

EIANZ Submission



Environment Institute
of Australia and
New Zealand Inc.

Inquiry into current and future impacts of climate change on housing, buildings and infrastructure

INTRODUCTION

The Environment Institute of Australia and New Zealand (EIANZ) welcomes the inquiry into the current and future impacts of climate change on housing, buildings and infrastructure by The Senate Environment and Communications References Committee.

These sectors of the economy are important in that:

- they contribute 25% of Australia's greenhouse gas emissions;
- despite 'green building' measures, population growth and additional building stock will drive increased emissions without further action;
- according to available estimates, at least US \$2.6 billion is currently invested by funds in green building projects across Australia and New Zealand;¹
- they represent a substantial asset value to the economy of approximately 16% of GDP;
- they can play an important role in climate change mitigation with extensive opportunities to improve energy productivity within existing buildings and infrastructure; and
- for small to medium enterprises, improved energy productivity can also improve product quality and output, reduce business risk, increase profitability and competitiveness and create new business opportunities.²

The Institute and its members welcome the opportunity to work with the Commonwealth as it conducts its review. EIANZ offers awareness, skills, training and a certification scheme to assure the Commonwealth that the advice it seeks on managing climate change is credible and competent. Details are provided below.

¹ *Review of climate change policies Discussion Paper 2017* Department of the Environment and Energy

² Op. cit.

SPECIFIC RESPONSES

(a) Recent and projected changes in sea level rises, and storm surge intensity

Observations show that the ocean has been changing over the past several decades and these changes include rising sea levels. There is a wealth of research findings around sea level changes and storm surges. For example, Sydney Coastal Councils Group's (SCCG) Mapping and Responding to Coastal Inundation maps areas of risk, using sophisticated modeling together with Councils' own information sources (e.g. LiDAR technology) to determine risk and develop consistent model planning and management responses in consultation with relevant state government agencies and the broader community.

In 2009 the SCCG secured grant funding to undertake the project with the CSIRO. Member Councils have access to the project outputs including all mapping information, stage outcome reports and associated meta data information.³

The consensus of these, and other, studies is that sea level rise around the Australian coast will be between 0.5m and 1.1m by 2100⁴. With around 85% of Australia's population living in the coastal zone, rising sea levels (and storm surges) will have significant impacts on Australia's main population centres, and increased storm surge intensity threatens valuable coastal assets such as ports, roads, railways and water treatment facilities.

It is therefore crucial that governments continue to support research into changing sea levels and programs to enable communities to adapt to these inevitable changes.

(b) Recent and projected changes in temperature and precipitation

The Bureau of Meteorology and CSIRO have concluded that Australia's climate has warmed in both mean surface air temperature and surrounding sea surface temperature by around 1 °C since 1910.⁵

The NSW and ACT Regional Climate Modelling (NARClIM) Project is a research partnership between the NSW and ACT governments and the Climate Change Research Centre at the University of NSW.

The NARClIM project began in 2011 in response to the need by regional decision makers and impact assessment researchers for high resolution climate change projections. NARClIM has produced an ensemble of robust

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http://www.sydneycostalcouncils.com.au/Project/Mapping_and_Responding_to_Coastal_Inundation

⁴ http://www.ozcoasts.gov.au/climate/sd_visual.jsp

⁵ <https://www.csiro.au/en/Research/OandA/Areas/Assessing-our-climate/State-of-the-Climate-2016/Report-at-a-glance>

regional climate projections for south-eastern Australia that can be used by the NSW and ACT community to plan for the range of likely future changes in climate.

For example, climate projections for the Sydney Region indicate that the region is projected to continue to warm during the near future (2020–2039) and far future (2060–2079), compared to recent years (1990–2009). The warming is projected to be on average about 0.7°C in the near future, increasing to about 1.9°C in the far future. Inland, away from the coast, the number of high temperature days is projected to increase.⁶

Apart from impacts on human health, these projections also have significant implications for industries such as agriculture and water resource management. This may also force governments to rely more on water demand management and alternative sources of water to supply populations and industry.

Further comments on this theme are found in topic (f)

(c) Recent and projected changes in extreme weather, including heatwaves, bushfires, floods, and cyclones

Heatwaves are among the most under recognised natural hazard in Australia. Between 1803 and 1992 heatwaves caused more fatalities than either tropical cyclones or floods. Recent assessments suggest extreme temperatures currently contribute to the deaths of more than 1,000 people aged over 65 each year in Australia every year. Since 1950, Australian average temperatures and the number of extremely hot days have increased. Most of this warming is likely to be a result of increased levels of greenhouse gases in the atmosphere.⁷

The NARcliM project also indicates that the Sydney Region is expected to experience more hot days in the near future and in the far future. The greatest increase is projected for Western Sydney and the Hawkesbury with an additional 5–10 days in the near future, increasing to over 10–20 additional hot days per year by 2070. In addition, average fire weather and severe fire weather days are projected to increase in the future.

Similar projections have been made for other population centres in Australia and extreme weather changes have implications for our capacity to deal with extreme weather events as well as the adaptability of our built environment to these expected changes. Further comments on the built environment can be found in topics (i) and (j) below.

⁶ NSW Office of Environment and Heritage 2014 *Metropolitan Sydney Climate Change Snapshot*

⁷ Climate Institute 2006 *Briefing Heatwaves*

(d) Recent and projected changes in natural coastal defence systems including coral reefs, kelp and mangrove forests

There was an occurrence of 10,000 ha of mangrove forest dieback in the Gulf of Carpentaria in 2016. This has been attributed to elevated temperatures and lack of rainfall. ⁸ Scientists examining the causes suggest that climate change could be a factor.

Apart from the impacts on fisheries and ecosystems more generally, the decline of vegetation communities such as mangroves and widely observed changes to coral reefs and temperate kelp forests can be expected to reduce the function of these ecosystems as defence systems in ameliorating impacts from storm surges and tropical storms.

(e) The impact of these changes on the vulnerability of infrastructure in coastal areas

To provide one example, Collaroy-Narrabeen Beach is the most vulnerable beach to erosion from coastal storms in northern Sydney and is ranked the third most at risk area from coastal processes in Australia. In 2016 severe storms eroded away about 50 metres of beach as well as causing extensive property damage. The cost of this damage has been estimated at around \$30 million.

The management of coastal hazards at Collaroy-Narrabeen Beach is guided by the Coastal Zone Management Plan for Collaroy-Narrabeen Beach and Fishermans Beach. Action to preserve and protect this vulnerable beach is already underway and includes ensuring that development along Collaroy-Narrabeen Beach considers current and future hazards of wave impact and coastal erosion.

For the Brisbane Airport Parallel Runway Project, climate change impacts were considered in the planning and design for the ongoing continuity and long-term viability of operation of the new runway. For example, the height above sea level of the runway became the major climate change related design issue and this resulted in a runway height that will mitigate against projected severity and frequency of sea level rise, storm surge and local/regional flood events.⁹

All coastal local governments and major asset owners will need to develop and implement plans to adapt coastal infrastructure to these changes and amend planning instruments to restrict and forestall development in areas

⁸ <http://www.abc.net.au/news/2016-07-10/unprecedented-10000-hectares-of-mangroves-die/7552968>

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https://www.nccarf.edu.au/business/sites/www.nccarf.edu.au.business/files/attached_files_publications/Case%20Study_Brisbane%20Airport%20-%20New%20Parallel%20Runway%20Project.pdf

assessed as vulnerable to wave impact and erosion. In places, this will also mean 'coastal retreat' to remove infrastructure that cannot be protected.

(f) The impact of these changes on water supply and sewage treatment systems

Climate change can be expected to alter rainfall patterns. The NARCLIM project cited above also foreshadows changes to rainfall in the Sydney Region. This has implications for water supply storages and will require responses such as greater reliance on other supply sources such as desalination and water conservation measures, particularly during periods of low rainfall. Similar challenges face other Australian cities and communities.

Sewage treatment systems may also require modification or even relocation, particularly in areas subject to coastal inundation, flooding and storm surge.

(g) The impact of these changes on transportation, including railways, roads and airports

There appears to be little consideration of climate change risks in the planning and construction of transport infrastructure. Climate risks are generally given only cursory treatment in environmental assessment studies. For example, new motorways can be expected to exacerbate climate risks due to increasing dependence on fossil-based transport (even allowing for expected expansion in low or zero emission technologies). Even public transport projects such as urban railways fail to acknowledge risks such as power outages due to extreme weather events.

Examples such as the Brisbane Airport runway project (see above) appear to be the exception and consideration of climate risk in the evaluation and design of major infrastructure such as ports needs to follow the Brisbane Airport approach.

(h) The impact of these changes on energy infrastructure, including generators and transmission and distribution lines

Climate change modelling suggests an increase in severe weather events such as cyclones, storms, heat waves and floods. These can be expected to potentially cause damage and disruption to the electricity supply and distribution network, both through direct damage to assets and network failure through extremes of electricity demand during heat wave conditions.

One adaptation strategy to this disruption would be in the greater uptake of distributed generation and storage rather than reliance on a centralized system. Market disincentives and regulatory restrictions to the greater uptake of distributed generation and storage should be reduced.

(i) The impact of these changes on health, education and social services infrastructure, including hospitals, schools and aged care

Climate change impacts will impact on all sectors of the community. However, they can be expected to have a marked impact on the aged, those with medical conditions and on those living in areas of socio-economic disadvantage. Western Sydney has a higher level of socio-economic disadvantage compared to Inner and Northern Sydney. Yet NARCIIM indicates that this part of Sydney will experience more severe climate impacts compared to the rest of Sydney.

Following the severe weather emergencies experienced in Victoria and South Australia in 2009, both South Australia and Victorian State and local governments have developed emergency plans for managing heat waves. The City of Darebin in Victoria has considered the introduction of cooling centres. Cooling centres – also referred to as cool centres, cooling stations or cooling rooms – are airconditioned government or community centres or spaces where residents can congregate during extreme heat events. Usual opening hours may be extended, cool drinks and entertainment may be provided, and government organisations may need to assist with transport to the centre or waive public transport fees.¹⁰

However, it is likely that most of these centres are reliant on the electricity grid and it is unclear as to how resilient cooling centres are to power disruptions during heat waves. To this end such centres should have access to alternative sources of power.

A survey of aged care facilities by the National Climate Change Adaptation Research Facility found that only 30% included heat wave emergency planning in the facility emergency plan and that heatwave policies are not routine across the aged care sector across Australia.¹¹ Lack of sleep is one of the factors that predisposes people to heat-related illness and increased heat-related morbidity and mortality has been identified after a second night of elevated minimum temperature.¹²

(j) The impact of these changes on private and public housing

Palmer et al (2014) have commented that Australian residential buildings are poorly adapted to predicted climate risks such as heat and that these impacts will be felt the greatest by residents that are more vulnerable. They recommend a number of design options for dwellings that will better adapt these dwellings to more severe heat wave conditions. For example, they conclude that the Building Code of Australia has too much focus on building

¹⁰ Darebin City Council 2014 *Local Government Heatwave Strategies*

¹¹ Black, DA, Veitch, C, Wilson, LA & Hansen, A 2013, Heat-Ready: Heatwave awareness, preparedness and adaptive capacity in aged care facilities in three Australian states: New South Wales, Queensland and South Australia, National Climate Change Adaptation Research Facility, Gold Coast, 41 pp.

¹² Palmer, J. et al 2014 Heat wave risks and residential buildings *The Architectural Review*

energy requirements at the expense of occupant thermal comfort in heat waves.

Similarly, building requirements such as the NSW BASIX scheme focus only on energy and water consumption and have failed to adequately consider climate risks in setting policy for new residential buildings. BASIX needs to be expanded and updated.

However, cooling is also a community issue. Innovative research in Western Sydney involving a range of community groups showed that these groups took very different approaches to keeping cool and that extreme heat divides people from their environment and from each other.¹³

Planting trees is not enough. New ways of living well in a climate-changed future are needed. These must involve people in the design of the material and social environments in which they will live, with criteria of comfort, neighbourliness and affordability.¹⁴

(k) The impact of these changes on public recreation and tourism facilities

In places like Western Sydney, extreme heat can have a marked impact on resident's capacity to access external spaces and to reduce the 'urban heat island' effect.

The City of Blacktown's Cool Streets program seeks to tackle these issues through intelligent streetscape design, good species selection and greater community participation in street tree design and planting. Measures include passive climate control through the strategic placement of tree species: taller trees in the West to cut hot afternoon sun; smaller trees in the east to let in morning light; and deciduous trees in areas that required more warmth in winter.¹⁵

(l) The impact on financing and insurance arrangements for housing, buildings and infrastructure

Climate risks has been nominated as a significant issue for Boards and Directors. APRA has highlighted the risks faced by the finance and insurance sector through inadequate consideration of climate risks.¹⁶ In addition, senior legal counsel of the commercial bar has provided legal opinion that, as a matter of Australian law, directors and boards must actively engage with the impacts of climate change-related risks on their operations and strategy in

¹³ Mellick Lopes, Abby 2017 How people can best make the transition to cool future cities *The Conversation* July 13

¹⁴ Op. cit.

¹⁵ <https://wsroc.com.au/media-a-resources/wsroc-news-stories/focus-on-cool-streets-blacktown>

¹⁶ <http://www.apra.gov.au/Speeches/Pages/Australias-new-horizon.aspx>

order to satisfy their duty of due care and diligence under section 180 of the *Corporations Act*.¹⁷

(m) The adequacy of current state and Commonwealth policies to assess, plan and implement adaptation plans and improved resilience of infrastructure

The City of Melbourne's Heatwave Response Plan warns that up to 297,000 workers could be forced to leave their offices if air-conditioning systems were paralysed by a widespread power outage.¹⁸ However, Gleeson (2017) comments that new modelling reveals that sea-level rise is likely to flood many inner-city high-rise redevelopment areas in Australian cities. This includes the zones identified for evacuation in Melbourne's Heatwave Response Plan.¹⁹ This highlights the problem of current policy approaches taking a 'silo' approach to adaptation. The Melbourne Plan fails to integrate energy network and supply considerations as well as the possibility that other climate impacts such as sea level rise will impinge on the ability of governments to respond to a weather emergency such as a heat wave.

This planning mistake is being repeated in other Australian cities.

The Greater Sydney Commission has rightly identified the need for a 'green grid' of open space to ameliorate the effects of a growing Sydney. The 'green grid' is a key element of the Commission's draft District Plans which will drive urban growth across Sydney. The 'green grid' will also reduce the urban heat island effect of a higher density city. Unfortunately, the utility of the 'green grid' will be reduced if other government planning fails to adequately cater for open space in setting targets for additional dwelling units at higher density. For example, the NSW Government's planning for an additional 35,000 dwellings along the Sydenham-Bankstown Metro rail corridor, appears to ignore the provision of additional green or open space in an area already poorly provided for in relation to open space.²⁰ This is likely to exacerbate impacts from 'urban heat islands'.

¹⁷ <http://aicd.companydirectors.com.au/advocacy/governance-leadership-centre/external-environment/climate-change-and-directors-duties>

¹⁸ <http://www.theage.com.au/victoria/plans-to-use-mcgm-as-shelter-for-melbournes-heatwave-refugees-20150213-13em74.html>

¹⁹ Gleeson, B. 2017 Market-driven compaction is no way to build an ecocity *The Conversation* July 10

²⁰ <http://www.abc.net.au/news/2017-07-09/fears-of-overcrowding-in-western-sydney-population-explosion/8682400>

EIANZ INITIATIVES

The Institute represents over 1,800 Environmental Professionals in Australia and New Zealand and in 2011 established a Climate Change Special Interest Section to lead its activities and advocacy in this important area.

As the peak professional association supporting Environmental Practitioners, the EIANZ and its members have a central role in informing and advising governments, businesses and society on climate change action.

The EIANZ will continue to educate, train and certify Environmental Practitioners to build capacity and capability to address the challenges of climate change.

The EIANZ Climate Change Special Interest Section (CCSIS) has led the following:

1. Climate change training and capacity building
 - a. In 2008 CCSIS and EIANZ SEQ Division partnered with the Queensland Government and University of the Sunshine Coast to trial a Climate Change Boot Camp. The subsequent Climate Change Skills Training program partly funded by the Federal government went on to train nearly 1000 practitioners in Australia and New Zealand over the following 3 years.
 - b. [Learning to Adapt](#) (L2A) evolved from that program. It is a 3-module climate change adaptation training program that trained nearly 1000 practitioners in Queensland, NSW, Victoria and ACT (for federal government officers). The Institute will continue to deliver L2A across Australia and New Zealand.

The L2A program included training elements specifically relevant to this inquiry in providing skills development and training on climate change risk assessment, legislation and regulation, climate change impacts and carbon management. L2A is designed by experienced sustainability educators to engage participants in case studies and exercises presented by recognised expert guest speakers in climate change adaptation.

2. Climate Change Certification specialist
 - a. In 2014 a [CEnvP \(Climate Change\) specialist](#) was launched for the [CEnvP Scheme](#) after many years of research, discussion of options across Australia and New Zealand and testing against national and international practitioners. Rather than rely solely upon 'learning by doing' and 'experience', ANZ now has the means to assess and certify climate change practitioners to be Suitably Qualified Persons (SQP).

In the coming year, the CCSIS is considering whether to develop and deliver a training program to complement activities that are occurring in various areas of Climate Change Mitigation.

The Institute would be pleased to assist the Commonwealth Government in this important review, including potentially:

- Providing specific feedback on aspects of the Committee's inquiry through the CCSIS or through other areas of expertise within the membership;
- Providing training on various aspects of climate change to practitioners within Government
- The development of SQP through the above combination of professional development and recognition.

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