-climate data and evidence of rapid loss of Arctic summer sea ice that may completely disappear in several YEARS.

Since then top US climate scientist Professor James Hansen (NASA) and others have commented on the accelerating and catastrophic loss of Arctic sea ice. The World urgently needs a Declaration of Climate Emergency to meet the huge threat from accelerating and catastrophic polar ice melting. Climate scientists have recently discovered that the rate of polar ice loss is accelerating unexpectedly and that the current atmospheric carbon dioxide (CO₂) has reached a tipping point for complete loss of Arctic sea ice in as little as 5 years. Positive feedback elements mean that the Greenland and West Antarctic ice sheets are acutely threatened and the World faces the real possibility of huge sea level rises in the coming decades (6 meters by 2100) and catastrophe for ecosystems, species survival, sustainability and Humanity. This indeed is a Climate Emergency and a Sustainability Emergency that warrants an immediate World Declaration if a State of Climate Emergency (see: <http://climateemergency.blogspot.com/>).

Since the release of the final IPCC Summary report in 2007 the situation and its scientific perception have become even worse (see “Climate Emergency, Sustainability Emergency”: <http://climateemergency.blogspot.com/>). The latest scientific findings are that the IPCC 2007 Report has greatly under-estimated the rate of melting of Arctic sea ice and of the Greenland Ice sheet. Climate scientists such as Dr James Hansen from NASA have found that water from melted ice is lubricating and speeding up the movement of glaciers to the sea; the so-called “albedo flip” involving converting light-reflecting, white ice to light-absorbing, dark sea is dramatically speeding up loss of Arctic sea ice; and the consequent increase in temperature in the Arctic provides a positive feedback to increase sea ice melting and Greenland ice sheet melting (see Hansen, J., Mki. Sato, P. Kharecha, G. Russell, D.W. Lea, and M. Siddall, 2007: Climate change and trace gases. Phil. Trans. Royal. Soc. A, 365, 1925-1954, 2007; for the abstract of this key 2007 paper of Dr James Hansen with other climate scientists in the prestigious Philosophical Transactions of the Royal Society, see: http://pubs.giss.nasa.gov/abstracts/2007/Hansen_etal_2.html). For analysis and dramatic images of Arctic ice melting see: http://nsidc.org/news/press/2007_seaiceminimum/20070810_index.html).

In February 2008 Australian Friends of the Earth published a very important book entitled “**Book Review: Climate Code Red – the case for a sustainability emergency**” by David Spratt (a policy analyst with Carbon Equity) and Philip Sutton (director of the Greenleap Strategic Institute Inc), both authors being located in Melbourne, Australia. This book can be downloaded from the Web: <http://www.climatecodered.net/>. The book was launched at an Australian Climate Change Convergence in Melbourne on February 8 2008 (see GreenBlog: <http://green-blog.org/2008/02/15/declare-climate-state-of-emergency-australian-climate-movement-convergence/>).

“Climate Code Red is a very important and timely book. It adduces the latest scientific evidence that we have already passed a key environmental “tipping point”, argues for a national and global Declaration of a Climate State of Emergency and urges rapid

implementation of the “negative CO₂ emissions policy” advocated by NASA’s Dr James Hansen i.e. rapid replacement of fossil fuel burning with renewables and rapid installation of mechanisms to reduce atmospheric CO₂.

“Climate Code Red” argues the case for a Climate Emergency and Sustainability Emergency. In short, the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (2007) was out of date when it was published (for a Summary of the Summary of the 2007 IPCC AR4 Synthesis report on GreenBlog see: <http://green-blog.org/2007/11/21/summary-of-the-summary-of-the-2007-ipcc-ar4-synthesis-report/>). The IPCC had a literature cut-off date of 2005 and since then scientific perception of the state of the world has changed dramatically. In particular it has been found that the rate of melting of Arctic sea ice and of Greenland glaciers is much faster than predicted. The top US climate scientist Dr James Hansen (Goddard Space Research Center, NASA) declares that we have already reached a “tipping point” such that Arctic summer ice may be completely gone in several years i.e. the CURRENT atmospheric CO₂ concentration of 385 ppm means catastrophic ecosystem change ALREADY and that accordingly we must have NEGATIVE CO₂ emissions to bring it back to a safe and sustainable 300-350 ppm (see: <http://news.bbc.co.uk/2/hi/science/nature/7143567.stm>). That necessary reversal of 2 centuries of profligate CO₂ pollution can be achieved by a massive shift to renewable power sources, immediate cessation of fossil fuel burning and measures such as re-afforestation, return of pyrolytically-charred biomass (biochar) to soil and, if need be, generation of global dimming SO₂ aerosols (see “: <http://www.thebulletin.org/columns/james-hansen/20080124.html>).

“Climate Code Red” is an acutely timely book that declares that “CO₂ emissions targets” and even “zero CO₂ emissions” are simply not good enough – that we must follow the advice of Dr James Hansen and his colleagues and urgently REVERSE the current dangerous CO₂ pollution of our atmosphere. In social actuality this will involve urgently educating the people, media and politicians to what the science is saying in order to achieve a Declaration of a Climate State of Emergency and urgent actions such as those outlined by NASA’s Dr James Hansen.

Part 1 of the book reviews the latest evidence about climate change. It is illustrated by 2 colour pages of figures that make extremely sobering reading as summarized below.

Figure 1 shows a roughly constant rate of various IPCC PREDICTIONS of a constant rate of loss of Arctic summer sea ice from 2000 (about 90% of the mean 1979-1990 extent) to 2100 (only about 10% left). However what will ALARM you is the ACTUAL, precipitous decline of Arctic summer ice in recent years to about 70% of the 1979-1990 mean, indicating that ALL the Arctic summer ice will be gone in several YEARS rather than in 9 decades. This is a massive ecosystem change that is happening NOW with huge implications for polar warming, Greenland ice sheet melting, tundra thawing and further positive feedbacks to accelerate global warming e.g. the albedo flip (change from light-reflecting white ice to light-absorbing dark sea); lubrication of glacier movement by melt water; and methane (CH₄) and carbon dioxide (CO₂) from thawing tundra in North America and Siberia.

Figure 2 plots sea level (in metres) versus global mean temperature (°C). There is a remarkably linear relationship as you go from the last glacial maximum 20,000 years ago (sea level minus 120 metres relative to today’s sea level, global mean temperature 9.5°C), to TODAY (15 °C), to the Pliocene 3 million years ago (sea level plus 20 metres, mean temperature 18°C) and the Eocene 40 million years ago (sea level plus 80 metres, mean temperature 19°C). The IPCC projection for sea level rise is less than 1 metre rise by about 18°C (clearly a big underestimate) and a temperature rise predicted to be 3°C on a “business as usual” scenario means a 20 metre rise in sea level.

“Climate Code Red” quotes the following dire comment by Dr James Hansen: “There is strong evidence that the Earth is within 1°C of its highest temperature in the past million years. Oxygen isotopes in the deep sea foraminifera reveal that the earth was last 2°C to 3°C warmer [relative to 2000] around 3 million years ago, with carbon dioxide levels of perhaps 350 to 450 parts per million. It was a dramatically different planet then, with no Arctic sea ice in the warm seasons and sea levels about 25 metres higher, give or take 10 metres.”

The atmosphere is ALREADY at 385 ppm CO₂ and CO₂ is increasing at about 2.5 ppm per year; global average temperature is about 1°C above the pre-industrial and increasing at about 0.25 °C per decade.

Figure 3 plots “warming per decade in °C” versus time for various scenarios of fossil fuel use identified by past IPCC reports. Thus the worst scenario involving intensive fossil fuel use shows “warming per decade” peaking at a catastrophic 0.65 °C per decade in about 2060. However the ACTUAL data indicate that the world greenhouse gas (GHG) pollution is already well above the worst scenario.

Superimposed on Figure 3 are graphical indications how all ecosystems and also forests in particular cope with various rates of climate change. Thus in the PRESENT circumstances of about 0.25 °C warming per decade, the poleward isotherm shift is about 75 kilometers per decade and only about 40% of all ecosystems and only about 20% of forests adapt to the rate of temperature change – an extremely serious situation ALREADY. However we are evidently on track to achieve a 0.4 °C increase per decade within 2 decades, at which point very few ecosystems or forests are able to adapt – a catastrophic situation for a world already suffering serious resource depletion.

Figure 4 plots the “West Equatorial Pacific sea temperature” over the last 1.35 million years. The temperature fluctuates between a minimum of about 25 °C and a maximum of 30 °C, this reflecting successive ice ages and periods of warming and with most of the data lying between 26 °C and 29 °C. From a pre-industrial temperature of about 28.7 °C (about 3 °C warmer than in the prior ice age situation of about 15,000 years ago) the temperature has steadily climbed in a mere 2 centuries to a current 29.7 °C, the hottest it has been for about 0.1 million years. The earth is on track to exceed in a mere several decades the highest temperatures for millions of years.

Figure 5 plots “global carbon emissions in gigatonnes/year” (billions of tonnes/year) from 1950 value of 2 to the present 9.5 gigatonnes carbon /year and thence projections for (a) “business as usual” (rising to a maximum of 16 gigatonnes per year in about 2050 and thence declining in a devastated world) and (b) various scenarios for capping temperature increase to about 2 °C (with carbon emissions declining about 80% from current levels by 2050, noting that much greater cuts now appear to be necessary to achieve this). However we are ALREADY on track to exceed the worst case scenario leading to a catastrophic temperature increase of 5 °C or greater.

This sobering information in a nutshell tells us that we are on track for a “worst case scenario” global biosphere catastrophe with rapid temperature rise in a few decades to take us beyond what the earth has experienced for millions of years.

However the possible scenario advanced by Dr James Hansen is that loss of Arctic summer sea-ice will speed up the ongoing loss of the Greenland ice sheet and a rise of sea levels by as much as 5 metres this century.

A key problem identified in “Climate Code Red” is the short-term global mean temperature increase expected in the next decade. We are already 0.8 °C above the pre-industrial temperature but there is an “in-built” “thermal inertia” capacity due to existing GHG pollution of

the atmosphere for a further 0.6 °C increase over and above a baseline current increase of about 0.3 °C per decade and positive feedback elements (e.g. the albedo flip and GHG gas release from thawing tundra) may give a further 0.3 °C. Thus it can be argued that even if we stop GHG pollution NOW we have an inbuilt capacity ALREADY to achieve a 2 °C increase in global temperature over the pre-industrial in the coming decades.

Part 2 of “Climate Code Red” is entitled “Target Practice” and discusses what temperature and GHG pollution targets are realistic or safe. Their essential and important conclusion is that “we suggest the goal is a climate safe for all people and all species over “all generations”. It is quite clear from massive species extinctions so far and to major damage to forests, soil, fisheries and other ecosystems (e.g. the complete loss of Arctic summer ice in several years’ time) that at 385 ppm atmospheric CO₂ we have ALREADY passed a “safe point” and that a combination of GHG pollution cessation and “Hansen cooling” is required to return us to a safe and sustainable state.

Part 3 of Climate Code Red is entitled “facing up to the challenge” and deals with what has to be done in practice and how urgent action can be achieved. What has to be achieved is urgent cessation of GHG pollution through a rapid shift to already available renewable technologies plus mechanisms for reducing the existing CO₂ in the atmosphere (re-forestation, putting biomass-derived biochar back in the soil and further mechanisms for global cooling e.g. SO₂ aerosols if need be as suggested by Dr Hansen).

Politically such rapid implementation requires global Declaration of a Climate State of Emergency and a successful analogy given is the extraordinary civilian-to-military turnaround of the US economy in World War 2 after Pearl Harbor.

The book concludes with the following assessment: “Many of us – in business and at work, in climate action groups, in NGOs and in political parties – know in our hearts that on climate the world is going backwards very rapidly and the sorts of solutions that currently dominate national and global forums are simply too little, too late because of the continuing pre-occupation with “politics as usual” and “business as usual”. But sometimes we dare to imagine that there could be a really rapid transition, a great national and international mobilisation, to a safe-climate, post-carbon sustainable way of living. We now need to “think the unthinkable”, because the sustainability emergency is not so much a radical idea as now simply a necessary mode of action.”

I would urge you to read “Climate Code Red”, suggest this book to your associates and join with other citizens in demanding a national and global Declaration of a Climate State of Emergency and rapid implementation of a “negative CO₂ emissions policy” involving rapid installation of renewable energy sources, cessation of fossil fuel burning and reduction of atmospheric CO₂ back to a safe and sustainable level.

The latest scientific findings have dramatically superseded the 2007 IPCC Report warnings of severe problems in the developing world already and dire global consequences in future decades. The time frame has been dramatically reduced. Thus the top US climate scientist Dr James Hansen says that the “tipping point” for the melting of Arctic ice has already been reached at the current 385 ppm atmospheric CO₂ and it is apparent that the present atmospheric CO₂ concentration is sufficient to completely remove summer-time Arctic sea ice (some scientists say this may be completely gone by as early as 2013, a mere 5 years away). However most alarming is the potential instability of large ice sheets, especially those of West Antarctica and Greenland.

According to Dr Hansen, in calling for an immediate cessation of coal power: “If disintegration of these ice sheets passes their tipping points, dynamical collapse could proceed out of our control. If it melts completely, West Antarctica alone contains enough water to cause about 20 feet (6 meters) of sea-level rise. There are also tipping points in life systems. Today, as global temperature increases at a rate of about 0.2 degrees Celsius (0.36 degrees Fahrenheit) per decade, isotherms (a line of average temperature) are moving poleward at a rate of about 50-60 kilometers (35 miles) per decade. In response, some species are moving.” (see “: <http://www.thebulletin.org/columns/james-hansen/20080124.html>).

This expert declaration of a Climate Emergency and Sustainability Emergency means that the December 2007 Bali-wrecking Australian, US and Canadian position of “no 2020 targets” was a gross insult to Humanity. However the harsh reality is that even the strongest Bali CO2 emission reduction targets (80% by 2050) have been superseded.

According to top US climate scientist Dr James Hansen we need “**negative CO2 emissions**” **NOW** to reduce the earth’s atmospheric CO2 from a current very dangerous 385 ppm to a sustainable level of about 300-350 ppm,. According to a recent BBC report: “Dr Hansen stressed that the point of no return had not been reached - that irreversible change had not taken place. He said that to get the Arctic ice to recover would require a reduction in CO2 concentrations down to about 300 or 350 ppmv. He believed this was possible, and called for greater energy efficiency and corrective pricing of carbon to allow cleaner technologies to compete and take over from fossil fuels.”

(see: <http://news.bbc.co.uk/2/hi/science/nature/7143567.stm>).

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