Submission No 88

INQUIRY INTO CLIMATE CHANGE (NET ZERO FUTURE) BILL 2023

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Submission on

Climate Change (Net Zero Future) Bill 2023

24 October 2023

Submitted via:

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Submitted by:

Richard Weller

Central Coast resident

As a retired structural engineer and long-time member of the Australian Standards Committee: *General Design* Requirements *and Loading on Structures*, I have professional expertise in the setting of design criteria for buildings and structures for the impact of environmental actions such as wind, storm, temperature, flood, hail, snow and earthquake as well as the durability of structures and their life expectancy. I also have expertise in the design of coastal structures for wave, current and erosion attack and storm attack. This has equipped me to develop a very detailed understanding of the impacts of climate change which I have made a personal area of study as well as professional for more than 20 years.

This comment is drawn from my personal expertise in the area of climate.

On review of the Bill, I consider it to be:

> ***Inadequate*** to address the Climate Crisis now threatening the safety and security of New South Wales.

The proposal includes emissions reduction targets for 2030 and 2050 which are inadequate to protect the people of NSW from the impacts of extreme changes in the climate.

It is imperative that Australia prepares for the impacts of Climate Change at all levels and acts urgently to cut emissions.

Importance of Climate Change

It is imperative that Australia prepares for the impacts of Climate Change at all levels and acts urgently to cut emissions and adapt to the anticipated and unexpected impacts.

The background for the seriousness of the climate crisis is set out in the following reports:

- IPCC AR6 2021/22 (WGI and WGII reports issued so far)
- IPCC SR15, Global Warming of 1.5°C (2018)
- IPCC SRCCL, Climate Change and Land (2019)
- IPCC SROCC, Ocean and Cryosphere in a Changing Climate (2019)
- UN Environment Program 2018 Emissions Gap Report
- CSIRO, State of the Climate 2020

(Refer: https://www.ipcc.ch/reports/)

Also of relevance are the following documents:

- Pathway 2022 (an Emissions Reduction Profile for setting of targets)
- NSW Community Plan (2022) (a plan to help the NSW Community respond to the climate crisis)

(Refer: https://climatefuture.org.au/)

The implications of this body of evidence are that climate change represents a clear and present danger to human society. The impacts we have seen so far will be dwarfed by the extremes expected in the next two decades.

The Climate Emergency

WE NOTE in particular, that effective cuts in global emissions have been left so late that it is no longer a case of doing a nation's "fair share". Instead, nations must do all that is in their power to cut emissions rapidly to zero without waiting for other nations to follow suit. Where a country or a state has the ability to cut emissions faster, it must do so immediately, on the basis of emergency action for the sake of the whole of humanity for many future generations. Indeed, action is now required by all of us, as if we were in a state of war. Only governments have the power to act in this manner and it is through Bills such as this one that we must act.

One of the implications of this situation is that the use of offsets that do not permanently and effectively sequester carbon will not help us to protect our home. In fact they will do the opposite – allow for cheating and delay. The physics and chemistry of the climate system will not care if we cheat and delay, the consequences will be dire.

The Bill

We support:

A. There be a Climate Change Bill.
B. The Bill include targets for emissions reduction.
C. An independent and empowered Net Zero Commission be established to advise on progress and on targets, make reports, consider submissions, etc.
D. The aim to increase the preparedness of NSW for the impacts of climate change.

There are some serious oversights in the current proposed Bill that leave it inadequate for the job it is required to fulfil:

1) The Bill does not require the whole of government to take responsibility for reducing emissions and preparing for impacts.
2) The targets of 50% by 2030 and net zero by 2050 are inadequate in the following ways:
    a. The targets are not stringent enough for the state of the climate and the science;
    b. The targets are only 2 points in time over a 30 year period and take no account of the fact that it is the budget of emissions that is critical and not two points on the graph;
    c. There is no allowance for the need to ratchet up action to reduce emissions as time passes – the review mechanism is way too slow (at 5 years) and there is no other mechanism for establishing tighter targets; and
    d. There is no provision for negative emissions following the achievement of the net zero position.
3) The Bill does not include a Duty of Care for the government – that the government must ensure that any decisions made by any part of the government must take account of the potential damage to NSW and its people that may occur from that decision. This Duty of Care to protect future people from the impacts of climate change must be included or there can be no adequate government response to this crisis.
4) The Net Zero Commission does not have explicit power to recommend changes in action, targets or behaviour that are required to achieve the emissions budget and reduction targets.
5) There is no mechanism for responding to an abrupt change in the climate system such as would require emergency powers to respond to the crisis or an urgent review of targets.

Detailed Comment by Clause

Clause 4(b) replace with:

To set a budget and targets for the reduction in net greenhouse gas emissions in NSW by 2027, 2030, 2035, 2040, 2045 and 2050.

[Definition of Budget: that amount of total greenhouse gas emissions over time that meets a certain target temperature.

NOTE: There is a global "budget" that is the total amount of emissions of greenhouse gases that will result in a certain rise in global temperature with a particular probability of success. Exceeding that emissions budget will result in exceeding the target temperature.

Clause 8(2) add a new point after the Clause

(3) The Parliament of NSW in all its functions has a Duty of Care for the health and wellbeing of its people and future generations and action must include consideration of the existential threat of climate change to the people of NSW and future generations.

[This will require the re-numbering of points 8(3) to 8(9) that follow as part of Clause 8.]

NOTE: The Duty of Care must be spelled out for all actions of the parliament. Decisions being made today that allow further emissions to occur will directly threaten the health and wellbeing of the people of NSW and future generations for potentially 1000 years. This threat and future damage extends to the population of the whole of the planet. National boundaries are irrelevant to the climate system.

Clause 8(5) add the word "stable" as follows:

"….clean, healthy, stable and sustainable….".

Clause 8(5) add the following to the end of the sentence:

"and recognize the vulnerability of future generations."

Clause 8(8)(c) add the following to the end of the list:

"(v) educating both adults and children on the basic science of climate change, its impacts and its solutions."

NOTE: One of the most difficult parts of action on climate is that most people still do not fully understand the existential threat presented by the burning of fossil fuels and the climate forcing which results from it. What really counts is the global concentration of greenhouse gases in the atmosphere and the forcing of the climate system that results. All words spoken that ignore this problem simply dig us deeper into the hole of extinction.

Clause 8(8)(e) add the words "medical and emergency services" as follows:

"….energy, water, medical and emergency services, telecommunications and transport,"

Clause 8 add the following:

(10) Work with local government to assist communities to cut emissions and prepare for impacts.

(11) Anticipate the need to increase ambition as time passes and the condition of the climate deteriorates.

NOTE: It cannot be doubted that as the world warms there will be increasing damage to the climate that will require increasing ambition to cut emissions and to adapt to impacts. Further, there will be some bad actors who do not take their fair share of emissions reductions leaving it up to others to take up the burden. There will also likely by surprises such as sudden release of arctic methane or other totally unforeseen effects that cause the need for increased ambition. This is a struggle for survival and we must be prepared for any contingency.

(12) Work with industry to create a just transition of workers in the fossil fuel and related industries that will need to move to different jobs.

NOTE: Capture of government personnel, lobbying and influence through donations must be prevented if we are to have any chance of meeting the required emissions reduction goals (Paris targets).

(13) The Government of NSW shall not consult with the fossil fuel industry. Nor will any political party in NSW take donations from any part of the fossil fuel industry.

Clause 9(1) replace with:

(1) The target reductions for net greenhouse gas emissions in NSW as a percentage cut below the amount emitted in 2005, based on a total budget to net zero of 940 MtCO2e are—

a. By 30 June 2027—48%

b. By 30 June 2030—75%

c. By 30 June 2035—Net Zero

Supporting information

NSW Emissions were approx. 225 MtCO2e in 2005, 183 in 2021. The IPCC and UNEP reduction profiles require global emissions reduction of 50% by 2030 below current levels. These cuts are based on 2019 calculations and are therefore will be too low due to the failure to cut global emissions since then (they have actually increased). We estimate emission in 2024 when this Bill comes into force will be 180.

Clause 9(1) insert additional point 9(2) after 9(1) and renumber subsequent point 9(2) to 9(3):

(2) The target reductions following achievement of net zero greenhouse gas emissions in NSW are—

a. By 30 June 2040— Elimination of all fossil fuel emissions and
b. By 30 June 2040— Negative emissions of -110%
c. By 30 June 2045— Negative emissions of -115%
d. By 30 June 2050— Negative emissions of -118%

(Definition: Negative Emissions – capture of greenhouse gases directly out of the atmosphere or from the ocean with permanent storage that are not used as offsets for any other emissions.)

NOTE: This assumes that all offsets are 100% permanently stored, secure, never to be released and that there is no cheating in the system. Should there continue to be failure to meet the IPCC emissions reduction pathway, these targets may need to be increased. It is possible that should the international situation continue to cause delays and obfuscation, eventually, facilities may need to forcibly shut down or the Paris agreed goals will be out of reach. If this happens, the consequences for humanity and our civilization are dire.

Clause 9(2)(a) replace with the following:

(a) the implementation of the targets set out above,

Clause 9(2)(c) replace with the following:

(c) other matters relating to the targets,

Clause 9(3) delete this Clause.

NOTE: 2050 is way too late. Its all over and done with by then. We have lost it and our little corner of paradise will be unlivable. Interim targets are necessary to ensure the emissions reduction profile can be met. Without interim targets, the allowable emissions budget will be blown within only a few years.

Without a budget and interim targets to aspire to there will be no action or so little that it will make zero difference. So sad, as a reduction profile of targets and aspirations will guide the necessary deeds to get the job done.

Constant re-evaluation of where we are and where we need to be will provide the pathway to actions that will make a real difference instead of turning this into a greenwashing box ticking exercise. 20 years is way too long between assessment of where we are and how bad it is. These need to be guided by the science which is showing us that we are in a really bad place There is still time with constant vigilance to make a huge difference to the livability of our little corner of paradise (and the rest of our planet). Lack of review and implementation of consistent and appropriate actions over this time frame will in both the short term and long term save an enormous amount of money as well as misery and heat-ache. It must be remembered that its not overstating the seriousness of the situation to say that many lives are on the line – health effects, fires, floods, storms, and death are all in our future if enough action is not immediately and consistently applied.

My wise grandmother would always say “A well spent penny saves a pound”.

Clause 10 Expand this Clause

Clause 10 includes no concrete ideas as to the who, what, where, when and why of preparation. Some more detail is necessary due to the serious nature of the expected (and unexpected) impacts of a warming world. The Clause must be expanded to include action by all departments to be part of the preparation effort.

The Net Zero Commission (NZC) will have little ability to convene and coordinate the sections of the government that are needed to face this aspect of the climate challenge. There most probably needs to be a specific body set up to do this job. Advice on impacts might be obtained from the NZC but not any detailed work. There simply are not enough of them to undertake this work.

The NZC should not be tasked with this requirement or it will have no ability to carry out its other duties. This Clause must be expanded to refer the objective on to every government department and every piece of legislation. In particular those involved in planning, construction, local government, health, defense, education, resources, agriculture, etc.

All measures must be taken to immediately prepare for severe environmental impacts on health, the built environment, agriculture, etc. right across the entire breadth of the government.

Clause 12(3) add the following additional point to the list:

"At least one commissioner should have the ability to communicate clearly and present findings and/or recommendations clearly in an oral manner."

Clause 14

Generally, The Commission needs an adequate budget to be able to procure research to support its work where necessary. It would also be an advantage if the Commission had regulatory compliance power to ensure targets are met other than to simply advise.

The Commissioners need to really represent/understand the science and impose a "Duty of Care" on NSW government that the Federal government does not appear to accept. There simply is no higher "Duty of Care" for any government than to provide for a safe future for our children as well as all animal and plant life, now so dependent on humans more than any other time in the modern era.

The Commissioners MUST put public interest ahead of corporate vested interests – the "Independent Planning Commission" showed utter disdain for the evidence of climate, energy, and economic experts (of national and international repute), youth and indigenous groups and directly affected communities in its approval of new and extended coal mines and gas fracking that these groups overwhelmingly opposed.

(1)(c) Again human health and wellbeing must be included. It will be logical to have a medically qualified commissioner, such as Dr. Kim Loo.

(1)(d) Local Government needs to be specifically included in this function.

PART 4 Miscellaneous

Clause 25 Modify to ensure review is undertaken every 2 years and reports tabled within 4 months.

NOTE: The critical nature of this emergency require a high rate of review and amendment.

Final Points

This Bill does nothing to tackle some important aspects of the climate problem. Specifically:

a) The approval of new fossil fuel investments must be prevented or we will fail too meet the Paris goals will become out of reach.
b) Subsidies and other support for fossil fuels must be removed and any funding available from this transferred to renewable energy, increased transmission network and provision of storage. These measures will ensure a timely shutdown of fossil fuel power stations.
c) No new support must be allowed for existing coal or gas facilities, including power stations.
d) All new development (of any scale) shall include limitations based on the projected impacts of climate change, including increased heat, drought, wildfire, flood, erosion, etc. that will flow from the increasingly chaotic climate. This is essential for preparation of the community for impacts.
e) The Offsetting industry must be overhauled so that offsets can be relied on to be permanent and real in the reduction of total emissions. It is the total budget of emissions released that will determine the actual rise in temperature and physics does not care if we cheat. If failure of offsetting already recorded is found all the targets must be reviewed and retightened to account for the lost emissions reductions. A mechanism for this must be part of the 2 year review and tasks for the NZC.

Please consider inclusion of Clauses to cover these issues.

We thank you for your attention and look forward to seeing our recommendations incorporated into the final Bill.

Further Background Information

No amount of action to reduce emissions will be sufficient if it allows any increases in emissions above current rates and fails to cut emissions quickly enough to remain within the budget set for the 1.5C limit. There is no "good enough" for the physics and chemistry of the climate system. We have left action so late that there is only failure to do enough.

We have experienced extreme fire and flood events across NSW, which clearly have been exacerbated by the warming of our climate system. Areas not flooded previously have been inundated with property and lives lost. One example of the increase in severity of flooding is the Lismore floods of 2022. Flood level reached 14.37m, well above the 1 in 500 level of 13.4m (refer 2014 Lismore Floodplain Management Plan, Appendices Figure A). Some have estimated the flood level to have been 1 in 1000 to 1 in 5000 year events.

The Australian climate has warmed by approximately 1.4˚C over the 1850 to 1900 average and is expected to get hotter still. This year we have the added influence of an El Nino that is pushing the global temperature up towards 1.5C. It is likely to breach that barrier either this year or next. Not only must we cut our emissions, but we must also try to adapt to the rapidly changing weather patterns and increasing extremes of weather that we are expecting to experience in this and the next decade.

The latest science and reporting indicates that 1.5C should be regarded as the absolute maximum allowable warming to avoid climate catastrophe (refer Tipping Points in NSW Community Plan (2022). This temperature is the threshold to a number of tipping points in the climate system and is the goal set out in the Paris Agreement and later UNFCCC agreements.

We note that the allowable budget to remain below the 1.5C target will be exceeded within 8 years at current international rates. For the net zero by 2050 target, the NSW Government website states "Overall output of carbon dioxide in the atmosphere will continue to rise under both scenarios, contributing to greater concentrations of carbon dioxide and amplifying the effects of climate change." (https://www.soe.epa.nsw.gov.au/all-themes/climate-and-air/net-zero-plan-stage-1-2020-2030) This is not sufficient and ambition must be increased. Cuts in emissions are what is needed, not increases in coal and gas mining and burning.

We recommend the rejection of any increase in coal mining or gas extraction (including for export). The emissions reduction profile proposed above should be applied to all new fossil fuel proposals with the result that they must be rejected. We note that due to time pressure, this pathway would need to be revised at least every 2 years in the light of global efforts to cut emissions and the remaining budget of allowable emissions. This means it may need to be tightened commensurate with the reduction in the remaining emissions budget.

Limits on release of GHGs that are consistent with the science must include yearly reductions in the allowed emissions levels to have any real meaning. It is useless to allow emissions to continue to increase when the science clearly requires rapid, deep and urgent cuts to emissions. Under no circumstances must there be any increases allowed in GHG emissions. Under no circumstances must any industry be allowed to create any new sources of GHG emissions, including the coal or gas industry.

It is clear that we cannot fund any new sources of GHGs or we will fail to achieve the Paris goal the 1.5C limit.

Benefits of Climate Change Action

"*The need for planning decisions to take pro-active action to mitigate and adapt to climate change springs from the fundamental responsibility of government - to protect the community from damage and care for those suffering impacts. The warming of our global climate will destabilize the environment and thus threaten the security of individuals, families and the Australian and wider global community. The atmospheric physics and chemistry revealed by our scientists means that to not act is to commit ourselves to a de-stabilized climate system that presents a real threat to human existence through a collapsing environment*."

We note that investment of the Australian community's financial resources on land that we later have to abandon due to climate impacts, would be a serious waste of the communities limited resources. This money would be better spent building projects on land that is away from threatened areas. We know enough about the coming impacts of climate change to anticipate where impacts are likely to occur and so we must plan for them.

We are likely to be hard put to adapt as it is, and there will be no money for many people who will need it. It is critical that our current decisions including on the content of this Bill, recognize and anticipate climate change impacts so that our people are not left disadvantaged by risks that we should have seen coming.

Further information is provided below on planning in the context of the impacts of the climate crisis. We refer in particular to the paragraphs headed "*Location of new large-scale developments*".

Climate Change for Planning and Adaptation of the Community, NSW

Background

Climate Change is increasing the intensity and, in some cases, the frequency of environmental impacts on the built environment. The recent IPCC AR6 WGI Report: The *Physical Science Basis* has set out clearly that widespread changes have already occurred and that *unless there is immediate, rapid and large-scale reduction of emissions* the climate will become much more dangerous.

[Reference: Intergovernmental Panel on Climate Change, 6th Assessment Report, Working Group I, first part (7 Aug 2021): *The Physical Science Basis* (IPCC AR6 WGI).]

What this means is that if we don't act immediately, we will be heading well above the goals of the Paris Agreement, which is disastrous territory. There currently appears to be little global political will to do what is required. The consequences are there will be very serious changes to heatwaves, bushfire, drought, flooding and storms on top of the changes that we have already seen and those baked in by emissions to date.

People will be relying on the built environment to protect them from the worst of these changes. Whatever action we take on emissions, planning must prepare the community for rapid and escalating changes to extremes that will impact directly on people, the food supply, water and the biosphere of plants and animals that we rely upon for survival.

Below is information on some of the impacts expected and discussion of the implications for planning decisions taken by local and state authorities.

1 Adjustment of Planning and Building Regulations

Increasing occurrence of rarer events will put much of our current infrastructure under stress and render current design rules inadequate. Measures that need to be undertaken to adapt to the impacts of climate change will depend on the speed of the changes and the time horizon being considered when making decisions.

A typical example is that of stormwater drainage systems. As storms are becoming more intense, we are seeing the design event for drainage systems exceeded much more frequently than before. Much of our current infrastructure will be under-designed for the extreme events nature will throw at us. Increasing flood water levels, localized flooding and bushfire attack are the most obvious threats that planning decisions must take into account. We must act immediately to respond to the increased hazard to avoid high costs in the future to rectify poor decisions made today.

Planning and design standards and regulations will be changed to follow the trends. Older existing building stock and other infrastructure will be left exposed to increasing damage. Decisions today are likely to place people in situations that will be increasingly exposed as climate change impacts unfold unless these conditions are taken into account during planning and design.

2 Increasing Risk of Extreme Events

Heatwaves

Extended hot weather and longer extreme heat waves are expected to occur in all locations. As the climate heats up, extreme heat waves will increase in frequency and become hotter. We need to be prepared for more heat than we have seen before.

This means health impacts such as the risk of heat stress will increase for outdoor workers, shoppers, travelers, those without air conditioning, etc. Dehydration and heat stress that progresses to heat stroke when the body starts to shut down from overheating will increase. Worsening of kidney disease, heart attack and respiratory issues such as asthma are some of the health problems that arise from increased heat. People entering cars parked in the sun will be exposed to dangerous levels of heat.

The urban heat island effect must be considered when making planning decisions. Street trees and bush areas will significantly reduce the urban heat build-up that occurs over open areas, roads, etc. and relieve electricity demand from building air conditioning.

Cool zones for the public and refuges such as shops, libraries, office buildings, etc. will become focal points for movement of people. It is likely that emergency cool shelters and drinking water supplies will be required in some public areas such as sports fields, beaches, parks and shopping areas.

Climate change also increases heat effects on transport (e.g. bent railway rails, melting road surfaces, damaged bridge decks, etc.) and on the vehicles that use them. Mechanical equipment may also be affected by heat causing breakdowns and increased need for emergency response and ongoing maintenance.

Bushfire

The entire Central Coast Region is vulnerable to bushfire. The increased scale and ferocity of wildfire seen during the recent Black Summer bushfires was a grim warning of worse to come as temperatures increase further.

The Central Coast was lucky to avoid the sort of damage that occurred to towns both to our north and to the south of Sydney. The intensity of the fires meant that areas burned again, even though they had been burned off just 6 months before. The largest of the Black Summer fires were all started naturally (e.g. lightening strike).

Fire weather is what drives bushfires. The increased heat of the hotter climate dries out fuel faster and makes it burn more rapidly when the fire hits.

Fire fighting will become a regular occurrence with the fire season extending through September to February. There is likely to be increased focus on provision of access for fire fighters. Roadways and cleared areas around suburbs will be required.

Building design is also likely to change as it becomes clear that our buildings are vulnerable to extreme fire storms. Buried structures may need to be approved including both housing and specifically designed fire shelters.

There will be a call for more clearing of bush, perhaps even removal of street trees and garden plants. This must be balanced against the need for cooler urban landscapes to ameliorate heat wave conditions.

All locations will require a detailed fire plan a part of the planning process, including access for fire trucks, strategies for fighting fires, evacuation routes and guidance for residents and fire refuge locations. Refuges will need to be provided with sufficient protection to allow locals to reach safety quickly when fire is close.

Flooding

The increasing temperatures in our climate system mean that rainfall intensity is increasing. This means that when it does rain the amount of rain that falls is increased over what has occurred in the past. This leads to more flooding. The behavior of weather systems also appears to be changing with some systems lingering for longer periods before moving on. The result is that rain can continue to fall for many days over one area leading to increased risk of flooding of the region.

Current drainage systems are generally designed for 1% AEP storms. These storms are already occurring much more commonly. The likelihood of 1000 year events (0.1% AEP) is becoming a reality in consecutive years. This means that street drainage is likely to be overwhelmed on a regular basis increasing occurrence of street “flash” flooding.

Escape routes and emergency shelters will be required as will increased emergency rescue equipment (e.g. boats). Location of services such as sewer systems, stormwater drainage, roads and bridges will need to be reviewed.

Location of housing and floor levels must be revised as a result of this increasing risk of flooding. Current housing stock will be vulnerable and new housing must be located differently and constructed to withstand the increased threat.

Coastal erosion/ inundation

Coastal property will be most vulnerable when ocean storms occur (see also under East Coast Lows below). Occurrence of extreme high tides together with ocean storm conditions will increase the risk of erosion and inundation across the foreshore areas of the Region.

Storm wave action causes sand on our beach fronts to be moved out into deeper water offshore. Over time sand will return as the non-storm waves and wind move sand back onto shore and up the beach slope. If another storm occurs before this returning sand has had time to build up, even more sand will be removed

from the beach front leading to a gradual recession of the beach inland. As storm intensity is increasing there is increasing removal of sand from the beach and the coastal beachfront dune, resulting in recession of the dune system.

For locations where wave action is of less issue such as Brisbane Water and the Lakes, inundation may be the more likely hazard. Foreshore structures such as sea walls and erosion protection will be put under increasing stress and design must take account of this change.

Emergency evacuation routes, provision of shelters and evacuation equipment will need to be considered here similarly as for flooding in general. The added hazard of ocean, lagoon and estuary wave action during the emergency response must be part of the planning.

Allowing construction on the beachfront dune system must be seriously re-considered in the light of the recent IPCC AR6 WGI Report (and many other scientific reports dating back at least 30 years). Such development is destined to be lost in the longer term leading to the loss of the capital value, which is considerable when taken across the whole of the Australian economy. Mortgage insurance may become more and more difficult to obtain, leaving owners of property exposed to significant financial loss.

East Coast Low Pressure Systems

East Coast Low Pressure Systems (ECLs also termed extratropical storms) impact on our Region from the ocean. They can lead to high winds and heavy rain. IPCC AR6 WGI states that storms of this type have already increased in number and moved poleward. They are also becoming more intense with heavier rain and possibly longer periods of high winds or stronger wind gusts.

The most common impacts of ECLs on the Central Coast are heavy rain, flooding, localized flash floods, coastal erosion and wind damage (with the accompanying falling of trees resulting in blocked of roads, damage to buildings and loss of electricity supply). More detail on these events is given under the headings for the specific extremes.

Impacts on ocean front erosion are accompanied by increased estuarine water levels. The storm tide effect combined with the south-westerly wind and wave development towards the shore and in the Hawkesbury, creates increased water levels inside estuaries and coastal lagoons. The water in Brisbane Water finds it harder to escape through The Rip at low tide and instead builds up further as the tide turns and starts to come in again. Flood levels inside Brisbane Water and the coastal lagoons are well understood with Council reports available that give levels at many locations around the foreshore.

The impacts of ECLs occur all at once. So planning decisions need to take this set of conditions into account when approving developments or anticipating the communities response to emergencies. The location and type of new development and the vulnerability of the current building stock must be considered in the light of these conditions.

Drought

Drought is a longer-term hazard which unfolds over time. Due to the increased heat in the climate system, drought conditions can deepen more quickly than before. For example, dam water levels dropped more quickly during the recent drought up to 2020 than they did during the millennium drought.

Providing our Regional water supply is likely to include raising of dams, desalination plants (to be constructed rapidly during a drought) local stormwater capture, ground water, household tanks and water recycling. Provision of new local medium to small dams and other storage facilities may be part of the strategy.

Wind

There is a general indication in IPCC AR6 WGI that average winds in Eastern Australia (including the Central Coast) will increase on current trends. However, an increase in average winds may not mean increase in extreme winds. The science is unsure on whether design wind speeds for housing and other buildings will need to be increased.

It is clear that for the design of structures for extreme wind forces, continuing as we are without rapid and large-scale cuts in emissions leaves all possibilities open. In a 3 ℃ or hotter world, all bets are off.

Sea Level Rise

Sea levels are slowly rising at present with only a few mm per year, which is adding additional pressure to coastal foreshore structures and beach sand dunes all around the globe. At present the effect is small and only changes the storm levels slightly. The IPCC AR6 WGI report projects up to 1m by 2100 expected under current government policies but does not rule out 1.7m by 2100. This is higher than the projections of the previous AR5 report from 2014 and could reach as much as 5m by 2150 if the major ice sheets of Greenland and Antarctica become destabilized – a very real possibility as ice sheet tipping points may be as low as 1.5C.

The influence of sea level rise (SLR) will be of relatively small importance for the current and next decade, but for planning decisions that look out to more than 50 years, it becomes a very significant consideration. A 2009 Government study indicated that Australian foreshore housing at risk of inundation from a 1.1m rise in sea level was worth $63 billion (more than double that in 2021 dollars).

This threat must be part of the consideration of the development of any low-lying or foreshore land. Such locations may become a serious flood problem at some point in the future. Simply designing for a raising of building floor levels or use of fill is dangerously flawed.

For example, a whole suburb designed to a certain level would become vulnerable all at the same time when flooding levels reach the particular design level used for the suburb. Any evacuation routes would become impassable. Rising sea levels would render the whole suburb uninhabitable at some point in time or require expensive public works to protect it.

Note: This is actually a very significant part of the longer term impact of climate change. The IPCC AR6 WGI report, which assesses the sum total of all the climate research currently available, cannot rule out sea level rise of 5m by 2150 reaching 15m over the following 150 years (by 2300). The disruption following the loss of our coastal cities could not be described. What we do to cut emissions over the next couple of years and towards 2030 will decide the outcome for the melting of the Greenland and Antarctic Ice Sheets which are the main cause.

3 Location of new large-scale development

The changes occurring now and those baked in due to historic emissions will require widespread reconsideration of where we build and how we build. The degree of change in environmental constraints such as rainfall and temperature issues is already reasonably well known. This is mostly because these impacts are here today and have been well studied by science. We know that increased flooding, heatwaves, bushfire and drought will occur increasingly over the next few years.

When looking out 50 to 100 years, additional considerations make themselves felt. The discussion has not been had as to what the community expects will be done with existing cities near the coast let alone new large-scale developments such as whole suburbs when sea level rise (SLR) begins to impact on large areas of occupied land.

Take, for example, location of a new suburb on land at say 6m above sea level. Previously, this would be acceptable because there is no problem with applying normal flood modelling to establish where housing should be located or how much land space can be filled to raise levels.

In the light of climate change, we must assume the global community implements one of the emissions reduction scenarios set out in the IPCC AR6 WGI (or previous IPCC Reports). Consider these two alternatives for our proposed suburb:

1. Sufficient action is taken to cut emissions, so SLR is around 0.8m by 2100 and 1.3m by 2150
2. Insufficient action is taken to cut emissions leading to 5m in 130 years from now (1.7m by 2100, 5m by 2150, 15m by 2300).

At present, it seems that pathway 2 is far more likely given the stance of the Australian Government and many others around the world.

For option 1, the suburb could be designed for this 0.8m rise. Following 2100 SLR would continue, reaching faster rates. For example, SLR could approach 20mm per year around 2100. In the longer term, tides or storm impacts might not reach the suburb at all and settle to a long term upper limit over more than 1000 years. This would be preferred from a climate change point of view, but the probability of global society achieving this is rapidly disappearing.

For option 2, inundation is likely to impact on the suburb within the life expectancy of the buildings constructed there. Having a predictable life expectancy is OK only if people accept that their property has a finite life and that they will need to give up their property when the time comes. This is by no means clear in the current understanding of ownership of land and the buildings it supports. Other possibilities for handling such property could be developed, but there are currently no proposals to do so.

This report does not seek to address this issue but notes that planning policies at state and federal level will need to consider the likely outcomes for Australian property owners and current planning decision makers should be considering this as part of their assessments. Before climate change was an issue, such a proposed suburb could be expected to continue in perpetuity.

Some of our cities have been in place for over 2000 years. Government must answer the question: Is it reasonable to spend hundreds of millions of dollars on establishing a new suburb when it has an expected life of only 130 years? Would not such significant investment capital and human effort be better spent on land where we could reasonably expect the development to last much longer? The answer requires a community conversation we have not been able to have yet.

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