

Degrees of Climate Crisis

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The climate crisis requires urgent and massive changes to all aspects of the world's political, social and economic direction. These changes are needed to avert a crisis that will undoubtedly affect the lives of most and the survival of many. The failure of governments to implement the required changes is causing, and will continue to cause, massive dislocations in humanity's health, wealth and safety. The Doomsday Clock is currently set at 100 seconds to midnight, and yet we dither. This crisis will affect Australia severely, and despite numerous opportunities to act, and even to benefit economically, governments have repeatedly failed to act in the nation's long-term security. Short-term economics and the promise of endless consumerism, it seems, have always held sway over long-term planning.

KEY WORDS: Climate change, climate crisis, super wicked problem, political failure.

The worst part about being lied to is knowing that you weren't worth the truth. *Jean-Paul Sartre*

Introduction

Fifty years ago, science writer Gordon Rattray Taylor's *The Doomsday Book* piqued public interest when it highlighted a plethora of critical environmental problems including probable global warming caused by the 'greenhouse effect' (Taylor 1970). This forecast a major crisis for humanity, although there was little anticipation of how soon it would occur.

Subsequent decades brought increasing awareness of the proximity of the threat from climate change. Global governance structures such as the Intergovernmental Panel on Climate Change (IPCC) and the UN Framework Convention on Climate Change have identified six anthropogenic greenhouse gases.¹ This paper will focus on carbon dioxide, nitrous oxide and methane as critical to this threat. Since the 1990s and high-profile presentations, such as Al Gore's *An Inconvenient Truth* in 2006, one would have to be 'challenged' in all senses to deny the problem existed. And yet, there are many in public life who continue to do so. Business, led by insurance companies, wants to address the problem as profitability is making them take notice. Nevertheless, the bald facts are that it is now too late to stop the planet from spiralling into increasing climatic mayhem. This paper takes no pleasure in stating the situation but is written as a lament to what we could have done to stop it.

The Science and its Denial

Taylor cites the British scientist John Tyndall who, in 1861, linked the levels of atmospheric carbon dioxide (CO₂) to global temperatures (Taylor 1970: 57). In 1938, another British scientist, GS Callender, tied this concept to the insulating qualities of a greenhouse, also suggesting that temperature increases already noted were the result of increasing levels of CO₂ emissions (Taylor 1970: 57).

The 'greenhouse effect' posited the theory that increasing levels of CO₂ in the upper atmosphere would prevent terrestrially-generated heat, whatever its source, from escaping.

Hence, the earth's enclosed atmosphere, much like a greenhouse in sunlight, would increase in temperature. The arguments appeared logical and convincing so it could have been expected that they would have been widely considered.

Detractors of the theory cited the needless pessimism of its proponents. In that era, the greenhouse effect was considered to be highly improbable and its mention, like sex, religion and politics, was best avoided in polite company. We were told to look on the bright side – 'We'll find a way of fixing it – if it even exists' was a frequent response. Nevertheless, in subsequent decades, this noted belief in science and technology did not extend to the results of climate research and modelling. The

'greenhouse' is now heating to the point which threatens our very existence. Yet some 150 years after Tyndall, former Australian Prime Minister, Tony Abbott, found this concept hard to accept asserting carbon dioxide is not a problem:

Carbon dioxide is not pollution, carbon dioxide is a naturally occurring trace gas. It's not pollution, we need it for life (Coorey 2018).

In 2017, Abbott stated that global heating was 'probably doing good' and reasserted his 2009 statement that the 'so-called settled science of climate change' was 'absolute crap' (Mathiesen 2017). He also stated that CO₂ is 'weightless', which not only mocks the billions of tonnes of annual emissions, but also the centuries-old pedigree of the periodic table. Abbott's appalling ignorance of basic science and other denialist rhetoric have peppered the air waves and the brains of humanity for too long. They have caused intended doubts in many while delaying if not stopping policy implementation for climate adaption and mitigation. Not all of the political right are climate denialists. It is of note that former UK Prime Minister Margaret Thatcher, a chemist by training, promoted the findings of scientists regarding global heating, whereas her then Chancellor of the Exchequer, Nigel Lawson, who was an economist, has remained resolutely opposed.

It is perhaps worth summarising the science regarding CO₂ as well as other greenhouse gas (GHG) emissions and their effect on the atmosphere. The planet on which we live and its surrounding atmosphere is a finite and closed system. The law of 'conservation of mass' states that in a closed system, the mass of the system remains constant. In other words, matter can be neither created nor destroyed. Since the beginning of the industrial era, humanity has been increasingly releasing carbon dioxide stored in forests and underground that are exacerbating the current crisis. The trend of this increase in CO₂ is indisputable, passing 400ppm² in 2016 and shows no sign of changing. One of two global monitoring stations collecting the atmosphere's purest air for analysis, Cape Grim, is 50km from the author's house in NW Tasmania. Mauna Loa, Hawaii houses the other monitoring facility, which charts annual CO₂ levels (Fig 1).

The last time the atmosphere contained CO₂ above 400 ppm was 3.6 million years ago in the Pliocene era, when Arctic temperatures were around 16°C (Ogburn 2013) and sea levels were 25m higher (Dwyer and Chandler 2008). Levels of methane and nitrous oxide continue to trend upwards as well. Assessing the level of risk posed by this massive change in atmospheric gases has been the subject of much debate.

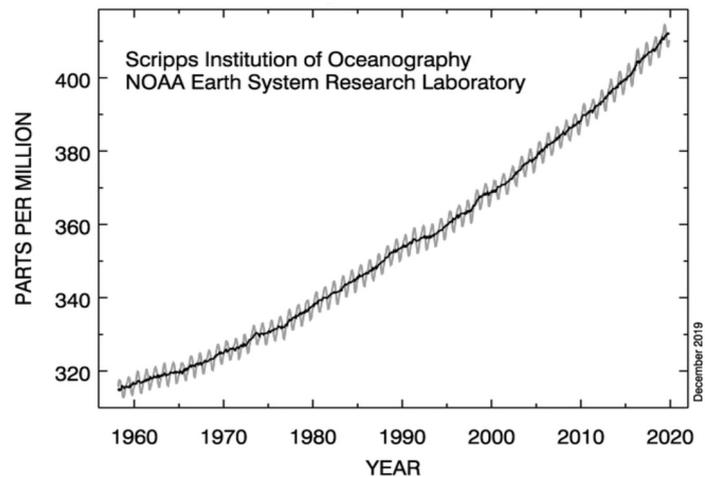


Fig 1: CO₂ ppm levels at sea level showing seasonal variation (NOAA 2019).

Global temperatures correlate with increasing levels of atmospheric CO₂ (Fig. 2) although they lag, possibly owing to the global ocean heat absorption discussed later.

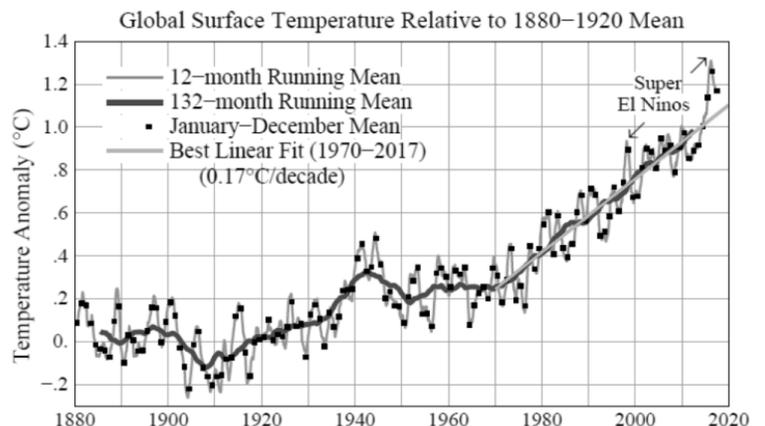


Fig. 2: Global surface temperatures relative to 1880-1920 based on GISTEMP data, which employs GHCN.v3 for meteorological stations, NOAA ERSST.v5 for sea surface temperature, and Antarctic research station data (NASA 2020).

An April 2019 paper in Atmospheric Chemistry and Physics (Wilkerson et al. 2019) revealed compelling data that emissions of the third most potent greenhouse gas, nitrous oxide, had increased by a factor of twelve. Nitrous oxide (N₂O) traps heat nearly 300 times more effectively than CO₂. This gas derives from the permafrost of the Arctic tundra in Russia, Finland, Canada and Alaska. These permafrost releases are occurring much earlier than expected, suggesting the beginning of a feedback loop that also includes releases of another potent GHG, methane(CH₄). Furthermore, the albedo effect may be exacerbating the feedback loop by reducing solar reflectivity as more snow melts. The Arctic is on the global heating frontline with air temperature anomalies nearly 5°C above 1979 levels while sea ice is rapidly decreasing.

The 2019 summer temperature anomalies in Alaska have exceeded all previous levels (ACCAP 2020). June 2019

was 6.2°C above normal and confirms the anomalous Arctic heating trend from numerous data sets (Fig. 3).

Alaska Statewide Temperature Index: Nov 27, 2018 to May 25, 2019

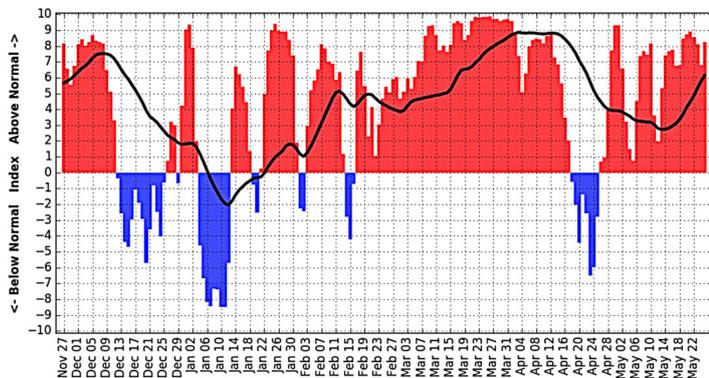


Fig. 3: Alaska temperature anomalies November 2018-May 2019.

Furthermore, the Arctic trend is not exceptional. In the middle latitudes of the northern hemisphere, average temperature increases of 100 times faster than that observed in the geologic record have been recorded (Caldeira 2015).

It should also be noted how closely the global NASA data sets coincide with those from other agencies in the US, the UK and Japan (Fig. 4).

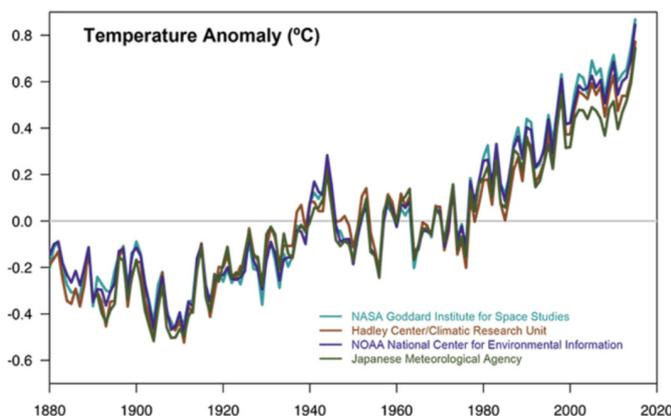


Fig. 4: Graph showing rapid heating over recent decades (NASA 2020).

However, the herd of elephants in the climate waiting room is the progression of ocean temperature anomalies. The world's oceans act as a thermostat for the land. The total ocean area of 360 million square kilometres and volume of 1.3 billion cubic kilometres (NOAA 2020) dwarfs the earth's land area of 149 million square kilometres in every dimension. This mass of water absorbs, circulates and stores not only heat from the air, but also from the land. While the daily land temperature may vary by 15°C or more, the adjacent coastal sea temperature will vary by merely a degree or two. The farther you test the water, the smaller the variation.

Anyone who lives near the coast (as do much of the world's population) will attest to the moderating aspects of oceans on the coastal climate – the sea breeze is but one aspect.

The data and arguments are lengthy, complicated and deserve a separate paper, however, the chart below reveals the steady progression of the amount of energy entering the oceans over 60 years. Without the normal variations seen in land-based data, the chart shows the relentless nature of the increase in global sea water temperatures. The 1.5×10^{22} Joule increase in the upper 2000m of the world's oceans in 2017 also yielded a 1.7mm global sea level rise (Fig. 5) (Cheng and Zhu 2018). This rise occurred not only due to ice-melt but also from thermal expansion. Using a nuclear analogy, Al Gore comments that the amount of heat energy currently trapped *daily* by the atmosphere is equivalent to 500,000 Hiroshima bombs (Seccombe 2019). With ninety percent of earth's residual heat being absorbed by oceans (IAP 2020) the upward progression of the bar chart becomes less surprising.

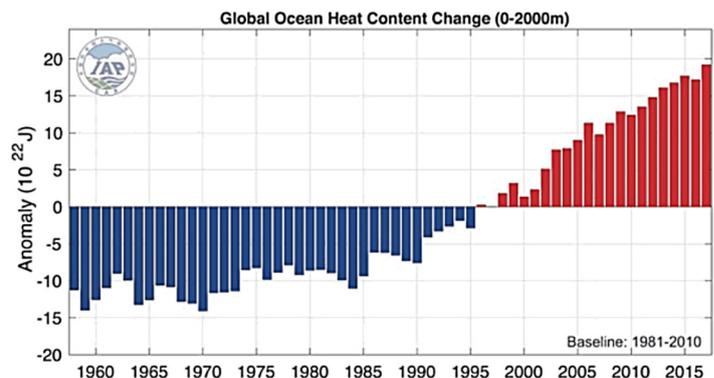


Fig. 5: Global Ocean Heat Content Change (IAP 2020).

Risk and Policy Failure

As an indicator of risk and a suggested definitive response as to the seriousness of the climate crisis, insurance actuaries provide an independent and pragmatic assessment. Actuaries' main concern is to assess risk categories in order to ensure a company's continuing solvency. If the actuaries' risk profile for a category is in error, a company stands to lose either billions in lost business or billions in excess claims. As in any business, rejecting a potential or existing customer would only occur when the risk is so great as to make it more likely than not to cause a loss to the company. The ability or cost to insure against climate-related events, such as flood or bushfire, therefore, becomes an indicator of any change in that risk category, much in the same way as a 20-year-old with speeding convictions driving a Ferrari should expect a hefty premium and excess, and may even be uninsurable. The Actuaries Climate Index (Fig.6) plots the combination of five climate variables (high temperature events, low temperature events, heavy rainfall, drought and sea level) since 1960 for North America. This shows

a consistent increase in extreme weather events with several years post-2015 revealing highest recorded values (ACI 2020). Following this trend, it is axiomatic that insurance premiums will increase proportionally to the increased risk, until eventually the likelihood of excessive claims outweighs the chance of profit.

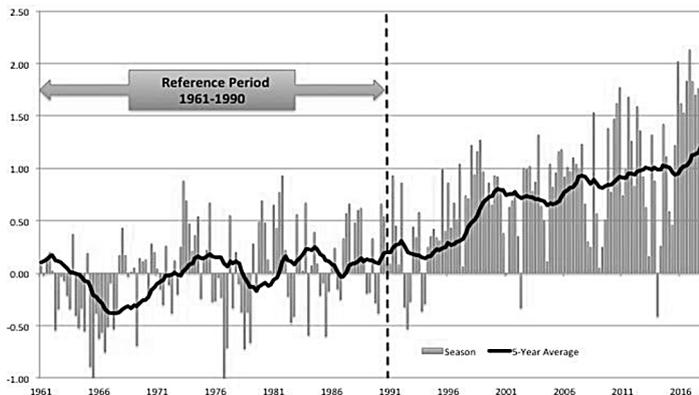


Fig. 6: Actuaries Climate Index – USA and Canada.

Although until recently no home in Australia has been uninsurable, several residents in Blackmans Bay, Tasmania were refused insurance in May 2019 owing to risk from flooding (ABC 2019). It is to be expected that more homes in Australia will become uninsurable as the climate crisis progresses. This refusal to insure will start in higher risk zones such as beachfront, riverside and proximity to fire-prone bush, then progress to what have been hitherto seen as lower risk areas.

Business also provides an indicator of risk assessment. In July 2019, the chief executive of BHP, the world's largest mining corporation, announced its acceptance of the IPCC assessment on a heating climate – that it was anthropogenic and the 'physical impacts are unavoidable'. As well as undertaking to reduce their emissions, BHP also proposed acceptance of the much-derided (at least in Australia) 'price on carbon' (BHP 2018). The BHP board have a fiduciary duty to shareholders to minimise their business's risk of exposure to the climate crisis. Once the climate crisis is acknowledged, this duty becomes incumbent on all public companies.

The climate crisis provides a problem that modernity is not well-suited to deal with. Extending Rittel and Webber's 1973 paper in which 'wicked' problems are difficult to define and inherently unsolvable³, Levin et al. (2012) term the climate crisis a 'super wicked' problem. Further to the ten criteria listed, Levin et al. extend these to include 'time is running out; those who cause the problem also seek to provide a solution; the central authority needed to address it is weak or non-existent; and, partly as a result, policy responses discount the future irrationally'. The climate crisis threatens our very existence, and not only have we failed to act, we have by our policy failure ensured

that our life-sustaining climate deteriorates even further. Furthermore, there is no sign of stabilisation in GHG emissions, let alone a decrease, although the COVID-19 epidemic may provide a temporary slowing of their growth resulting from the impending global economic recession.

So how has this come about? How have the multitude of human strands failed so spectacularly to face the one issue that ensures human existence is increasingly threatened? One can suggest the disinformation campaigns by business and their lobbyists, the ideologues of climate crisis denialism and their specious arguments, the ignoring of reports and scientific data, but all these can be sheeted home to a failure of politics and the political class. Subject to 'a politics of the aggrieved', political parties quickly become demonised if they make any group worse off (Aly 2019). If they try to tax or deny the financial privileges of one group, whether it is mining companies or retirees with over-generous benefits, governments are certain to meet not only howls of protest but a vigorous and well-financed campaign to drop the proposal. This has occurred in both State and Federal Australian elections for the last two decades. Hence, taking necessary policy measures that impinge on one group for the benefit of the majority becomes problematic. In this policy process, the environment becomes an early casualty as 'jobs' are a current concern, while climate considerations can be postponed to some distant date, if not indefinitely.

Acting against threats to the nation and its people is a primary duty of political leaders. However, the tendency is to act on threats that enhance their political capital. Terrorism is a case when governmental over-reaction and new legislation unite, encouraging voters to re-elect the legislators who say they keep us safe. The fact that the terrorist, as has been demonstrated, is frequently not on the security agencies' watch list is ignored. The much-used and abused term of 'security' is invoked when short-term threats of bomb and bullet are considered, but not for the security issue that threatens every member of humanity – the massive issue of a heating planet. The failure of governments worldwide to take meaningful steps currently and in preceding decades is of epic proportions. Their duty was to listen to the informed and their own experts, and to ignore the voices acting against the common interest. Waleed Aly argues that the national interest acts against any state disadvantaging itself through pre-emptive climate action and that democracy is therefore incapable of solving the problem (Aly 2019). Whatever the reasoning, ongoing arguments regarding responsibility for the cause of global heating and any required action have resulted in delays that ensure a worsening of a crisis in which every day counts. Instead, short-term electoral cycle interests were, and continue to be, prioritised. For this, the political class must be held

accountable. The issue most affecting voters' security is the one they have failed to act on.

The political class now in power have had a unique opportunity to act, having had access to as much, if not more education and information than previous generations. Politicians have access to the best science, which has been available since the 1980s, and a responsibility to develop mitigation and adaptation measures that will serve in the national interest as well as fulfilling our global commitments. There was no shortage of expert advice with numerous bodies and reports all giving similar predictions with even the Pentagon, not known as an environmentally sensitive organisation, giving warnings. In 2003, the US Defense Department commissioned a report that voiced concern regarding the security implications from global heating for US bases and their operation (Schwartz and Randall 2003). Further, the US Navy is equally engaged in addressing the dangers facing its operations with the focus on the strategic consequences of a melting Arctic (Rosenberg 2012). Yet the conclusions stemming from these reports were not acted on, while the upward trend in GHG concentrations not only increased but accelerated.

The fact that governments have done nowhere near enough not only indicts them but also reflects the system in which they operate. Making policy that extends further than their period of power has always been problematic and in the current era increasingly so. Highly partisan environments along with the perceived electoral benefits of budgetary allocations prevent governments from taking the steps needed against specific threats. Projecting policy ten or more years into the future is considered beyond a risk worth taking when an hour in politics can be a long time.

Nevertheless, it should also be noted that governments have become increasingly out of phase with voters' concerns. Public opinion on matters such as same sex marriage, euthanasia and climate breakdown have not been reflected by government policy directions. This time lag and even outright opposition reflects a turgid bureaucracy that is resistant to change and innovation with voters often well ahead of government policy and the conservative approach of ministers.

Australia's record on renewable energy is a case study in government inaction and procrastination. With the uptake of renewable energy led by households, the Federal Government has done little to promote it. Cost, convenience and common sense have been trumped by a gold-plated electricity infrastructure, coal-induced emissions and political hot air. If Australian Governments had promoted and supported renewable energy instead

of mining industry subsidies, they could have encouraged the transition from a fossil fuel-based to a 'green' economy decades previously. Instead, in 2020, there are still many members of the Federal parliament lobbying to build coal-fired power stations. The fact is that, not only will these power station assets become stranded in the near future, but the mines from which they derive their fuel will become redundant and non-productive eyesores.

Consequence and the Economics

The next question to pose is, if we have reached the widely-predicted tipping point, is there any point in attempting to change the way in which we conduct our lives? This existential moment is now the reality we have to face. Despite humanity's many faults and foibles, we remain an optimistic species. The countdown to the ticking bomb ends with the hero saving the day in the last few seconds. A drug is developed that cures the plague; the pilot pulls out of the dive. Alas, these movie endings do not replicate reality. With few exceptions, humanity rarely steps back from the abyss – as Jared Diamond has explained, civilisations perish from drought, greed or overuse of limited resources. The planet on which we live has now reached the point where even our upper atmosphere is conspiring to act against our survival. Could this gaseous entity be made to change direction? Under a war footing in which the global economy was turned 180 degrees towards reduction and absorption of anthropogenic GHG emissions, there is a possibility, but I suggest that this is unlikely to happen – the greed and wilful ignorance is too deeply embedded.

Proposing economic growth in this finite and deteriorating system is an assured way of accelerating the crisis. A policy that proposes a reduction in growth let alone a deflationary contraction is seen as economic heresy that would bring ruin to any state and is political suicide. However, a radical change of the current economic model was precisely what was required decades ago. Nevertheless, in our current predicament, any change appears highly improbable and would, anyway, be far too late to prevent the vicissitudes of the worsening climate emergency.

A global temperature increase of 2°C is already 'baked in' by 2100 with an additional increase of between ½-2°C predicted by various climate models. The minimum predicted increase will be sufficient to change the planet as we know it with increasing droughts, fires and floods. It is argued that while we need to decarbonise our economies yesterday in order to limit global temperature increases beyond 2100, government parsimony regarding climate action would be better directed to adapting to the effects. The relocation of vulnerable communities would be a massive and budget-challenging program that

cannot be avoided. Such relocations have already begun in Alaska and Greenland. Equally, relocation of farming communities in drought areas would involve massive costs as well as creating concerns for food production and budgetary bottom lines. However, the alternative 'do-nothing' approach would be even more costly in both dollar and human terms. We have to start now to mitigate the future fall-out from the climate crisis.

Joseph Stiglitz, former chief economist of the World Bank and Nobel Prize winner could not be more emphatic: 'The climate emergency is our third world war. Our lives and civilization as we know it are at stake, just as they were in the second world war' (Stiglitz 2019). However, the climate crisis differs from a war in that, like the wicked problem criteria mentioned previously, it has no end. Whatever happens, future generations will be obliged to battle climatic deterioration on a permanent basis. Stiglitz also states that a 'Green New Deal' would in fact be beneficial to the economy (Stiglitz 2019). With the amount of property and infrastructure reconstruction required in addition to transitioning to a renewable energy system along with a decarbonising of manufacturing, there would be massive boost to the global economy. When it is considered that this economic stimulus would also assist in humanity's long-term survival, the argument becomes indisputable.

As in the case of convincing a heroin addict that a drug-free life is possible, part of the problem is envisaging that a fossil fuel-free economy is not only viable but preferable. While the withdrawal period might be lengthy, eliminating the worst atmospheric pollutants such as coal-burning must be prioritised. In 2019, the UK managed two weeks without any coal-powered electricity generation – the first time this had occurred since 1880 (BBC 2019). Although nuclear generation was part of the supply, the change to renewables is unambiguous. On one day, one quarter of the total energy supplied was solar in a country not known for its sunny disposition. In the end, the market may be the decision-maker as renewables become increasingly cheaper per watt/hour to generate.

The seeming inability of Australian Governments and many voters to want, or even envisage, a carbon-free future, along with the benefits this would create, has been a major obstacle to progress. Given the rate of technological change and the use of batteries in buses and taxis, there seems no reason why all modes of land transport cannot be powered without fossil fuels.

Failure

The failure to act has attracted comment from all levels of science and academia. Professor Hilary Bambrick, the head of school of public health and social work at

Queensland University of Technology asserted, 'It's not a stretch to think that, unless we urgently and meaningfully reduce our emissions, we are heading into the endgame. We actually have a choice right here and now as to whether that's where we want to go' (Bellamy 2019). Professor Bambrick does not state what the endgame might entail but others are not so moderate in their comments.

David Wallace-Wells's *The Uninhabitable Earth* is unambiguous from the opening line, 'It is worse, much worse, than you think' and does not resile from giving every potential outcome (Wallace-Wells 2019: 3). Although needlessly over-written in places, for the data alone are alarming enough, he covers every aspect of a warmer future including the psychological effects on a heated population. The book emphasises the enormity of the task if heating is to be limited and eventually stopped, although this is a coda to the main thrust of disastrous inevitability.

Climate scientist, Ken Caldeira of the Carnegie Institute for Science calculated in 2003 that to avoid catastrophic climate breakdown⁴ the world would need to build the clean equivalent of a 1500 megawatts (MW) power station every single day between 2000 and 2050 (Caldeira et al 2003) – the equivalent of over 18,000 nuclear power stations in total (see Fig 7). Even to maintain equilibrium at a potentially catastrophic 2°C, 900 MW/day of renewable energy would need to enter the system.⁵ Despite valiant efforts by renewable power generators, failing a powerful new technology in the next few years such as nuclear fusion (that has been 30 years away for the last 50 years) it is hard to see how we could even achieve 10% of this figure. The unstated premise is that 'nuclear' is a clean technology which is in itself disputed. However, to achieve this target, it would be hard if not impossible to achieve without nuclear generation.

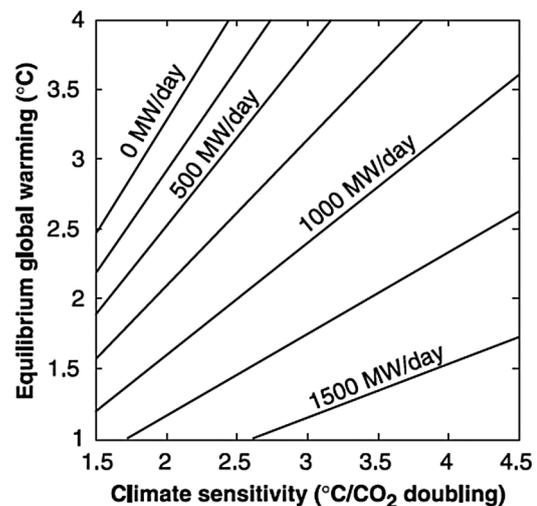


Fig. 7: The chart plots the amount of clean energy required to be built every day from 2000-2050 to maintain an equilibrium at various temperature levels (Caldeira 2003).

Professor Penny D. Sackett of the Australian National University's Climate Change Institute, and former chief scientist for Australia comments:

Humanity as we have known it is not doing us any favours in this climate emergency. Individuals the world over could define and demand a new future, embracing our common humanity and rejecting proposals that place private, isolated profit over the common, unified good (Bellamy 2019).

This comment invites the adoption of a global political and economic philosophy diametrically opposed to what is currently practised. The sheer scale of the crisis and the major changes required to address it make the problem virtually insoluble, and every day that the crisis escalates, so does the means of addressing it.

Self-admitted catastrophist, Kelly McKinney, a former New York City emergency management official and Chief Disaster Officer at the American Red Cross, judges that populations are woefully unprepared both physically and mentally for impending natural disasters. As a generally optimistic species, humanity prefers not to consider situations in which normal life with running water, food and emergency services becomes unavailable (Riminton 2019). For a single event in a specific location, this unpreparedness can have serious consequences. Governments already face enormous challenges coping with emergency events. For a long-term, world-wide and slowly increasing level of natural disasters, both in frequency and severity, physical preparedness becomes exponentially harder. McKinney also emphasises the lack of national, let alone global, planning for such events. Currently, local planners are mainly responsible for front-line responders whereas disasters frequently have nation-wide consequences. Food supply, high casualty levels and populations migrating to safer areas are all of national consequence. Furthermore, the psychological ramifications of life-changing disasters require consideration. In July 2019 the independent UK-based Committee on Climate Change stated that the UK's climate crisis preparations, along with the cutting of essential programs, are totally inadequate and leave the population at risk (CCC 2020). The chair of the committee, Lord Deben, commented:

The whole thing is run by the government like a Dad's Army. We can't possibly go on with this ramshackle system; it doesn't begin to face the issues. It is a real threat to the population.

You need to make real changes to protect people here and now from the climate change that we know is happening. We are not even preparing for 2°C

[rise in global temperature] let alone the position we might be in if the world does not [drive emissions down to zero] (Carrington 2019).

After hurricane Katrina in 2005, sixty-two percent of evacuees met the criteria for acute stress disorder with the likelihood that nearly fifty percent would suffer PTSD up to two years afterwards (Mills et al. 2007). Widespread mental illness in national populations after a disaster is currently outside any consideration by governments and their budgets. Suffice it to say that profound mental disturbance could become normal. It is to be expected that the fabric of social cohesion will probably break down, leading to irrational behaviour and panic. The normal responses of fight, flight or freeze will most likely lead to a preponderance of the latter with those affected unable to conduct their optimal survival plan. In these circumstances, society would be unable to function in a life-sustaining manner.

This probable societal breakdown emphasises the absolute requirement for governments and their agencies to consider every aspect of preparation to confront the upcoming emergency. As well as population relocation, shelters, food stocks and power supply provision, an army of health workers will be needed to deal with the plethora of mental and physical injuries in addition to the disease ramifications of a heating planet. That no government has mobilised to this degree and has not stated any provision for dealing with this future apart from normal emergency management is concerning. Currently, emergency events such as floods and bushfires are difficult to control with systems and responders usually taxed to the limit. For example, in the January 2016 remote area bushfires started by lightning, the Tasmanian Fire Service was not only underfunded and unprepared for such an event, but were unable to extinguish numerous blaze fronts for over a month. Eventually, interstate firefighters in small vehicles were ferried to Tasmania to deal with the crisis. Despite this warning, bushfires in the 2018-2019 season were widespread and long-lasting with similar problems encountered. It might be considered that the budget for a future increase in bushfire frequency, intensity and size would be increased to reflect this likely reoccurrence, however, to date, the Tasmanian Government shows no such inclination.

This failure will perhaps become the new normal in that governments accept that they will be unable to protect their territory and their populations, instead relying on interstate, or even international aid. This is a dubious premise as all territories will be affected by their own emergencies and therefore increasingly unwilling, or even unable, to sacrifice their own protection. 'Borrowing' equipment such as airborne water bombers will become

a redundant policy. This has enormous consequences for State budgets as they will require large amounts of expensive plant on hand for when an emergency occurs along with in-depth training for personnel who will be needed to operate them. The services needed to support these personnel will need concomitant expansion. But even then, emergency management will never be able to cater for all situations and a triage process will inevitably be required. Some bushfires will be left to burn. Owing to the sheer weight of numbers, some casualties may receive little or no help. This leads to the conclusion that government emergency management will consequently be obliged to admit that they are no longer able to help increasing parts of the territories for which they hold responsibility and probably retreat to large population centres. If a prime function of government is to care for the health and safety of their populations this admission would cast into doubt their *raison d'être*.

Conclusion

This paper discusses from a pragmatic and practical level the likely effects on populations and their integrity in a heating world. For too long, the bitter pill has been coated in multiple layers of saccharin. Most politicians and many academics have been unwilling to state clearly what are the outcomes in a heating world. When I asked the Radio National broadcaster, Phillip Adams, about the optimism of his climate expert interviewees, he replied in an email headed 'Too Late' that, 'Backstage, Tim F, George M and most others entitled to an opinion are, like you and I, despairing ...' (pers. comm. 27/11/2013). Scientists are very cautious, perhaps too cautious, in giving their analyses of the climate modelling pumped out by their supercomputers. They risk the opprobrium of their peers and even ridicule by the public for any overstated conclusions along with rejection by governments who want their policies, and the spin they put on them, to dominate the news agenda. This has given us a new age of ignorance in which peer-reviewed scientific research is rejected while social media and amateur websites continually broadcast conspiracy theories. It is time that we at least acknowledge that, without effective and enduring climate action, a majority of humanity's remaining time on this planet will be measured in decades, and not centuries, and that for many of us, leading what we consider a 'normal' life is going to become increasingly unlikely. Currently, we are not even arranging the deck chairs on the *Titanic*, but are merely thinking about cutting the timber to make them.

Coda

In this fast-developing crisis, there is an inevitable time lag between policy and research announcements, and the publication of this journal. In July 2019, a study by 19 climate scientists of the Pages 2K Consortium increased

the level of certainty to 99% for the anthropogenic cause of global heating. Furthermore, the paper stated that the current era is producing the fastest and most extensive increase in temperature in the last 2000 years (Neukom et al. 2019).

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End Notes

1. Carbon dioxide, methane, nitrous oxide and the fluorinated gases of perfluorocarbons, hydrofluorocarbons and sulphur hexafluoride. 410.27 ppm in November 2019.

2. The categorisation of wicked problems derived from social policy planning include ten criteria:

1. There is no definitive formulation of a wicked problem.
2. Wicked problems have no stopping rule.
3. Solutions to wicked problems are not true-or-false, but better or worse.
4. There is no immediate and no ultimate test of a solution to a wicked problem.
5. Every solution to a wicked problem is a "one-shot operation"; because there is no opportunity to learn by trial and error, every attempt counts significantly.
6. Wicked problems do not have an enumerable (or an exhaustively describable) set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan.
7. Every wicked problem is essentially unique.
8. Every wicked problem can be considered to be a symptom of another problem.
9. The existence of a discrepancy representing a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem's resolution.
10. The social planner has no right to be wrong (i.e. planners are liable for the consequences of the actions they generate).

3. Rittel, H and Webber, M, 1973, 'Dilemmas in a General Theory of

Planning', *Policy Sciences*, 4: 155-169.

4. To stabilise heating at 1.5°C.

5. It should be noted that the paper gives a ± 500 MW/day margin of error on this figure allowing a large variation.

Author

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The Shell of Entitlement

Emerging from the shell of entitlement
broken open, at last,

by voices too loud and raw to ignore,

my tree of certainties gleaming bare and wet,
all its leaves adrift at its base,

the world entire is remade

and I am astonished at the extent
of the damage and pain all around me

no more than at the inherited blindness

with which for so long I engaged the world,
so many truths hidden from my view.

DAVID ADÈS,
BEECROFT, NSW