Submission No 5

INQUIRY INTO CLIMATE CHANGE (NET ZERO FUTURE) BILL 2023

Name: Mr Geoffrey Miell

Date Received: 18 October 2023

Thank you for the opportunity for me to make a submission concerning the **Inquiry into Climate Change (Net Zero Future) Bill 2023** conducted by the NSW Parliament Legislative Council Portfolio Committee No. 7 – Planning and Environment.

The long title for the *Climate Change (Net Zero Future) Bill 2023* is:[1]

> An Act to establish guiding principles for action to address climate change; to set 2030 and 2050 targets for the reduction in net greenhouse gas emissions in New South Wales; to set an objective for New South Wales to be more resilient to a changing climate; and to establish the Net Zero Commission to monitor, review and report on progress towards the 2030 and 2050 targets and the objective and to exercise other related functions.

The 16 Oct 2023 Media Release[2] by the NSW Parliament Legislative Council Portfolio Committee No. 7 – Planning and Environment includes:

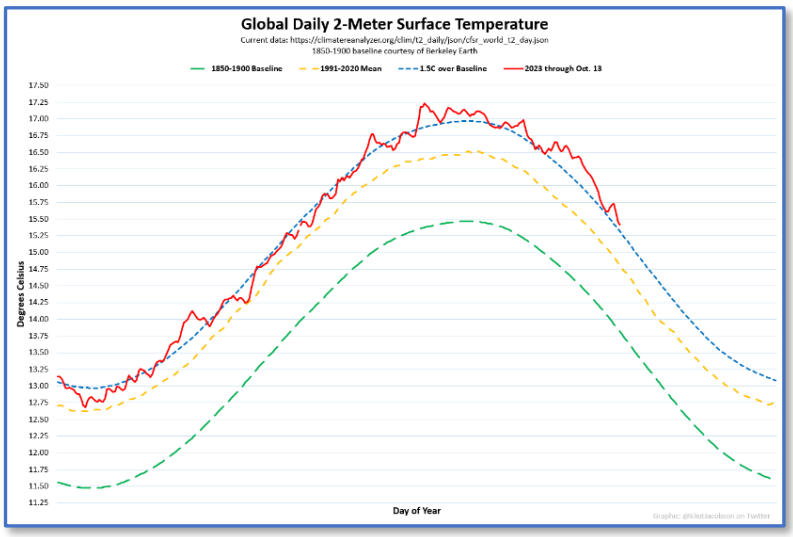
> A new parliamentary inquiry has been established to examine the Climate Change (Net Zero Future) Bill 2023.
>
> This bill will set targets for reductions in greenhouse gas emissions in New South Wales, with a goal of net zero emissions by 2050. The bill will also establish the Net Zero Commission which will independently monitor and review progress in New South Wales towards greenhouse gas emission targets. Other key objects of the bill include establishing guiding principles for action on climate change, and for New South Wales to be more resilient to a changing climate.

My submission is in response to the 2030 and 2050 targets, and how they are entirely inadequate contributions to prevent worst-case outcomes for the people of NSW, and for all of humanity in general, based on credible scientific evidence/data.

The Climate Crisis has already arrived

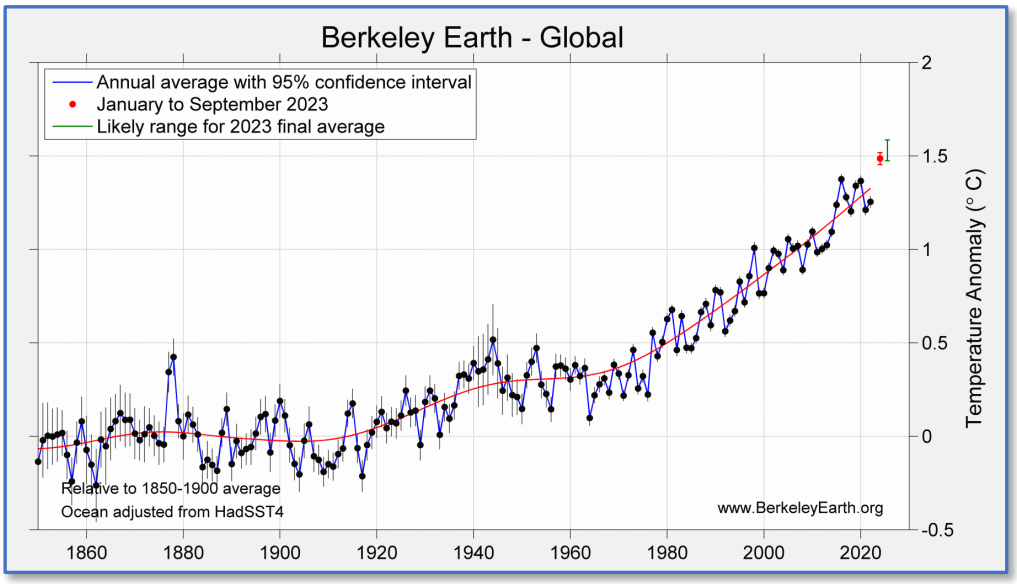
Climate change has arrived and it is going to get worse, and how much worse depends on the decisions that we/humanity make this decade especially, this year and today.

The Earth System is already exceeding the +1.5 °C global mean warming threshold (relative to the 1850–1900 global mean temperature baseline) on multiple occasions on daily-, weekly-, and recently on monthly-average bases – see the graph opposite showing global daily 2-metre surface temperatures for year-2023 to Oct 13.[3]



[1] https://www.parliament.nsw.gov.au/bills/Pages/bill-details.aspx?pk=18510, accessed 17 Oct 2023
[2] https://www.parliament.nsw.gov.au/lcdocs/other/18555/Media%20release%20-%20Net%20Zero%20Bill.pdf
[3] https://twitter.com/EliotJacobson/status/1713197223679574361

Per Berkeley Earth (BE), the global mean temperature in Sep 2023 was 1.82 ± 0.09 °C (3.28 ± 0.17 °F) above the 1850–1900 average, which is frequently used as a benchmark for the preindustrial period. This is the 14th time in the BE analysis that any individual month has reached at least 1.5 °C (2.7 °F) over the pre-industrial benchmark. This also previously occurred in March, July, and August of 2023. BE now consider there to be a 90% chance that year-2023 will have an annual-average temperature anomaly more than 1.5 °C/2.7 °F above the 1850–1900 mean – see the graph below.[4]

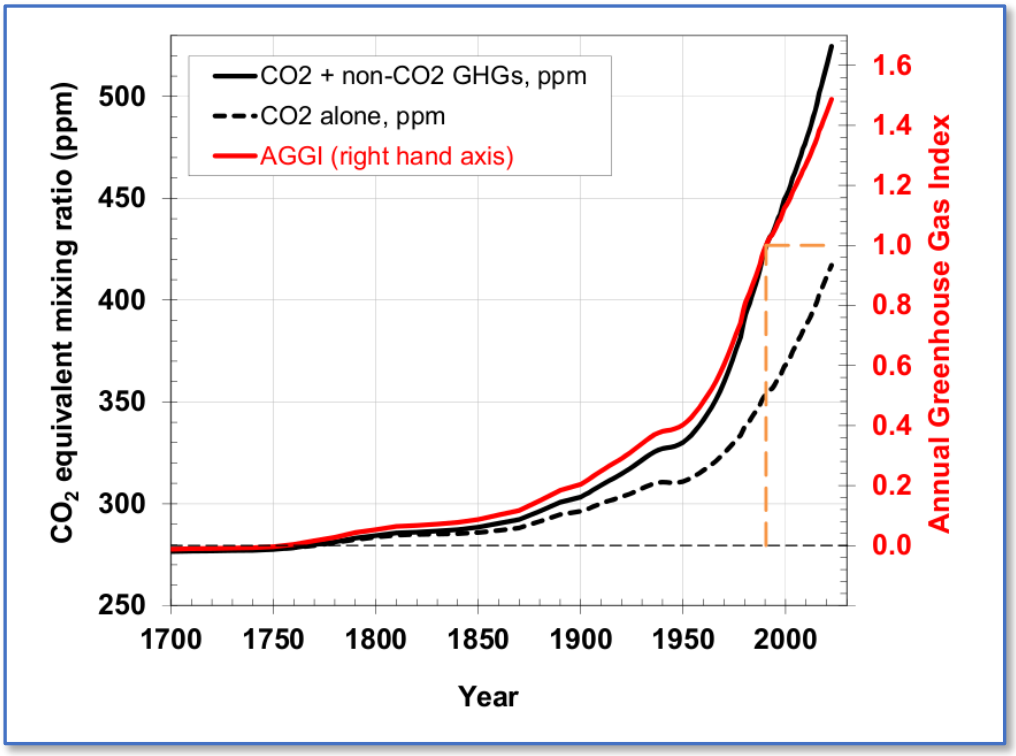


A few months, or a single year, warmer than +1.5 °C, does not automatically mean that the IPCC goal to limit global warming to no more than the longer-term/multi-year +1.5 °C global mean threshold above the pre-industrial age baseline has been exceeded. However, breaching +1.5 °C this year would indicate how close the Earth System is to breaching the longer-term/multi-year global mean threshold.

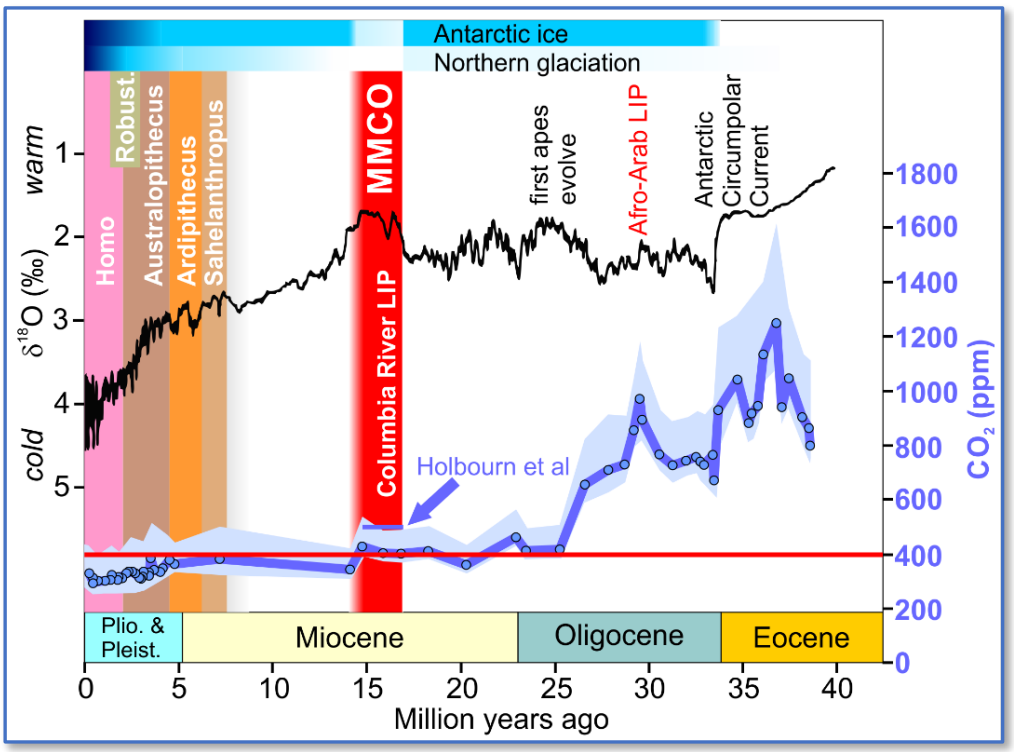
Global mean atmospheric CO_2 concentration levels in year-2022 were at 417 ppm, but that's only part of the story. From NOAA, re their Annual Greenhouse Gas Index (AGGI):[5]

> In a nutshell:
>
> - The AGGI in 2022 was 1.49, which means that we've turned up the warming influence from greenhouse gases by 49% since 1990.
> - It took ~240 years for the AGGI to go from 0 to 1, i.e., to reach 100%, and 32 years for it to increase by another 49%.
> - In terms of CO_2 equivalents, the atmosphere in 2022 contained 523 ppm, of which 417 is CO_2 alone. The rest comes from other gases.
> - CO_2 is by far the largest contributor to the AGGI in terms of both amount and rate of increase.
> - Note: The IPCC suggests that a constant concentration of CO_2 alone at 550 ppm would lead to an average increase in Earth's temperature of ~3°C (5.4°F).

[4] https://berkeleyearth.org/september-2023-temperature-update/
[5] https://gml.noaa.gov/aggi/, accessed 17 Oct 2023

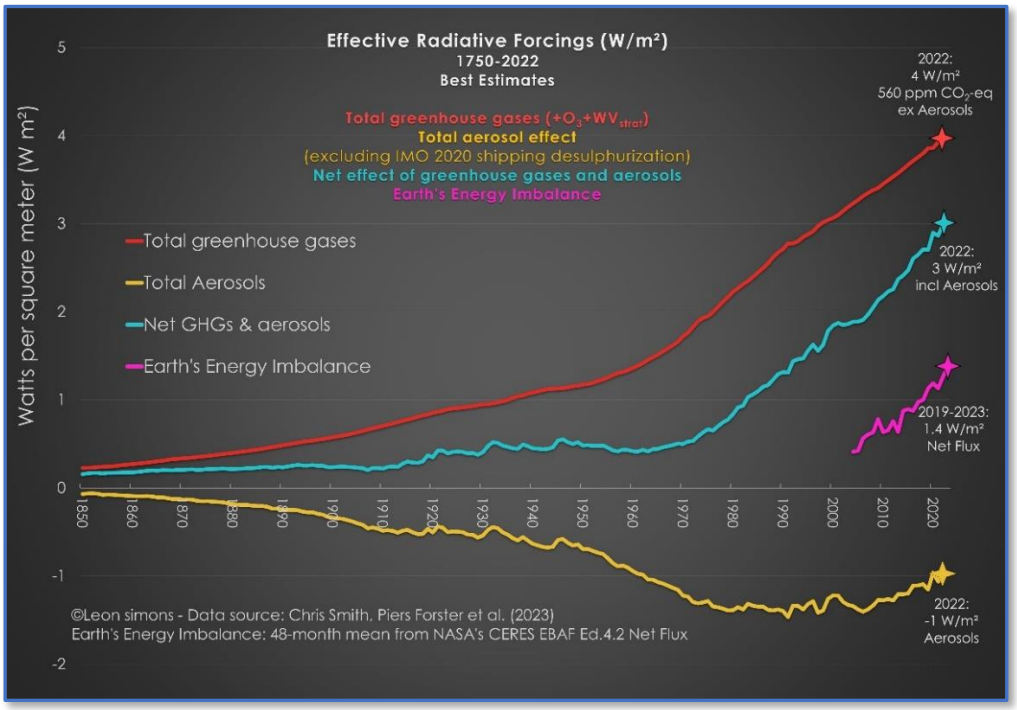


The Earth System has well and truly crossed the 400-ppm line in modern atmospheric CO_2 concentrations, and the 500-ppm line for CO_2-equivalent. Per paleo-historical data, the Earth System is now entering climate territory not encountered for many **millions of years**, heading towards mid-Miocene-like climate conditions.[6]



[6] https://skepticalscience.com/print.php?n=2845

The higher the Earth Energy Imbalance (EEI), the more (net) heat is absorbed by planet Earth and the faster the Earth System warms.[7]



Where on Earth are We Heading: Pliocene or Miocene?

On 17 Oct 2023, keynote speaker Professor H. J. Schellnhuber CBE, then Director Emeritus, Potsdam Institute for Climate Impact Research, Member, Pontifical Academy of Sciences, and Member, German Advisory Council on Global Change, delivered his Aurelio Peccei Lecture: *Climate, Complexity, Conversion*, which can be viewed in the *YouTube* video titled **Keynote Debate Can the Climate Emergency Action Plan lead to Collective Action? (50 Years CoR)**,[8] duration 2:23:08. Professor Schellnhuber said:

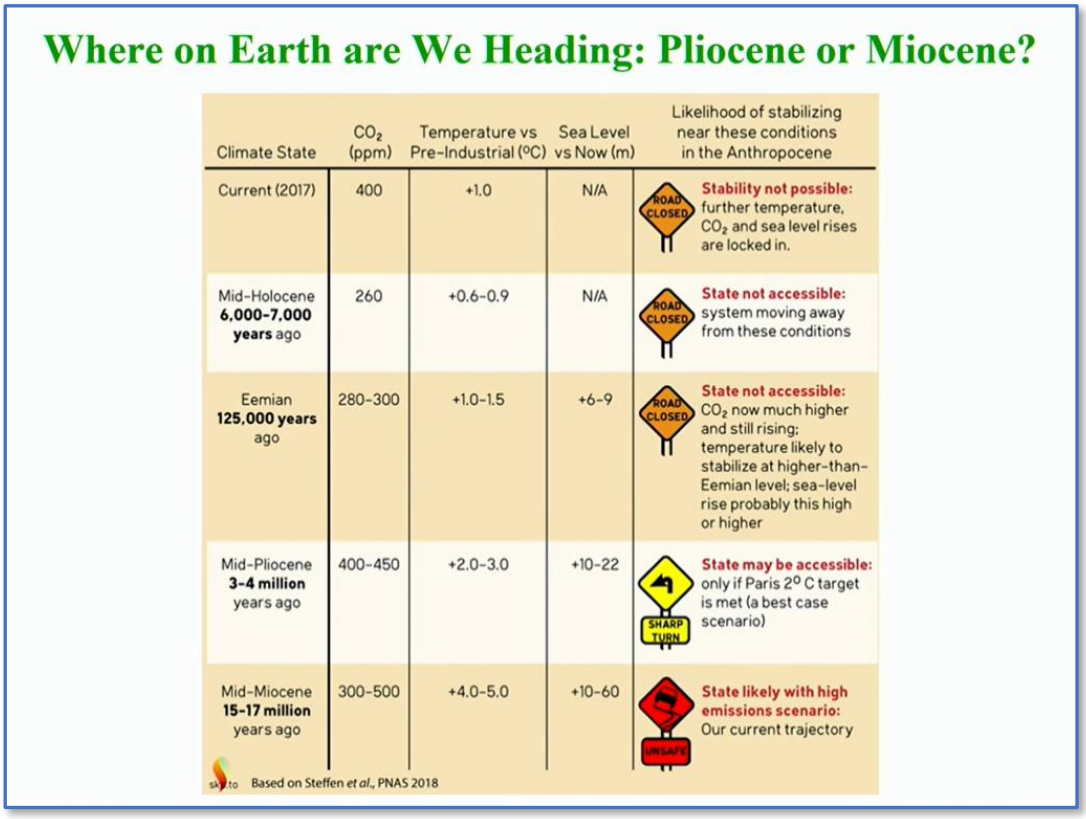
> **0:20:56** ***So, some people have speculated the next ice age will be next week. I can tell you: It's not true! Don't believe that!*** [audience chuckles] ***It will happen… I blow it up… Actually, never again! That's why we are in the Anthropocene. Remember, if the blue line is crossing or cutting the black line, from the left, there will be another glacial inception. Now this is a hundred-thousand years into the future, and if you look where, in fifty-thousand years, there would be another ice age, but only if the CO_2 would not be influenced by human intervention. Actually now, the atmospheric content is, according to the orange line, and you see, the lines are not crossing anymore, but we will add another billion, and hundred-billions of tonnes CO_2, where rather we will have to use the brown line, so there will be no ice age anymore. The human impact is so powerful already – that's why we talk about the Anthropocene – that we have suppressed the Quaternary planetary dynamics already.***
>
> **0:22:15** ***This is a fact… but let's see what will happen in the future beyond that. So, just for you to remember, the Holocene… Holocene mode of operation, the last twelve-***

[7] https://twitter.com/LeonSimons8/status/1711664194829873513
[8] https://www.youtube.com/watch?v=QK2XLeGmHtE

thousand years where human civilisation was created, will not come back, not for the next millions of years. It's just… done! What will happen instead? And we have in this paper, Steffen et. al., which I mentioned in the beginning, we have discussed fourteen feedback loops, actually, ja? You have so-called tipping elements – give you an example: Greenland is melting. That means there will be a huge freshwater impulse into the Atlantic Ocean. That will suppress the Thermohaline Circulation, so-called Gulf Stream. If the Gulf Stream will be shut down, this has a major impact on the Southern Atlantic, in particular, on the algae production there, and so on. So that's one of the possible cascades. Looked at fourteen of these cascades.

0:23:23 ***And it turns out that there are two alternatives left, namely… either… if we… tried to park the Earth's system, and it's now very important… In spite of the dimming of the light, this is a moment where you should not sleep. So if your neighbour has fallen asleep now, just give him a sort of…*** [indicating elbowing motion] ***Ja? Try to be cruel. Because this is the very moment which you have to take home.***

0:23:55 ***So, when we try, according to the Paris Agreement, to park the planet safely between one-point-five and two degrees – that seems to be the right option – but will the planet just stay put there?***



0:24:12 [Where on Earth are We Heading: Pliocene or Miocene? slide displayed] ***If you just push it, according to some atmospheric calculation, by two degrees or one-point-five degrees, or will it just spin out of control and just… go down a slippery slope? If you look back in Earth's history, there are two alternatives. So, what I'm talking about is of course based on computer simulations and everything, but in particular, it's based on empirical evidence because we can reconstruct the fate of the planet and the climate system for millions and millions of years. So if you look back, there are two… er… alternatives, actually… Let me see…*** *[switch slides, then back]* ***Yes, we go back to that…***

0:24:51 [Where on Earth are We Heading: Pliocene or Miocene? slide displayed] ***You either end up with say, 500 ppm – we have now 410 and we are on the course of towards***

> ***500 ppm – you either end up in the so-called Mid-Pliocene, that was three million years ago, where the Earth in fact was two or three degrees warmer, and sea level was at least ten metres higher. But under the same condition, more or less, you could also go back to the Mid-Miocene, fifteen million years ago, where the Earth was five degrees warmer and sea level was sixty metres higher. So with the same boundary condition, you could either have a situation where human civilisation could simply not exist, or something – forget the Holocene – if we would go into the Pliocene, we might… we might somehow adapt to it, we might manage it, just so! But this is what the paper said. The jury is still out on that. And what is the knack here, what is the real secret here, ja? Its path dependence. If the boundary conditions are the same, but you could end up in two different states, it depends on the path you have taken for this trajectory, ja? And we simply don't know yet, whether the current path will lead us fifteen million years back, or just three million years back. So, look up the paper. It is… the summary of what… thousands of scientists have put together. It's a meta study. But… it is posing the most important questions of all, actually: Do we still have a chance to preserve civilisation on Earth? And I think this is well within the context of a Peccei Lecture.***

With the help of Makiko Sato and Isabelle Sangha, Dr James Hansen has added a section on the Cenozoic era (past 66 million years) to the preprint paper titled *Global Warming in the Pipeline*,[9] originally submitted in Dec 2022 to the broad reaching interdisciplinary journal *Oxford Open Climate Change* for peer review. The revised pdf format version 3 preprint paper (dated 23 May 2023) is now available for download at arXiv,[10] the website used by physicists for preprints.

On 13 Oct 2023, James Hansen, Makiko Sato, Reto Ruedy, and Leon Simons published a communication titled **El Nino Fizzles. Planet Earth Sizzles. Why?**[11] It began with:

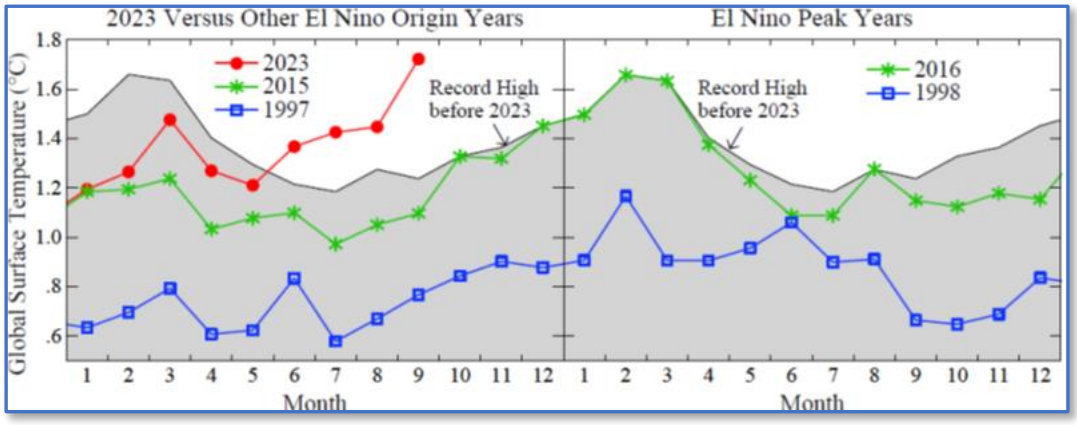


Fig. 1. Global temperature (relative to 1880-1920 mean for each month) for the 1997-98, 2015-16 and 2023-24 El Ninos. The impact of El Nino on global temperature usually peaks early in the year (El Nino Peak Year) following the year in which the El Nino originated.

Abstract. September 2023 smashed the prior global temperature record. Hand-wringing about the magnitude of the temperature jump in September is not inappropriate, but it is more important to investigate the role of aerosol climate forcing – which we chose to leave unmeasured – in global climate change. Global temperature during the current El Nino

[9] http://www.columbia.edu/~jeh1/mailings/2023/PipelineDraft.19May2023.pdf
[10] https://arxiv.org/abs/2212.04474
[11] https://mailchi.mp/caa/el-nino-fizzles-planet-earth-sizzles-why

> provides a potential indirect assessment of change of the aerosol forcing. Global temperature in the current El Nino, to date, implies a strong acceleration of global warming for which the most likely explanation is a decrease of human-made aerosols as a result of reductions in China and from ship emissions. The current El Nino will probably be weaker than the 1997-98 and 2015-16 El Ninos, making current warming even more significant. The current near-maximum solar irradiance adds a small amount to the major "forcing" mechanisms (GHGs, aerosols, and El Nino), but with no long-term effect. More important, the long dormant Southern Hemisphere polar amplification is probably coming into play.

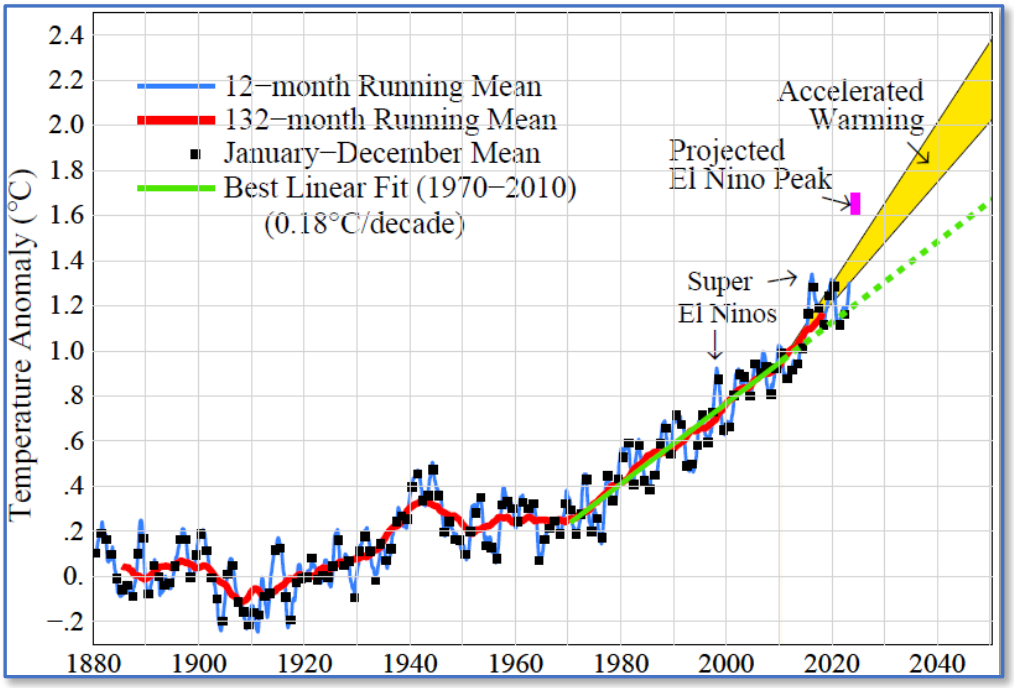


Fig. 2. Global temperature relative to 1880-1920 based on the GISS analysis.

Compelling scientific evidence/data I see suggests overshooting the longer-term/multi-year +1.5 °C global mean warming threshold is already 'baked-in', and likely to occur as early as within the 2020s, regardless of any deep human-induced greenhouse gas (GHG) emission cuts in the interim.

I would also suggest overshooting the longer-term/multi-year +2.0 °C global mean warming threshold is probably 'baked-in' too, and on our current GHG emissions trajectory likely to arrive by mid-century. Andrew Y. Glikson stated:[12]

> During the Anthropocene greenhouse gas forcing has risen by more than 2.0 W/m^2, equivalent to more than >2 °C above pre-industrial temperatures, which constitutes an abrupt event over a period not much longer than a lifetime.

Multi-metre sea level rise (SLR) is now unstoppable

On 22 August 2022, at the Cryosphere 2022 Symposium at the Harpa Conference Centre Reykjavik, Iceland, glaciologist Professor Jason Box said from time interval **0:15:27**:[13]

[12] https://www.researchgate.net/publication/345345361_The_Age_of_Consequences
[13] https://www.youtube.com/watch?v=iE6QIDJIcUQ

> **"*And at this level of CO_2, this rough approximation suggests that we've committed already to more than 20 metres of sea level rise. So, obviously it would help to remove a hell-of-a-lot of CO_2 from the atmosphere, and I don't hear that conversation very much, because we're still adding 35 gigatonnes per year.*"**

SLR certainly will not stop even if we/humanity stops GHG emissions ASAP.

The US National Oceanic and Atmospheric Administration (NOAA) published in Feb 2022 a technical report titled *Global and Regional Sea Level Rise Scenarios for the United States: Updated Mean Projections and Extreme Water Level Probabilities Along U.S. Coastlines*.[14] Table 2.3 in the report shows:

Table 2.3: Global mean sea level and contiguous United States scenarios, in meters, relative to a 2000 baseline.

	Global Mean Sea Level				Contiguous United States		
	2050	2100	2150		2050	2100	2150
Low	0.15	0.3	0.4	Low	0.31	0.6	0.8
Intermediate-Low	0.20	0.5	0.8	Intermediate-Low	0.36	0.7	1.2
Intermediate	0.28	1.0	1.9	Intermediate	0.40	1.2	2.2
Intermediate-High	0.37	1.5	2.7	Intermediate-High	0.46	1.7	2.8
High	0.43	2.0	3.7	High	0.52	2.2	3.9

In the *YouTube* video titled **John Englander, Expert on Sea Level Rise, Talks with US Harbors About Changing Coastal Waters**,[15] duration 0:41:42, oceanographer John Englander said:

> **0:14:48:** ***But we're now looking at feet of sea level rise this century. The latest NOAA projection in a paper that came out since we last talked, it was in February, looks at 10-to-12 inches of sea level rise as a global average by mid-century. But then in the second half of century, between 2-to-7 feet, in other words they're noting the acceleration which is happening decade-by-decade now. The rate of ice melting on land, and therefore the rate of global sea level rise, has tripled in thirty years. It's gone from an average of a millimetre-and-a-half to about 5 millimetres*** [per year] ***in thirty years. Hard to notice, it's fractions of an inch, but it's the acceleration that should get our attention, like compounding interest.***
>
> **0:18:39:** ***And then two is, knowing the planet is already 1.1 degrees Celsius, right around 2 degrees Fahrenheit warmer, that heat's in the ocean, that's not going anywhere quick, even if we stop burning fossil fuels, the heat that's in the ocean will continue to melt the ice for centuries, and that's unavoidable now, because of the tremendous energy stored in the ocean. 93% of the excess energy that we're trapping in the atmosphere goes into the sea, and that acts like a hot rock fuel, or a storage battery for heat, and as I say, the truth is, even if we can solve the energy problem, and be more resilient, that the heat that's in the ocean is going to cause the ice sheets (above me there), Greenland and Antarctica, the big white spots on the world, um, the ice on land, it's going to cause them to melt faster and faster, and raise sea level and change the shoreline. That's just fact.***
>
> **0:20:57:** ***The good news is, we have time to adapt. The bad news is, this is going to be really a challenge. It's going to change harbours, your, your passion, and ah, the work for US Harbors. It's going to change harbours; it's going to change every coastline***

[14] https://oceanservice.noaa.gov/hazards/sealevelrise/sealevelrise-tech-report.html
[15] https://www.youtube.com/watch?v=hXskGqw4Uxo

from big cities like Jakarta and New York, to rural fishing villages in Thailand and ah, Africa.

SAFE flood design guidelines

Oceanographer John Englander produced a "9 Box Matrix"[16] that provides a simple, conservative guidance construct with three rows for different SLR risk levels and three columns for different time horizons, as shown in the table below:

Risk Sensitivity	30 Years (2050)	50 Years (2070)	100 Years (2120)
Low	30 cm (1 ft)	60 cm (2 ft)	2 m (7 ft)
Medium	60 cm (2 ft)	1.3 m (4 ft)	4 m (13 ft)
High	1 m (3 ft)	2 m (7 ft)	6 m (20 ft)

Important Explanatory Notes:

1. These estimates are for design and engineering guidance to allow for future sea level given the potential abrupt contributions from Antarctica and Greenland glaciers and are subject to change.
2. Because of the uncertainty for the future rate of collapse of the "mega glaciers" in the two major ice sheets and because these are intended to be safe estimates, they may be rounded upwards. The Metric and U.S. estimates are each done as "round numbers" and therefore are not exact equivalencies.
3. These figures are based on the latest data, with proprietary interpretation by knowledgeable experts.
4. These are global average values. In addition to these factors, locations should be evaluated for local land subsidence or uplift.
5. These factors for quasi permanent sea level rise *are in addition* to estimates for the usual short duration flood events from coastal storm surge, heavy rainfall, downhill runoff, and extreme tides.
6. For calculation of drainage and water clearance heights, allowance should be made for the combination of higher base sea level plus, the extremes of rainfall and storms experienced in recent years and associated with the warming oceans – now at one degree Celsius, and predicted to be anywhere from two to four times higher this century, depending on the success to limit greenhouse gases.

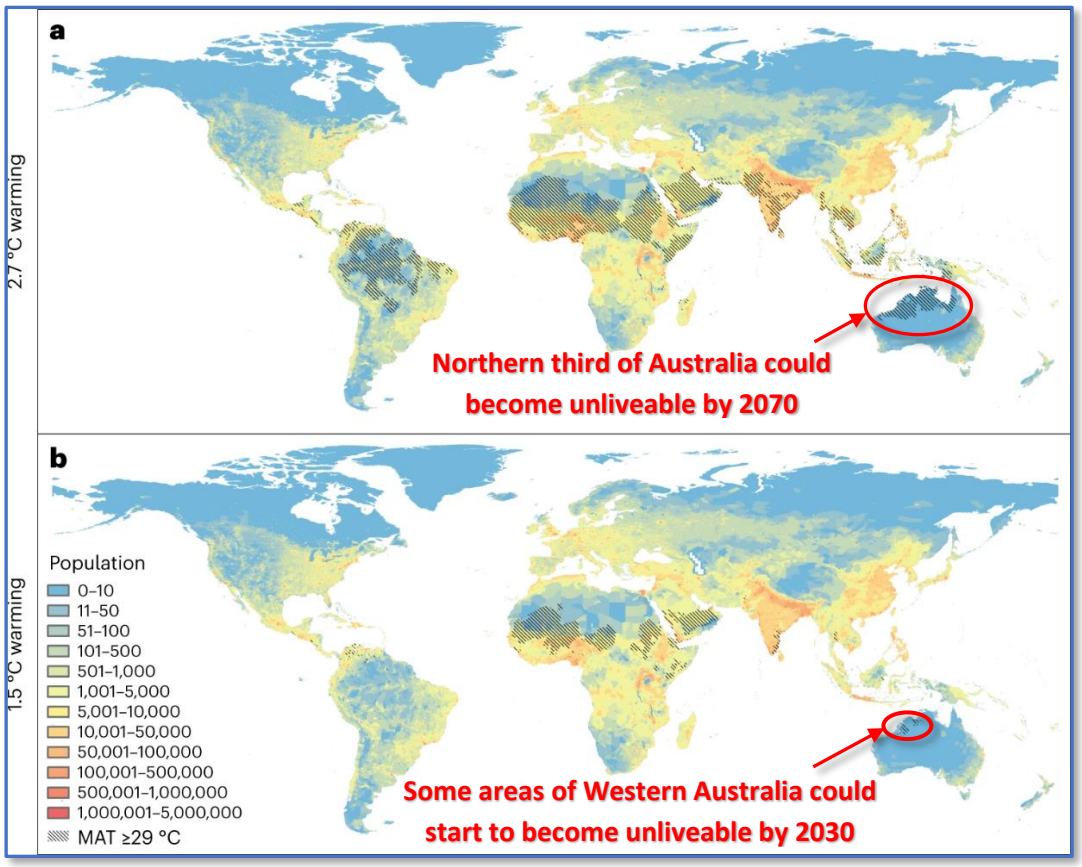
On 12 Nov 2019, the UK Institution of Mechanical Engineers published their report *Rising Seas: The Engineering Challenge*.[17] Their report has adopted the oceanographer John Englander's 9-Box Matrix (see Table 3) as a design tool for guidance for planning for future flooding from rising seas, in addition to whatever current flooding a location may be experiencing.

I recommend NSW should adopt a similar policy to mitigate for projected future flooding.

[16] https://risingseasinstitute.org/englander9boxmatrix/
[17] https://www.imeche.org/policy-and-press/reports/detail/rising-seas-the-engineering-challenge

Quantifying the human cost of global warming

Nature Sustainability published a paper by Timothy Lenton *et. al.* on 22 May 2023, titled **Quantifying the human cost of global warming**.[18] It included Fig. 4: Regions and population densities exposed to unprecedented heat at different levels of global warming. See the tagged figure below. Fig. 4a shows large regions of the world expected to be exposed to unprecedented heat (mean annual temperature, or MAT ≥29 °C) under a +2.7 °C global mean warming scenario (including substantial parts of Australia). Fig. 4b shows regions of the world expected to be exposed to unprecedented heat (MAT ≥29 °C) under a +1.5 °C global mean warming scenario.



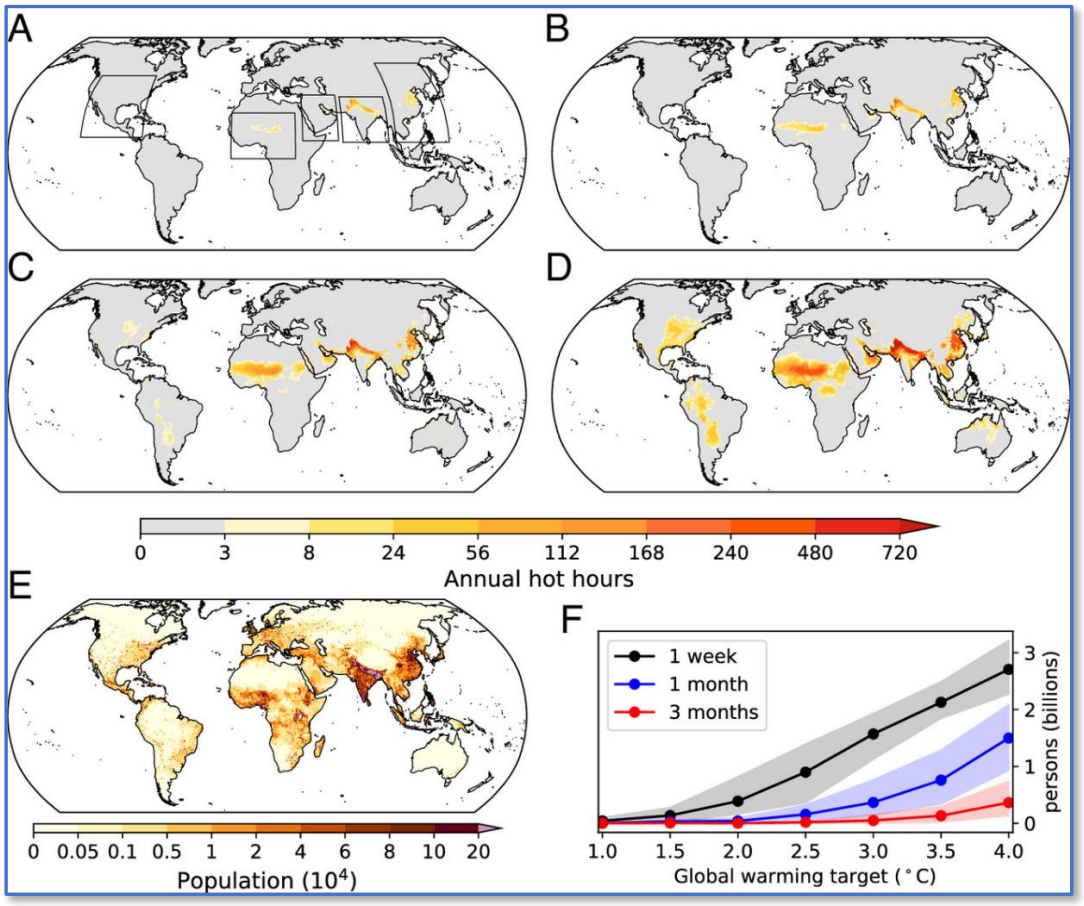
It appears from the map that the region between Port Hedland and Broome extending inland, and around Kununurra in Western Australia, could start to become increasingly unliveable at and above the +1.5 °C global mean warming threshold, and progressively enlarge as the global mean surface temperature continues to rise.

Professor Stefan Rahmstorf tweeted on May 25 a gif animation showing areas of the globe (in purple) that would be considered no longer habitable (MAT ≥ 29 °C).[19]

When it gets too hot, the data shows increasing mortality and pregnancy problems, decreasing labour productivity, the ability to think and learn, and poor crop yields, so that many people try to move away from these regions.

[18] https://www.nature.com/articles/s41893-023-01132-6
[19] https://twitter.com/rahmstorf/status/1661450321766371329

The *Proceedings of the National Academy of Sciences* (*PNAS*) published a paper on 9 Oct 2023 titled **Greatly enhanced risk to humans as a consequence of empirically determined lower moist heat stress tolerance**, by Daniel J. Vecellio, Qinqin Kong, W. Larry Kenney and Matthew Huber.[20] Figure 1 shows annual hot-hours under (A) 1.5, (B) 2, (C) 3, and (D) 4 °C of warming relative to preindustrial level, (E) population projection in 2050 following the Shared Socioeconomic Pathway 2, and (F) population subject to accumulated duration of 1 week to 3 months of uncompensable heat stress annually under 1–4 °C of global warming (the shaded area corresponds to the 10th to 90th percentiles of CMIP6 model spread).



The *PNAS* paper includes:

> A wet-bulb temperature (T_w) of 35 °C has been proposed as a theoretical upper limit on human abilities to biologically thermoregulate. But, recent—empirical—research using human subjects found a significantly lower maximum T_w at which thermoregulation is possible even with minimal metabolic activity. Projecting future exposure to this empirical critical environmental limit has not been done. Here, using this more accurate threshold and the latest coupled climate model results, we quantify exposure to dangerous, potentially lethal heat for future climates at various global warming levels. We find that humanity is more vulnerable to moist heat stress than previously proposed because of these lower thermal limits. Still, limiting warming to under 2 °C nearly eliminates exposure and risk of widespread uncompensable moist heatwaves as a sharp rise in exposure occurs at 3 °C of warming.

[20] https://doi.org/10.1073/pnas.2305427120

What is required to avoid worst-case outcomes?

The proposed goal of "Net-zero by 2050" is now far, FAR TOO LATE. It means essentially that the Earth System will inevitably overshoot the longer-term/multi-year +2.0 °C global mean warming threshold, likely by or before 2050 and 'bake-in' much higher temperatures. That would be catastrophic for human civilisation.

The current level of warming of around +1.2 °C is now unacceptably dangerous. **Net-zero is certainly NOT ENOUGH to avoid worst-case outcomes.** We/humanity need NEGATIVE emissions, or atmospheric carbon drawdown, at large-scale, to reduce current atmospheric GHG concentrations back to pre-industrial Holocene levels.

On 21 Jun 2023, published by *Climate Code Red* was an article headlined **Three climate interventions: Reduce, remove, repair**.[21] It included:

> To protect small-island states, the Great Barrier Reef, Antarctica, Greenland, the Amazon — indeed to provide protection for the many places and people we care about — requires returning to a climate similar to the relatively stable Holocene conditions of the last 9000 years and fixed human settlement, during which time carbon dioxide (CO_2) levels did not exceed 280 parts per million (ppm) CO_2. it also requires preventing a cascade of tipping points in the meanwhile.
>
> For example, in 2022 a group of Australian scientists suggested that from a geologic perspective: "a justifiable aim for a future climate is one akin to pre-industrial conditions." Other evidence points to the need to return to pre-industrial levels of 280 ppm, for example in relation to the cryosphere.
>
> If this were the goal, activists and policymakers would be advocating a "three levers" approach to reversing global warming: a strategy to rapidly "reduce, remove and repair". That means:
>
> 1. **Reducing emissions to zero** at emergency speed;
> 2. **Removing carbon by drawdown** to return atmospheric conditions to the Holocene zone; and
> 3. The urgent research to **identify safe interventions that protect and repair vital systems** and, in the shorter term, aim to prevent warming reaching a level that triggers a cascade of calamitous tipping points that are irreversible on human timescales.

Nothing less will do. The Laws of Physics are not negotiable.

I recommend also to include in the *Climate Change Bill 2023* for an immediate and effective ban on all further fossil fuel developments within NSW – allowing further fossil fuel developments, either new or extensions of existing projects to proceed just makes the task of reducing emissions to zero at emergency speed impossible. Why make the existing problem increasingly unworkable?

Giving up is also not an option, unless one wishes to condemn billions of people (likely including loved ones and even oneself, depending on age/life-expectancy) as civilisation heads on a path towards collapse from apathy, ignorance, resignation, and/or denial, with consequent mass sufferings and deaths.

And time is running out before we/humanity are 'locked-in' to civilisation collapse later this century, and the dire consequences for billions of people deriving from that.

[21] https://www.climatecodered.org/2023/06/three-climate-interventions-reduce.html