

NEIGHBOURHOOD ISSUE: CLIMATE COSTS AND RISKS TO COUNCILS



Thank you for supporting the Climate Council.

The Climate Council is an independent, crowd-funded organisation providing quality information on climate change to the Australian public.



Professor Lesley Hughes
Climate Councillor



Dr Annika Dean
Senior Researcher



Morgan Koegel
Senior Campaigner

Published by the Climate Council of Australia Limited.

ISBN: 978-1-922404-29-9 (print)
978-1-922404-28-2 (digital)

© Climate Council of Australia Ltd 2021.

This work is copyright the Climate Council of Australia Ltd. All material contained in this work is copyright the Climate Council of Australia Ltd except where a third party source is indicated.

Climate Council of Australia Ltd copyright material is licensed under the Creative Commons Attribution 3.0 Australia License. To view a copy of this license visit <http://creativecommons.org.au>.

You are free to copy, communicate and adapt the Climate Council of Australia Ltd copyright material so long as you attribute the Climate Council of Australia Ltd and the authors in the following manner: Neighbourhood issue: Climate costs and risks to councils.

Authors: Lesley Hughes, Annika Dean and Morgan Koegel.

The authors would like to thank Professor Jan McDonald from the School of Law, University of Tasmania, and Dominique La Fontaine from the South East Councils Climate Change Alliance for their helpful comments on a draft of this report.



Cover image: Steve Shipton (left) is consoled by fellow farmer Peter Mercieca in Coolagolite, NSW, Wednesday, January 1, 2020. (AAP Image/Sean Davey).

This report is printed on 100% recycled paper.

This report contains information about local governments and climate change, including information on a number of legal issues relating to local governments and climate change. Information contained in this report is for general informational purposes only. It is not advice and should not be treated as advice.

You must not rely on the information in this report as an alternative to legal advice from an appropriately qualified professional. If you or your organisation have any specific questions about any of the matters raised in this report you should consult an appropriately qualified professional.



facebook.com/climatecouncil



info@climatecouncil.org.au



cpp@climatecouncil.org.au



twitter.com/climatecouncil



climatecouncil.org.au



citiespowerpartnership.org.au

Contents

Key findings	2
Summary of report recommendations	4
Foreword	6
1. Introduction	7
2. Direct climate impacts and risks	11
3. Indirect climate impacts and risks	20
Exposure to increased litigation risk	20
Rising claims, damages and insurance	31
4. Councils rising to the climate change challenge	35
How councils are reducing emissions, and saving money	35
Protecting lives, property and places: adaptation	41
- Value for money today, and in the future	45
- Avoiding negative adaptation outcomes	46
5. Barriers to rapid action for councils	47
Funding	47
- Doing more with less	47
- Access to grants	47
- Need for funding before disaster strikes	48
- Insufficient grant funding	50
- Limitations to “building back better”	51
Policy and decision-making power	52
Lack of clear guidance and consistency	54
Scale of the challenge	58
6. Report recommendations	60
Recommendations for local governments	60
Recommendations for state, territory and federal governments	62
7. Conclusion	65
References	66
Image credits	71

Key findings

1

Climate change is an immense challenge for all levels of government, but its impacts are felt most acutely at the local level.

- › Australia's 537 councils are responsible for community infrastructure and assets valued at nearly half a trillion dollars, including land, buildings, and 75% of the nation's roads.
- › As the level of government closest to the community, council staff are often directly impacted by disasters and also required to respond. During Black Summer, one fifth of Towong Shire Council staff were personally affected as the workforce took on extra duties and council resources were effectively exhausted within 72 hours.
- › As climate impacts – including coastal erosion, flooding, bushfire risks, and extreme storms – continue to accelerate, the risk to council infrastructure and services increases – as do community needs.

2

Worsening extreme weather, driven by climate change, is compounding costs for councils. This includes mounting damage to council-owned assets, rising insurance premiums and increasing liability risks.

- › Critical council infrastructure including roads, drainage and coastal defences, is being damaged by more frequent and/or severe extreme weather, and state and federal assistance is falling short of what's required.
- › Coastal councils are being forced to choose between competing interests in deciding how to protect their coastlines and communities from rising sea levels and worsening erosion. The bill for local governments to fix eroding beaches or protect beachside property or infrastructure commonly exceeds \$1 million and could reach as high as \$54 million per year.
- › Claims and damages following extreme weather events are on the rise with average home insurance premiums rising 178% in northern Australia and 52% across the rest of the country in the decade between 2007-08 and 2018-19.
- › A growing number of Australians have no insurance or inadequate insurance coverage for their property, which increases pressure on councils and the broader community to provide financial support in the wake of climate-fuelled disasters. Rates of non-insurance range from 17% in north Queensland (more than 62,000 properties) and as high as 40% in north Western Australia (more than 10,000 properties).
- › One of the most common concerns for councils as climate impacts escalate is increasing litigation, with 21% of coastal councils surveyed in 2019 citing this as their highest concern. It's virtually impossible for councils to eliminate such legal risks, but they can take steps to materially reduce them.

3

Local government is playing a leading role in responding to climate change, but there are common barriers that councils face in trying to take further action.

- › In Australia, local governments and communities are aligning with the latest climate science by working towards 100% renewable energy goals and zero emission targets. Already, the cities of Sydney, Melbourne, Brisbane and Adelaide have carbon neutral operations – as do Moreland and Darebin councils in Victoria.
- › By cutting or avoiding greenhouse gas emissions, councils can also significantly cut operational expenses. For example, the Cities for Climate Protection program supported 233 councils to collectively avoid 18 million tonnes of carbon emissions and save \$95 million in energy costs.
- › Councils are effectively being asked to do more, with less. While council responsibilities – including those related to climate change – are growing, their tax revenue has shrunk to the fourth lowest share among the 30 industrialised nations that make up the Organisation for Economic Co-operation and Development.
- › It is difficult for councils to access funding to prepare their communities for worsening extreme weather. Evidence shows the return on investment is higher for spending on disaster preparation rather than disaster recovery, yet 97% of all Australian disaster funding is spent in the wake of an event.

4

Protecting communities from worsening extreme weather, and minimising the costs borne by them, requires climate leadership at all levels of government.

- › This report demonstrates that councils are already experiencing damage and loss beyond their ability to manage. Decisive and immediate action is required at all levels of government to deeply reduce fossil fuel emissions, increase the use of renewable energy and support communities to prepare for and cope with climate-fuelled disasters.
- › Australia can and should do more as part of international efforts to keep global warming well below 2°C. This means cutting our emissions by 75% below 2005 levels by 2030, and reaching net zero emissions by 2035.
- › Extreme weather events like bushfires and floods don't respect municipal borders, so coordination from higher tiers of government is needed.
- › There are big opportunities for councils when they have the resources to act on climate change. Beyond benefits to the community, action can create local jobs and result in long term savings for councils.

Summary of report recommendations

A full explanation of report recommendations can be found on page 60.

RECOMMENDATIONS FOR LOCAL GOVERNMENTS

1. Increase operational net zero targets and efforts to mitigate climate change through emissions reduction activities.
2. Work with local communities and businesses to support broader efforts to cut emissions beyond council operations and infrastructure.
3. Undertake a climate change risk assessment and implement plans for adapting to those risks.
4. Seek out opportunities for collaboration across multiple councils to reduce emissions and adapt to climate impacts.
5. Encourage economic development units to explore how climate action can boost the local economy.
6. Upskill all council staff to ensure they are confident about the impact of climate change on their day-to-day work, including opportunities for adaptation and mitigation.
7. Ensure that all planning and development activity at a local level considers climate risks and opportunities to cut emissions.
8. Advocate for other tiers of government to embrace stronger climate policies, emissions reductions targets and frameworks for mitigation and adaptation.

RECOMMENDATIONS FOR STATE, TERRITORY AND FEDERAL GOVERNMENTS

1. Lead the country in responding to accelerating climate change at the scale and pace required; with a science-backed approach.
2. Increase state, territory and federal funding sources to councils for responding to climate impacts, and cutting greenhouse gas emissions.
3. Invest in preparing before climate disasters strike, rather than responding after the damage is done.
4. Ensure all disaster response funding incorporates the principle of "betterment".
5. Make funding available post-disaster for all damaged and destroyed council assets.
6. Support residents and businesses exposed to extreme weather events to build resilience.
7. Look for cost sharing opportunities between local and state governments for asset upgrades.
8. Encourage and resource regional collaborations between councils to address climate change.
9. Ensure all planning and development activity at a state and territory level adequately accounts for accelerating climate risks.
10. Improve energy efficiency standards and invest in building upgrades to ensure Australian houses are safe and comfortable.
11. Establish a national body, or expand the remit of an existing one, to support research on adaptation and act as a centralised hub for up-to-date climate change information.
12. Take responsibility for coordination of climate impact responses to ensure consistency and clearly delineated responsibilities between different levels of government.
13. State, territory and federal governments should urgently implement the 2020 findings of the Royal Commission into National Natural Disaster Arrangements.
14. Support councils to undertake and regularly review climate change risk assessments.

Foreword

No community within Australia remains untouched by climate change. Our country is highly exposed to impacts including record breaking heat, more dangerous bushfire seasons, coastal flooding and supercharged storms. These extreme weather events are worsening, and the impacts are reverberating throughout our communities.

As the level of government closest to the community, councils are at the heart of responding to climate impacts. When disaster strikes, local governments work closely with communities to cope and respond. They are also often left with the task of cleaning up – and paying for – the mess, while they keep delivering the essential services that so many residents rely on.

We have a choice about how much worse we're willing to let things get. But the latest science makes it clear that there is no time to waste. Every fraction of a degree of avoided global warming makes a difference, and our success will be measured in lives, communities, properties, species and economies saved. There is one solution, and one solution only: a concerted effort to make immediate, deep and sustained greenhouse gas emission cuts.

While climate action at a federal level has stagnated, local governments are just getting on with it. For many councils, this is part of their core work. Within the Cities Power Partnership more than 150 councils are united in their desire to look after their communities by responding to climate change.

From Margaret River to Hepburn, and from Byron Bay to Cairns, cities and towns across Australia are cutting their emissions, switching to clean energy and building greener, more efficient and resilient communities. The momentum is tangible and benefits like cleaner cities and healthier communities are there for the taking.

While we switch away from using coal, oil and gas there are climate impacts already baked into the system that councils must also respond to in order to keep our communities safe and strengthen their resilience into the future.

The findings and case studies in this report paint a picture of the impacts and scale of the challenge we face, but also outline a pathway to overcome them. I hope this serves to accelerate action at all levels of government to address climate change, and a platform from which councils can advocate for greater support to help them get on with the job.

No one can do this alone, and councils are no exception. If we want communities to stay secure, prosperous and resilient then we need all levels of government to put the right actions and policies in place.

This is an opportunity to improve the lives of all Australians. We expect all levels of government to step up and grasp this opportunity by backing local governments in. With the right support in place they can be ambitious, collaborative and action-orientated in creating the safe and thriving communities we all desire.



Dr Portia Odell
Director, Cities Power Partnership

1. Introduction

Climate change impacts are felt acutely at the local level.

Councils must manage damage to their own assets and infrastructure from increased temperatures, sea-level rise, shifting rainfall patterns and increasingly frequent and/or severe extreme weather events, as well as the additional demands placed on them via damage to private property in the community.

As climate impacts escalate, communities will increasingly approach their councils for help in responding to and managing such events and associated risks. Councils may be exposed to increased litigation from the community if climate risks have not been properly considered in council decision-making. Councils will also be affected indirectly by harm to local residents and private property, demographic changes in response to extreme weather events and climate impacts on local industries and livelihoods.

In fact, the impacts of climate change cut across almost all areas of local government responsibility including the critical assets, infrastructure and essential services that councils provide for their local communities. Councils are directly responsible for urban planning, land use and building approvals, which means they can take significant steps to manage climate risks. As the level of government closest to the community, councils play a critical role in ensuring on-the-ground needs of local communities are considered and met by all levels of government. Councils also play a critical role in communicating with their communities to explain climate impacts and solutions

(DCCEE 2012). All of this takes place in the context of increasing financial pressures on councils from climate impacts, and limited funding, capacity, information and support from higher tiers of government.

Responsibility for local governments rests with state and territory governments. For this reason the specific roles and responsibilities can differ between jurisdictions. However, the broad responsibilities of local governments in relation to adapting to climate change are outlined in Box 1.

Under state and territory legislation, local governments are also delegated a broad array of responsibilities in relation to preparing for, responding to, and recovering from climate-related disasters. These responsibilities can differ between jurisdictions and between local governments – dependent on the size, resourcing, capacity, demographics and geography of the council or local government area, amongst other factors. Responsibilities may include:

- › Preparedness and risk mitigation actions before disasters (such as delivering public education and awareness programs, implementing risk management plans, managing firebreaks and asset protection zones around key assets, working with fire agencies to conduct hazard reduction activities, maintaining fire trails and vegetation management programs on local government lands, land-use planning and management including zoning and administering development applications);

- › Delivery of community services and support for emergency management during disasters (such as provision of operational and administrative support to the local emergency management committee and evacuation and relief centers);
- › Recovery after climate-related disasters (such as preparing recovery plans, coordinating the recovery effort, conducting disposal of damaged infrastructure, distribution of supplies to survivors and restoring damaged community infrastructure).



BOX 1: RESPONSIBILITIES OF LOCAL GOVERNMENT FOR CLIMATE CHANGE ADAPTATION

Local governments have a responsibility to:

- › Administer relevant state and territory and/or Commonwealth legislation to promote adaptation as required, including the application of relevant codes, such as the Building Code of Australia;
- › Manage risks and impacts to public assets owned and managed by local governments;
- › Manage risks and impacts to local government service delivery;
- › Collaborate with other councils and with state and territory governments to manage regional climate impacts and risks;
- › Ensure policies and regulations under their jurisdiction, including local planning and development regulations, incorporate climate change considerations and are consistent with state, territory and Commonwealth government adaptation approaches;
- › Facilitate building resilience and adaptive capacity in the local community, including through providing information about relevant climate change risks;
- › Work in partnership with the community, locally-based and relevant non-government organisations, business and other key stakeholders to manage climate risks and impacts;
- › Contribute appropriate resourcing to prepare, prevent, respond and recover from detrimental climatic impacts.

Source: DCCEE 2012 cited in NCCARF 2013.

Climate change is increasing the frequency and/or intensity of many extreme weather events, and these trends are projected to continue. A summary of some of the key climate trends for Australia from the latest report from the Intergovernmental Panel on Climate Change (IPCC) is provided in Box 2.

BOX 2: KEY CLIMATE TRENDS IN AUSTRALIA

In August 2021, the Intergovernmental Panel on Climate Change (IPCC) published the most important update on the physical science of climate change in a decade. The report – the first part of the IPCC’s Sixth Assessment – contains many findings relevant to Australian councils as they adapt to climate impacts.

Key findings specific to Australian communities, include:

- › Heat extremes are increasing and cold extremes are decreasing. These trends are projected to continue;
- › Heatwaves and droughts will become more frequent and intense;
- › Australia is experiencing sea level rise above the global average. Such rises are projected to continue, contributing to increased coastal flooding and shoreline retreat;
- › Heavy rainfall and floods are increasing, and projected to continue to do so;
- › An increase in marine heatwaves and ocean acidity is already being observed, and both are projected to increase. This is likely to be catastrophic for the Great Barrier Reef;

- › Sandstorms and dust storms are projected to increase across Australia;
- › Snowfall and snow coverage have decreased, and are projected to decrease further;
- › The intensity, frequency and duration of fire weather events have already increased, and are projected to increase further, throughout Australia.

Past inaction and inertia in the climate system mean that climate impacts will continue to worsen over the next two to three decades, even if global greenhouse gas emissions plummet over the same time period, and then could level off. However, if we fail to cut emissions rapidly and steeply within the next decade impacts will escalate steeply post-2040.

Immediate, deep and sustained emission reductions are required to protect communities and ecosystems in Australia. Based on the latest science, and taking into account Australia’s national circumstances, the Climate Council recommends that Australia reduce its emissions 75% below 2005 levels by 2030, and reach net zero emissions by 2035. We must do everything possible to deeply and rapidly cut our emissions, while also preparing for climate impacts that can no longer be avoided.

Source: IPCC 2021a.

Rising average temperatures, sea level rise, shifting rainfall patterns and the increasing frequency and/or intensity of extreme weather events create a number of risks for councils. These can be divided into direct risks, indirect risks and community risks (see Box 3).

This report discusses the direct and indirect risks of climate change for local governments in Australia. Community risks, while significant, are out of scope of this report. The report draws on case studies to illustrate the different types of risks and

impacts, and the burdens placed on councils. Further, it discusses the ways councils are proactively responding to climate change by reducing emissions, adapting their own operations and helping their communities do the same. Finally, the report examines a range of barriers that local governments face in trying to take climate action and puts forward a non-exhaustive list of recommendations to address these.

BOX 3: TYPES OF CLIMATE CHANGE RISKS AFFECTING COUNCILS

Direct risks

Direct risks to councils occur where council-owned or managed assets, infrastructure and operations or services are directly affected by climate change hazards. These include council assets damaged in extreme weather events, the costs of increased maintenance, and clean-up costs.

Indirect risks

The impacts of climate change may cause knock-on, or indirect risks to councils through the decisions or actions of secondary parties. For instance, as risk profiles rise due to climate change, insurers may raise premiums to unaffordable levels (as occurred in Bundaberg, Queensland in relation to flood cover), or even refuse cover (as occurred in Emerald and Roma

in Queensland in relation to flood insurance). Councils may also be subject to increased litigation risks if they fail to consider the likely effects of climate change when exercising their statutory responsibilities. For instance, without consistent planning legislation and well-defined roles and responsibilities, councils may find it difficult to refuse maladaptive developments, exposing them to increased litigation (NCCARF 2013).

Community risks

Local communities face a range of climate risks and impacts and are engaged in a variety of ways to cope with or adapt to these. In turn, the strain on the community from these compounding impacts can alter council decision making and activities.

2. Direct climate impacts and risks

Councils are already dealing with direct impacts on their operations, assets and expenditure from climate change-driven extreme weather events. With continued warming locked in (see Box 2), these risks are set to increase with more frequent and intense extreme weather events.

Australia's 537 councils are responsible for the provision of community infrastructure and assets (including buildings, structures, machinery, equipment and land) valued at around \$457 billion (2018-19), making them one of Australia's most significant infrastructure owners and managers (ALGA 2021a). Many council assets have a long lifespan (greater than 50 years) so will be affected by escalating climate change impacts long into the future.

The types of council assets at risk of climate damage are as diverse as the extreme weather events that threaten them. Roads are one of the most valuable assets that councils manage (Balston et al. 2012), accounting for approximately 75% of the national road length (ALGA 2021b). In addition, councils manage buildings such as community houses, libraries, town halls and gyms, other transport infrastructure such as local airports, and land that makes up public open spaces such as foreshores, beaches and parks. Critical infrastructure such as drains and footpaths also fall within council responsibility.

Some impacts on council assets are slow and chronic, such as increased temperatures deteriorating infrastructure, while others are rapid and acute from fast onset hazards, such as a bushfire destroying buildings within hours.

Figure 1: Roads and a new bridge submerged during a flood in Windsor, New South Wales, in 2021.



CASE STUDY 1: RISING SEA LEVELS AND COASTAL INUNDATION

Australian beaches are at high risk from climate change with over half the coastline vulnerable to erosion from rising sea levels, and an estimated \$226 billion worth of infrastructure and homes at risk from coastal inundation at a sea level rise of 1.1 metres (DCCEE 2011).¹

Councils face complex and long-standing problems when it comes to managing the coastline, and these problems are set to worsen due to climate change. Whilst council decisions are made within frameworks and legislation developed by state and territory governments, and can be overruled by these governments, councils make the majority of planning and development decisions relating to the everyday maintenance and management of coastal zones. This is

done both through the development and promulgation of local planning schemes that set out land use zoning and setbacks, and via individual decisions made by councils on development applications (Harvey and Caton 2010).

Councils are responsible for maintaining beaches and coastal facilities. Councils are also responsible for decisions regarding roads and carparks, the location of access paths, keeping public coastal land in public use, and maintaining coastal reserves and associated facilities, including boat ramps and jetties.² The task of shoreline protection is shared between local and state and territory governments. The costs of being the “coastal housekeeper” are high due to the popularity and heavy use of the coastal zone by residents, as well as the fact that catchment wastes end up at the coast (Harvey and Caton 2010).

Councils are one of Australia’s most significant infrastructure owners, and are already experiencing climate impacts on their assets.

¹ This is comparable to the upper range of likely sea level rise by 2100 under a very high greenhouse gas emissions scenario, as outlined in the most recent IPCC report (IPCC 2021b). However, the IPCC (2021b, p. 28) notes that: “Global mean sea level rise above the likely range – approaching 2 m by 2100 and 5 m by 2150 under a very high GHG emissions scenario (SSP5-8.5) (low confidence) – cannot be ruled out due to deep uncertainty in ice sheet processes”. Due to these uncertainties, as well as further development along the coastline since the study by DCCEE (2011) was published, it is worth noting that the value of homes and infrastructure at risk from sea level rise would likely be much higher.

² Water authorities can also be involved in planning and decision-making regarding some coastal assets.

Sea level rise and associated erosion and inundation due to storm surges pose significant challenges to coastal councils, and these challenges will continue to accelerate. Implementing coastal adaptation measures and policies requires reconciling competing social values including economic development, scenic amenity, public health and safety, and preservation of natural resources. For example, coastal “retreat” might be the best option for the preservation of beaches and coastal habitats, but is unlikely to be the preferred option of coastal-dwelling residents. Uncertainties of planning for the long-term and the need to consider multiple time frames means traditional cost-benefit analysis is of limited use. Coastal adaptation measures, such as beach nourishment and hard defences, are often very costly. Individual landholders may be the primary beneficiaries, but could find the costs prohibitively expensive. At the same time, councils may have a hard time justifying expenditure on coastal defences for which the predominant purpose is the protection of private property. The costs of seawalls are sometimes partially transferred to third parties, and flow on effects borne by the surrounding environment. For example, erosion of sand adjacent to and immediately in front of seawalls can be exacerbated. These factors make the value proposition of coastal defences difficult to resolve as the costs and benefits are often borne by different actors.

Rising sea levels and associated coastal inundation is already affecting many coastal local government areas. In a recent member survey by Australian Coastal Councils Association, 90% of council respondents said they had been affected by coastal erosion hazards (such as damage to infrastructure from storm surge) in the past five years (ABC News 2021a).

A case in point is the township of Port Fairy (in Moyne Shire), located 280km west of Melbourne on Victoria’s south west coast. The south facing coastline is low-lying and subject to wave run-up and inundation. Seawater regularly spills onto the road and adjoining land during storm surges. Thirty houses are at risk of being undermined by present day erosion, a number that will increase to around 200 by 2100 (Flocard et al. 2013). The east-facing beach consists of fine sand, making it highly susceptible to erosion and dune recession. Under existing sea level rise, two decommissioned landfills have become exposed due to dune recession and are releasing contaminants and debris into the coastal environment. One of the landfill sites, the former municipal tip, dates back to the 1970s, and could contain substances such as asbestos, faeces and medical waste (ABC News 2019). As a stop-gap measure, the council has embarked on a program to extend the existing sea wall structure, at a cost of \$1.1 million (ABC News 2019). The cost of upgrading the seawall to a standard that would be effective until 2100, considering future sea level rise, has been estimated to be around \$3 million (Moyne Shire Council 2018). The council has also proposed adding large quantities of sand to the beach (a process known as “beach nourishment”) to protect the decommissioned landfills and provide sand for beachgoers to enjoy. However, without removing the landfill sites entirely – at an estimated cost of around \$22 million – the risk of waste being exposed in the future remains (Moyne Shire Council 2018).



Figure 2: Coastal erosion in Gold Coast, Queensland.

The Gold Coast is another example of coastal councils struggling with the challenges of sea-level rise. Beaches, such as those on the Gold Coast, are extremely vulnerable to recession as sea level rises, combined with the impacts of increased storm surges (Sano et al. 2011), and more southerly occurrence of tropical cyclones (Kossin et al. 2014). There is little to no opportunity for these beaches to move landwards due to the adjacent high-rise development. The Gold Coast coastline has been highly modified since the 1960s. Artificial sand dunes over rocky armouring are actively maintained by Gold Coast City Council through beach nourishment. In 2017, over three million cubic metres of sand were delivered to vulnerable sections of the coastline as part of the Gold Coast Beach Nourishment Project, at a cost of \$13.9 million (City of Gold Coast 2019). Tidal inlets are also artificially maintained with dredging, and jetties with rock groynes and an artificial surf reef provide coastal protection. The cost of beach nourishment will be an estimated \$11-54 million per year over the next century, depending on the sea-level rise scenario used (Cooper and Lemckert 2012). Pre-planned adaptation would

likely enable the Gold Coast to survive a sea level rise of 1 metre, but a 2 metre rise would severely stretch the city's resources. The raising of the artificial dune and the rock bund would require additional material and cost, varying between \$30 and \$150 million per year over the next century, depending on the rate of sea level rise (DCC 2009). Protection of the 500km long lagoonal shoreline will also require revetments (sloping structures that absorb the energy of incoming water) around the entire perimeter of the waterbody and raising of bridges and roads. Under 1 metre of sea level rise, the entire area would likely be vulnerable to flooding semi-annually without systematic enhancement of coastal protection.

CASE STUDY 2: RAPID AND EXTREME HAZARDS

Extreme weather events that occurred in 2019/20, including the Black Summer Bushfires, resulted in significant damage to council assets across New South Wales. The estimated costs of restoring the damage from bushfires in Bega Valley Shire Council was \$20.5 million, with a further bill of \$8 million resulting from flooding events in February, July and August 2020 (Audit Office of New South Wales 2021).

Clarence Valley Council was also hit by bushfires and floods with a total estimated damages cost of \$19 million. The Council received grants that equated to two thirds of these costs (\$7 million related to flood and storm damage and \$5.2 million related to bushfires) (Audit Office of New South Wales 2021).

Eurobodalla Shire Council's loss of 14 bridges due to bushfires cost an estimated \$10 million alone (Audit Office of New South Wales 2021). Those 14 bridges are just a fraction of the 63 NSW local government bridges destroyed or damaged in the 2019/20 bushfires (Royal Commission into National Natural Disaster Arrangements 2020).

Some of the damage to council assets comes not just as a result of disasters, but from responding to them. In Shoalhaven City Council, 84 roads totalling 316km were damaged not only as a result of the bushfires, but also from firefighting efforts. Large vehicles, excavators and other equipment used in the firefighting effort and driven on unsuitable roads caused significant damage (Shoalhaven City Council 2020). In Mallacoota, the airfield's runway pavement was damaged by heavy aircraft operations carried out in response to the bushfires (Shoalhaven City Council 2020).

Figure 3 (left): Reedy Creek Bridge destroyed by fire in Eurobodalla Shire area, New South Wales, January 2020.

Figure 4 (right): Reedy Creek temporary crossing built to replace bridge destroyed by flood waters, February 2020.



When assets are damaged, or extreme weather events disrupt activities, council operations can be affected. Extreme weather events are already disrupting standard council services such as use of libraries and recreation facilities, rubbish collection and grounds maintenance. Moreover, councils' responsibility to the local community means that extreme weather events trigger additional operational responsibilities on top of council's core service delivery.

CASE STUDY 3: THE RISING COSTS OF MAINTAINING COUNCIL ASSETS

Extreme weather can significantly affect the maintenance costs and lifespan of council-owned assets and infrastructure. Droughts and storms can have a particularly severe impact on assets such as sports fields. Drought (and associated extreme heat) can lead to compaction of playing fields, resulting in an increased incidence of injuries.

Water availability was particularly limited during the Millennium Drought due to government mandated water restrictions (Dingle and Mallen 2020). Consequently, many compacted playing fields across Victoria were closed, both as a safety precaution and because of difficulties in obtaining public liability insurance (Dingle and Mallen 2020). For example, more than half of the community sporting leagues in rural Victoria had their sporting season curtailed in 2007 due to the drought. When water allocations have been reached, some community-level sports clubs have paid for water to be carted in. Water is traditionally around \$50-60 per megalitre, but can go up to around \$220-240 per megalitre due to limited supply and high demand. During the Millennium Drought, communities that could afford to purchase carted water had usable fields, and communities that could not afford to cart in water had their fields closed (Dingle and Mallen 2020).

CASE STUDY 4: EMERGENCY MANAGEMENT AT A LOCAL LEVEL

Although state and territory governments have the primary responsibility for emergency management, local governments play a critical support role. During an extreme weather event, such as a bushfire, councils undertake additional activities above and beyond core service delivery. In some cases, this may be true not just for the council directly affected, but those surrounding it as well. For example, during the 2020 Kangaroo Island fire, 23 South Australian councils supported the affected council in its response (LGA of SA 2020).

During the 2019/20 bushfires, more than 100 local government areas were affected (Royal Commission into Natural Disaster Arrangements 2020). Sixty-eight percent of the local government area of Shoalhaven was burnt (Shoalhaven City Council 2020). After its experience in the fires, the Council identified the following rapid-response interventions as being undertaken:

- › Waste disposal;
- › Road and bridge repairs;
- › Telecommunications reinstatement;
- › Water supplies and sewer repairs;
- › Power supply provision;
- › Temporary accommodation;
- › Food and urgent necessities;
- › Mental health support;
- › Fencing repairs to contain livestock;
- › Distribution and storage of donations and supplies;
- › Establishment and staffing of recovery centres and assistance points;
- › Financial assistance (ALGA 2021a).

In Towong Shire Council in Victoria, 43% of its total area was burned during the 2019/20 bushfires (Commonwealth of Australia 2020). Council staff were required to undertake emergency management roles on top of their normal functions. The council's resources were stretched to their limit during the season by managing the disaster, with the resources reportedly being "effectively exhausted" within 72 hours (Commonwealth of Australia 2020). With 22% of the council's staff members also reported to be personally affected by the bushfires, this presented significant challenges for Towong performing its relief, recovery and coordination functions.

The costs of these emergency management support activities can add up quickly for councils. For example, the 2019/20 bushfires caused numerous power cuts to the Shoalhaven City Council area, which spoiled food for residents. Shoalhaven City Council waived fees for the disposal of green waste, costing Council approximately \$630,000, and for spoiled food, costing Council \$193,600 (Shoalhaven City Council 2020).

Yarra Ranges Council in Victoria faced similar costs after storms in June 2021 brought significant damage and prolonged power outages to the region. In the local government area, 72 buildings (including 68 homes) were damaged to the point of being uninhabitable and over 54,000 residents were without power (11,346 for a period of 1-2 weeks and 891 for a period of 2-3 weeks) (Yarra Ranges Council 2021a). Initial conservative estimates of the required financial commitment to undertake the necessary rehabilitation, restoration and recovery work were approximately \$65 million (Yarra Ranges Council 2021). This does not include any work required on private property which has been initially estimated at over \$160 million (Yarra Ranges Council 2021).

During Black Summer, one fifth of Towong Shire Council staff were personally affected and council resources were "effectively exhausted" within 72 hours.

Beyond assets and operations, climate change is affecting council staff, with extreme weather influencing both the health and wellbeing of individuals, and how well they can perform their duties.

CASE STUDY 5: REPEATED COUNCIL SERVICE DISRUPTION DUE TO EXTREME WEATHER

Pools and recreation centres are frequently managed by councils with services and facilities provided to the local community. Extreme weather events can threaten this infrastructure in a variety of ways with repairs often proving expensive.

The Mittagong Swimming Pool in Wingecarribee Shire Council has been plagued with damage from repeated storms and flooding, with multiple closures to undergo repair. Between 2014

and 2021, the pool was closed five times for major repairs and refurbishment as a result of flood damage with a total repair cost of \$6.1 million (Wingecarribee Shire Council Media Centre 2021). In making the decision for the pool to remain closed across summer, 2021/22 Council's Interim Administrator Viv May commented:

"There's no point continually throwing money at the pool every time it floods without a long-term plan. It's important that Council provide the community with a facility that isn't continually interrupted or closed." (Wingecarribee Shire Council Media Centre 2021).

Figure 5: Damage and flooding at Mittagong Swimming Pool, 2020.



CASE STUDY 6: HEATWAVES AND WORKPLACE SAFETY AT COUNCILS

Climate impacts can affect workers in a range of ways, and council staff are no exception. In particular, heatwaves can push the physical and mental capacity of workers beyond what is safe, with outdoor workers and those in environments with poor climate control particularly at risk (Humphrys et al. 2020). Heat exposure can increase the risk of workplace accidents through physical fatigue and slowed decision-making capacity (Rowlinson et al. 2014). High heat can also impact workers in less direct ways, such as poor sleep or overheating while working, making the commute to work more dangerous (Humphrys et al. 2020).

In 2019, researchers from the University of Technology Sydney gathered quantitative and qualitative data from climate-exposed workers in the City of Sydney, including parks and road

maintenance council employees. Focusing on work during heatwaves, the data revealed that many respondents felt less comfortable at work (such as feeling hot, thirsty, fatigued and having difficulty concentrating) and their work was affected. One-fifth of council workers took extra breaks, and two-fifths changed the way they did their work, such as undertaking lighter duties or stopping work.

Quotes from council workers who participated in the survey included:

“Hedging large hedges most of the day creates a hot personal environment due to how close the machinery is to your body and the extra safety gear worn”

“Temperature was around 35°C, estimate it felt like around 40°C. Very hot and somewhat uncomfortable. Makes any labour task harder to physically do and reduces the speed at which you work” (Biloria et al. 2019).

Figure 6: Protective equipment makes hard work even hotter.



3. Indirect climate impacts and risks

The impacts of climate change hazards may lead secondary actors to make decisions that pose risks to councils. For example, insurers may raise the price of premiums, or even refuse cover, or councils may be subject to increased litigation risks related to climate change. These indirect risks are explored in this chapter.

EXPOSURE TO INCREASED LITIGATION RISK

Councils are potentially exposed to liability if they fail to take into account the likely effects of climate change when exercising a wide range of statutory responsibilities including across land-use planning, development approvals, management of public infrastructure (such as drains and roads), management of public lands (such as foreshores and parks), management of community facilities (e.g. libraries and sporting facilities), public health, water and sewerage services (in some states), and emergency planning (Baker and McKenzie 2011). Councils are also exposed to potential liability if they fail to disclose information about climate change risks, or if they share incorrect information.

Climate change-related litigation affecting councils is likely to arise under either administrative law or tort law (see Box 4). Administrative challenges are likely to occur shortly after a decision has been made. For example, a neighbour or developer may challenge the rejection or approval of a development based on whether or not climate change risks have been adequately considered. By contrast, proceedings in relation to negligence or nuisance may occur decades after a decision has been made, once climate change hazards further materialise (Bell-James et al. 2017).

 **BOX 4: CLIMATE CHANGE AND ADMINISTRATIVE AND TORT LAW**

Administrative law allows citizens to challenge decisions made by government authorities. Depending on the context, this may be in the form of a merits review or a judicial review. A merits review is a broad form of review where the court is given the power exercised by the original decision-maker to consider the same or additional evidence afresh and make a new decision. For example, in a merits review a court might deliberate over whether or not a decision made by council to approve a beachside development was a good decision, drawing on relevant legislation and/or expert evidence to consider the issue (such as evidence on future projections for sea level rise). Judicial review, on the other hand, allows the court to consider *only* whether the original decision maker followed correct statutory procedures and acted within their authority. For example, a judicial review might focus on whether or not submissions which raised concerns about climate change had been adequately considered by a council before approving a development. The right to a merits review must be specifically granted by a statute and varies across different states and territories. It is usually limited in terms of who can bring a review (e.g. it may be limited to people who made a submission during the planning process). The right to a judicial review is broader. Generally, a person has a right to judicial review if they will be affected by a decision in some way, or if the statute gives them the right (Bell-James et al. 2017).

Tort law, which includes negligence and nuisance, allows citizens to seek compensation in response to a careless decision or action that has caused loss or harm (Bell-James et al. 2017). The main tort relevant to councils is negligence. There are three elements of negligence: a duty of care was owed; that duty of care was breached; and this breach caused

damage. Generally speaking, local governments have a duty of care to landholders. According to civil liability legislation in most states and territories, a duty of care is only breached if: the risk was foreseeable, the risk was not insignificant, and a “reasonable person” would have taken precautions under the circumstances. Generally, for an action in negligence to be successful, there must be: a) evidence that actual harm has occurred (although there is growing recognition that some negligence actions can result in an injunction to prevent the breach from occurring, as shown by *Sharma v Minister for the Environment* [2021]) and b) some level of causation demonstrated i.e. that actions by the council were (or would be) the cause of the harm. For example, a claim for liability in negligence could be made if a poorly maintained council asset caused harm to a person during an extreme weather event.

Nuisance is another tort that may be relevant to councils in the context of climate change. Nuisance liability claims may be made if a council’s unreasonable land use causes unreasonable interference with a neighbouring person’s land. For example, erosion exacerbated by a council seawall that encroaches on private property could give rise to a claim in nuisance liability.

Some states and territories have legislative provisions limiting the liability of public authorities (including councils) for negligence and nuisance. In New South Wales, under s733 of the *Local Government Act 1993*, councils can raise a defense against negligence and nuisance claims if any acts or omissions that caused the plaintiff loss or damage were done honestly or in good faith in the performance of statutory functions. This is an important protection for councils (Baker and McKenzie 2011).

There have been a large range of cases relating to the liability of councils in nuisance and negligence, and in judicial and merits reviews. Climate change is now becoming increasingly relevant across these areas of law (Baker and McKenzie 2011). Most of the

legal challenges brought against councils to date have been under administrative law. Some of the types of claims (and examples of cases) that have been brought against local governments in relation to climate change are listed in Box 5.

BOX 5: TYPES OF LEGAL CLAIMS RELATED TO CLIMATE CHANGE AND COUNCILS

Legal challenges involving councils and related to climate change have focused on the following areas:

- › Private property owners challenging the application of climate-relevant conditions in building permits (e.g. *Lark v Shellharbour City Council* [2015] and *Charles & Howard Pty Ltd v Redland Shire Council* [2015]);
- › Private property owners or developers challenging the refusal of a development application based on climate change grounds (such as unacceptably high risk of current or anticipated coastal flooding due to sea level rise, or failure to consider various climate impacts in accordance with state and national coastal and climate policy) (e.g. *Joe Davidson Town Planning v Byron Shire Council* [2018], *Restall & Ors v Hobsons Bay City Council* [2010] and *Pridel Investments Pty. Ltd. v Coffs Harbour City Council* [2017]);
- › Claims by third parties challenging council approval of a development in an area subject to coastal erosion or flood risk, or where it was argued that climate impacts had not been properly considered (e.g. *Stewart & Honan v Moyne Shire Council* [2014]);
- › Proceedings initiated by private landholders seeking compensation in relation to negligence and nuisance due to maladaptation – for example, coastal protection works that exacerbated erosion on adjacent beach parcels (e.g. in *Ralph Lauren 57 v Byron Shire Council* [2016] as outlined in case study below);
- › Proceedings initiated by a council seeking to prevent a private landowner constructing coastal protection works (e.g. *Byron Shire Council v Vaughan* [2009]);

A number of climate-related legal challenges involving councils have been launched in Australia.

 **BOX 5: CONTINUED**

- › Proceedings initiated by private landholders alleging that council breached a development consent in preventing the construction of private coastal protection works (e.g. *Vaughan v Byron Shire Council* [2011]);
- › Proceedings initiated by a private landowner seeking to compel a council to construct coastal protection works;
- › Claims by third parties against development approvals where submissions that raised concerns about climate change had not been adequately considered;
- › Challenges to the preparation and adoption of planning scheme amendments that sought to impose standards to guide development in a coastal zone;
- › Claims challenging the refusal or approval of developments in the coastal area without a coastal hazard vulnerability assessment having been conducted (e.g. *Ronchi v Wellington Shire Council* [2009], *Owen v Casey City Council* [2010], and *Cooke v Greater Geelong City Council* [2010]).

Examples of cases sourced from Sabin Centre for Climate Change Law (2021).

In some cases, whilst applicants did not explicitly make arguments about climate change, the Tribunal introduced climate change as a relevant consideration. For example, in *Cadzow Enterprises Pty Ltd v Port Phillip County Council* [2010], the permit to construct a house near Port Phillip Bay was challenged by local residents. Though the residents did not make arguments related to climate change or flooding, the Tribunal sought information about risk of flooding from sea level rise from the regional flood control authority, Melbourne Water, which recommended that the house be substantially elevated. The Tribunal subsequently granted a permit to develop, subject to the house being elevated in line with Melbourne Water's recommendation (Sabin Centre for Climate Change Law 2021).

In *Johnston v Bass Coast Shire Council* [2015], a third party, Marjorie Johnston on behalf of the Silverleaves Conservation Society, applied for a review of Bass Coast Shire Council's decision to permit construction of a three-level building due to the environmental and landscape impacts that the building would have, amongst other factors. Although the influence of climate change on coastal hazards was not raised in the grounds of the objection, the court considered these risks, but ultimately found the development plan to be acceptable (Sabin Centre for Climate Change Law 2021). These cases illustrate that even when the grounds of objection to developments do not necessarily include climate change risks, the court may introduce these risks as relevant considerations in its deliberations.

Figure 7: Current inundation risk modelling at highest tide in Silverleaves on Phillip Island, Victoria.

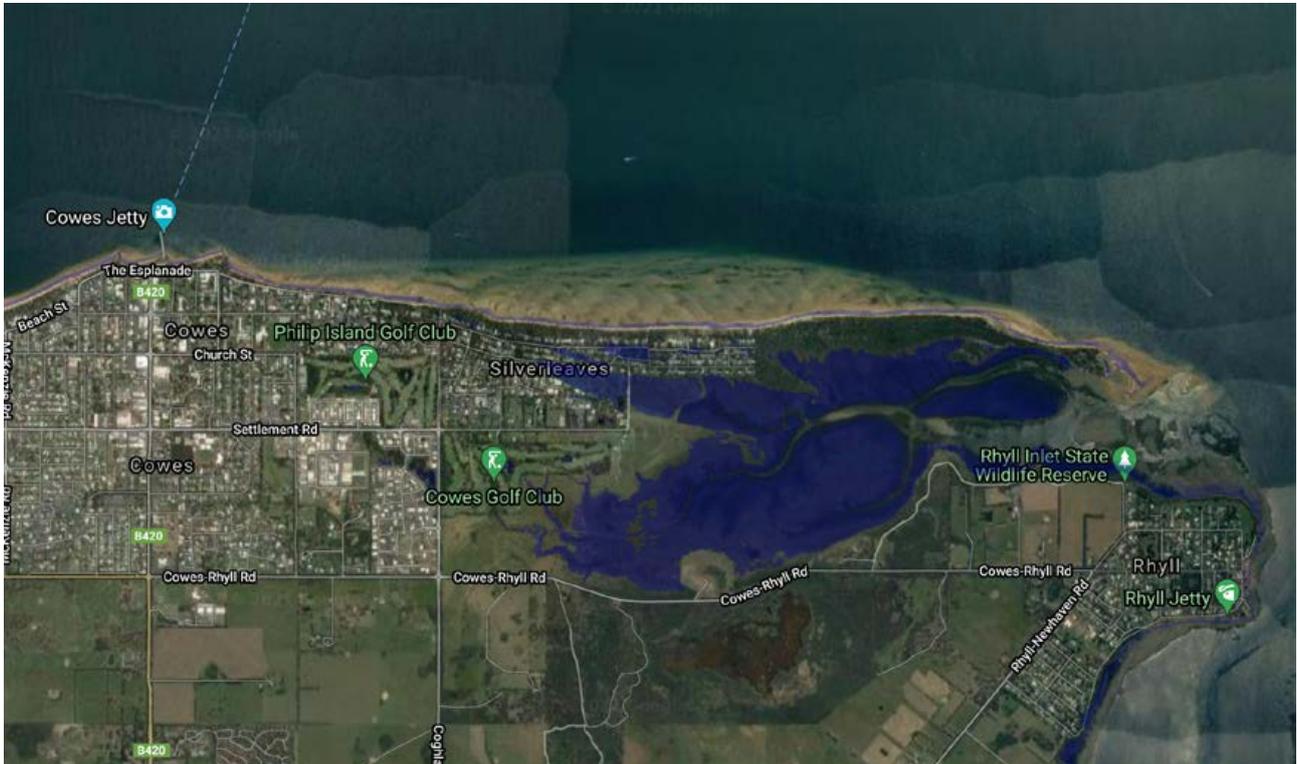
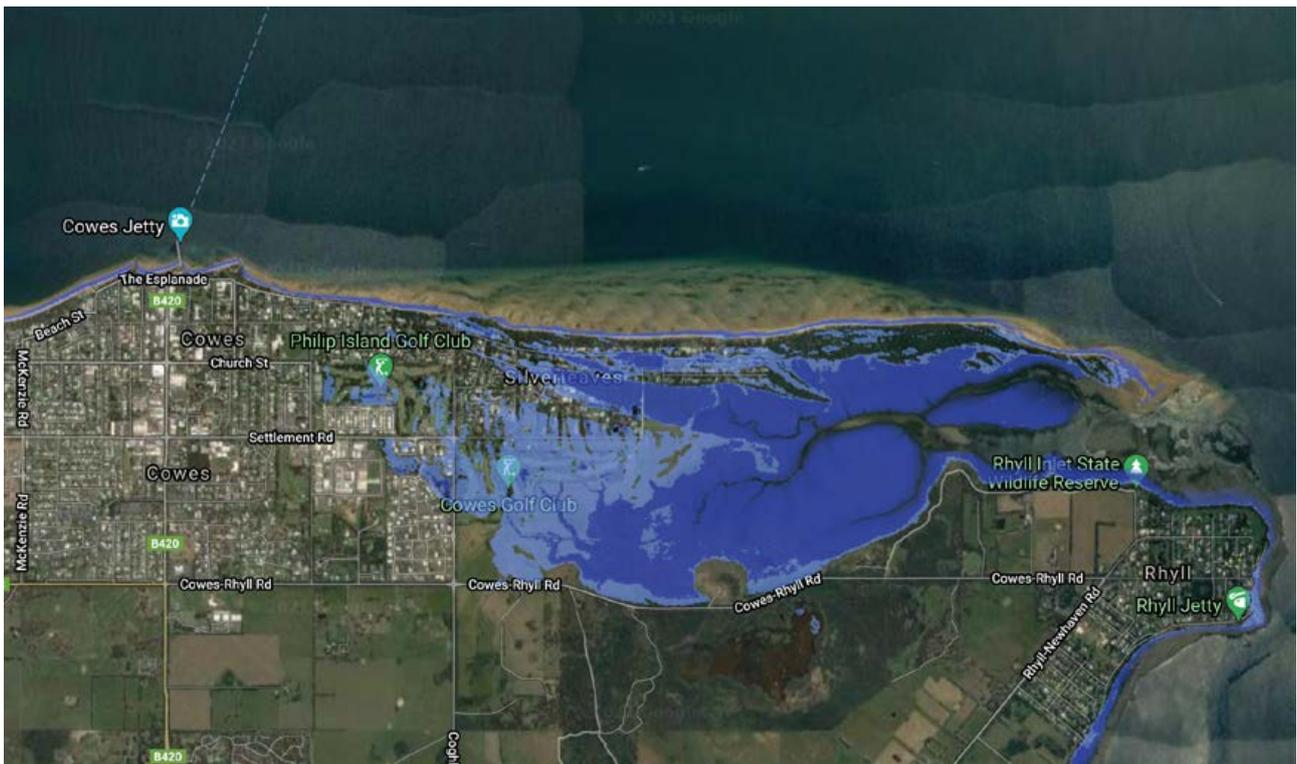


Figure 8: Predicted inundation risk modelling at highest tide for 2100 with +0.74m sea-level rise.



In several cases, the main grounds of objection have been about whether or not climate risks have been adequately considered in the process of decision making. For example, in *Owen v Casey City Council* [2010] the core issue for the Tribunal was whether a coastal hazard vulnerability assessment, which would specify the nature and degree of flood risk, was a prerequisite for council reviewing its decision to reject a development application for two dwellings near the coast in a designated flood zone. Ultimately, the Tribunal upheld the council's rejection and ordered that a coastal hazard vulnerability assessment be commissioned. When the parties came before the Tribunal again, the Tribunal found the assessment was inadequate as it did not consider risks of riverine flooding, which will also worsen with climate change (Sabin Centre for Climate Change Law 2021).

Types of legal risks related to climate change

Potential challenges related to disclosing or withholding information

Local governments may face legal risks if they decide to release hazard risk information related to climate change. For example, landholders may use tort law (e.g. negligence liability) to challenge the release of information if it reduces the value of their property. This may occur regardless of whether the information is correct, but where the information is correct such a case is unlikely to succeed. First, releasing accurate information on climate risks for the benefit of public safety would not breach a duty of care. Second, the benefits of providing risk information to the public would likely be seen to outweigh any potential negative impact on property values (Bell-James et al. 2017). However, such a case has not yet occurred in Australia, so it is difficult to be certain about the likely outcome of such a challenge.

If a council released climate change risk information that was incorrect, partial or confusingly presented, a much stronger case could be made about negligence liability. Given that the future extent of climate change risks and impacts is dependent on global actions to reduce greenhouse gas emissions, some level of uncertainty is unavoidable. Local governments should take care to ensure that information provided is based on the most up-to-date science available, and that a balance is struck between communicating the risk of various hazards and communicating uncertainty. It may be appropriate for disclaimers to accompany any climate change risk information that is released, which may reduce liability (Bell-James et al. 2017).

On the other hand, legal challenges may arise if local governments fail to provide information on climate change and hazard risks. For example, claims may arise on the basis that a council failed to seek information on climate change risks, and to make that information publicly available, leading a landholder to develop in a risky area and subsequently experience loss. In considering such an argument, the court would be likely to take into account the size, resources, capacity (e.g. financial resources) and competing demands of a local government to determine whether or not it is realistic for the council to have allocated resources towards that purpose. This is in line with statutory provisions in tort legislation in most states and territories that limit the liability of public authorities, essentially recognising that governments have limited resources and many functions to perform, and funds can not necessarily be directed to every purpose that constituents may desire (Bell-James et al. 2017).

Another situation that could give rise to legal challenges is if a council has hazard risk information, but withholds it. This is more likely to be classified as negligent misstatement by a court, particularly if that information has been explicitly requested (Bell-James et al. 2017).

Legal challenges related to strategic planning and development approvals

Local governments also face the risk of legal challenges when deciding whether or not to approve developments, most likely through administrative law (either judicial review or merits review). This may occur no matter what decision is made. If a development application is refused, it may be challenged by a developer. If approved, challenges may be brought by third parties such as neighbours or community groups. Developers may also challenge approvals if they come with conditions which are seen to be unduly onerous.

There is also a risk of challenges being brought against development approvals in the long-term, under claims of negligence liability. For example, if a development is permitted in an area exposed to foreseeable future climate change risks, the council may be held liable for harm incurred once the risks have materialised (Bell-James et al. 2017).

Councils should be particularly careful about approving private seawalls given the risk

that they could be held liable in nuisance or negligence if a seawall has a negative impact on other parties, i.e. if the seawall exacerbates erosion on other parcels of beachfront land (Bell-James et al. 2017).

Another role of local government is strategic planning around which types of developments can be situated where (usually outlined in planning schemes). Failure to include climate change risks in planning schemes themselves would be unlikely to form the basis of successful litigation claims. Strategic policy is generally exempt from negligence liability, and it is generally well-accepted in administrative law that the failure to create legislation is not open to review. However, it may be useful for local governments to include consideration of climate change risks in strategic policies such as planning schemes. Whilst legal challenges related to the inclusion or exclusion of climate change in strategic policies themselves are unlikely to succeed, the existence of such strategic policies could help provide consistency and predictability in decision-making, which could reduce the risk of individual decisions around development applications being challenged (Bell-James et al. 2017).

Figure 9: Holiday resort villas on Kangaroo island, South Australia destroyed by 2020 bushfires.



CASE STUDY 7: IMPORTANCE OF INCLUDING CLIMATE RISKS IN PLANNING STRATEGIES

In *Fetherston v Wollongong City Council* [2016] Mr. Fetherston, who had been denied permission to build a two-story dwelling by the Wollongong City Council, appealed that decision by arguing, among other things, that the design made adequate provision for flood risk. Before ordering the council to grant the permit, the court considered evidence on flooding from two experts, one of whom presented evidence of the effects of climate change. The court, noting that the Wollongong Development Control Plan did not require a planning review to incorporate climate change impacts, accepted the submission of the flood expert who had not evaluated climate risk (Sabin Centre for Climate Change Law 2021). This case speaks to the significance of failing to incorporate climate change considerations into relevant planning documents.

The inclusion of climate risks in planning schemes could result in restrictions to development being placed on certain parcels of land. This could, in turn, result in pushback from affected landholders who may argue that they are entitled to compensation for ‘injurious affection’ if the value and insurability of their property is reduced by the planning scheme amendments. Noosa Shire Council is facing such opposition to its Noosa Council Coastal Hazards Adaptation Plan from coastal landholders, who warn the Council will face a potential class action for ‘injurious affection’ compensation if the planning scheme is amended leading to a loss in the

value of coastal properties (AFR 2021). In most states and territories, compensation claims arising from planning scheme amendments restricting development potential are unlikely to succeed, unless land is compulsorily acquired or reserved for a public purpose. There are a limited number of situations in Western Australia, Tasmania and Victoria where compensation is payable (Baker and McKenzie 2011). Queensland does have a broad provision for injurious affection due to adverse planning scheme amendments, but a number of exceptions may constrain claims for compensation³ (Baker and McKenzie 2011).

Legal challenges related to asset management

Local governments are not obliged to provide risk mitigation infrastructure (e.g. seawalls). The allocation of financial and other resources of public authorities is not open to challenge under statutory provisions governing negligence liability. Hence, a decision not to build a seawall due to resourcing constraints would be unlikely to be considered negligent (Bell-James et al. 2017). It would also be highly unlikely for it to constitute public nuisance.

On the other hand, if a council does build coastal protective infrastructure or stormwater infrastructure, but fails to adequately maintain it, leading to loss or harm, it may be found liable for negligence or nuisance. Similarly, if a council constructs a seawall that leads to erosion on adjacent parcels of land and causes damage to private properties, claims of negligence or nuisance might be brought.

³ For example, under s 30 of the *Queensland Planning Act (2016)*, a planning change is not considered to be adverse if it: reduces a material risk of serious harm to persons or property on the premises from natural events or processes and a report assessing feasible alternatives for reducing the risk, including imposing development conditions on development approvals, has been prepared by the local government as instructed under the Minister’s rules that apply specifically to the making of a planning change to reduce the risk (see s 30 of the *Queensland Planning Act 2016*).

CASE STUDY 8: LEGAL CHALLENGES TO COASTAL ADAPTATION WORKS

In *Ralph Lauren 57 v Byron Shire Council* [2016] residents who owned property along Belongil Beach in New South Wales sought compensation from Byron Shire Council to cover the costs of shoreline protections and loss of property value due to the encroaching sea. The plaintiffs argued that the council was negligent for installing hard shoreline armouring in the 1960s and 1970s that had since displaced wave action to adjacent portions of beach, worsening erosion there. The plaintiffs also argued that the council's shoreline armouring constituted an instance of public nuisance. The plaintiffs further argued that their injury was compounded by the council's position that managed retreat is the preferred policy response to shoreline encroachment. Ultimately, the council's insurers, who had been leading the defense, agreed to a settlement with the plaintiffs so the court never determined legal liability for the alleged claims (Sabin Centre for Climate Change Law 2021). The settlement involved Byron Shire Council paying \$2.75 million to

the plaintiffs, as well as agreeing not to remove any existing shoreline protections in front of the properties, or any approved repairs made in the year following the settlement (McDonald 2019).

A few years later, the Transitional Coastal Panel refused an application from property owners along Belongil Beach to repair the seawalls in front of their properties. The Transitional Coastal Panel argued that approving the repairs would impede public access and be a threat to public safety, and would set a precedent leading to the undesirable outcome of continuous seawalls along Belongil Beach, which would also preclude a whole-of-embayment solution to coastal hazards. This decision was appealed by three property owners in *Ralph Lauren Property Ltd v Transitional Coastal Panel* [2018] and related cases.⁴ Justice Brian Preston upheld the Panel's rejection in the New South Wales Land and Environment Court, finding that the repairs would indeed impede public access and would increase damage to the beach (given that no development consent had been granted for the original seawalls) (McDonald 2019).

Litigation against councils is likely to increase as climate impacts escalate, and councils can find themselves caught between a rock and many hard places.

⁴ *Ralph Lauren Pty Ltd v New South Wales Transitional Coastal Panel; Stewartville Pty Ltd v New South Wales Transitional Coastal Panel; Robert Watson v New South Wales Transitional Coastal Panel* [2018] NSWLEC 207 (21 December 2018).

As climate impacts escalate, litigation against councils is likely to increase, and the types of legal challenges are likely to expand. Potential claims against councils could include:

- › Failure to include climate change in local government planning schemes;
- › The inadequacy of emergency procedures when more frequently put to the test;
- › Responsibility for erosion and landslides (catalysed by extreme weather events);
- › The inadequacy of public health and disease prevention programs;
- › Failure to implement strategies to preserve public natural assets and protect properties from climate change risks;
- › Inaction regarding mitigation and adaptation measures;
- › Provision of inadequate information regarding climate change risks or failure to disclose known information about climate change risks (e.g. related to sea level rise);
- › Failure to consider climate change risks in planning decisions;
- › Interference with private property rights as a result of the construction of coastal protection or other works on public land;
- › Failure to provide services or maintain infrastructure for climate change-related reasons;
- › The diminution of land values due to planning scheme amendments and rezoning;
- › Challenges to compulsory acquisition valuations;

- › Reassessment of coastal boundaries and related claims related to diminution of land value as a result of coastal erosion and changes to property boundaries (Baker and McKenzie 2011).

When it comes to climate change, councils face many difficult decisions in a contested space, and can find themselves caught between the community, the courts and state and territory governments. On many fronts, councils are caught between a rock and a hard place. Councils can potentially be exposed to liability for approving or rejecting developments and for withholding or disclosing information on climate change risks. It is virtually impossible, therefore, for councils to entirely eliminate the risks of litigation in relation to climate change. Coastal councils face particular challenges in this regard, and appear to be painfully aware of the risks with 21% of coastal councils ranking legal risks associated with coastal planning decisions as their highest concern (Australian Coastal Councils Association 2019).

However, councils may be able to limit their liability by exercising care when making planning decisions. In particular, by basing their decisions on the best available scientific evidence at the time a decision is made, and having a clear and consistent process/criteria for considering climate impacts when determining development applications. Councils can also reduce their liability by embedding consideration of climate change risks in planning strategies, zoning land appropriately to minimise future risk to people and properties, and taking care to strike an appropriate balance between communicating climate risks and uncertainty to residents.

As climate change accelerates, more litigation is likely to be brought against councils. In many cases, councils will not be able to recuperate the legal and administrative costs associated with this. Actions in negligence and nuisance may be particularly costly and time consuming, as defending proceedings could take several years. Even if councils are successful, it may be difficult to recover all costs. If councils are unsuccessful, potential compensatory damages or injunctions may be extremely onerous. Regardless of the outcome of any legal proceedings, the lack of clarity and fear of repercussions has consequences for effective decision making by councils in regards to risk. Councils would benefit from clearer provisions in the respective state and territory planning laws requiring attention to climate change, and, where councils have given this attention and followed state or territory guidance, better protections for councils that reduce their liability.

Figure 10: Litigation against councils is likely to escalate as climate change impacts escalate.



RISING CLAIMS, DAMAGES AND INSURANCE

Climate change will lead to secondary impacts on councils via changes to the costs and availability of insurance. Insurance is a mechanism to spread risk, but as insurers adjust to changing risk profiles they may choose to refuse cover (as occurred in Roma, Queensland, as discussed in the following case study) or raise insurance premiums (sometimes to unaffordable levels, as occurred in Bundaberg, Queensland) (NCCARF 2013). This can lead to reduced property values and marketability, and may even drive entire communities into decline.

Average home insurance premiums rose by 178% in northern Australia and 52% in the rest of Australia in real terms in the decade between 2007-08 and 2018-19 (ACCC 2020). Over the same period, combined home and contents insurance rose by 122% in Northern Australia and by 71% in the rest of Australia (ACCC

2020). The increase in claims and damages following extreme weather events over recent decades has likely contributed to the rise in insurance premiums.

In the past decade, inflation-adjusted insurance claims following disasters have more than doubled compared to the previous decade (as reported by the Reserve Bank of Australia to the Royal Commission into National Natural Disaster Arrangements) (Commonwealth of Australia 2020). In 2011 and 2017, cyclones Yasi and Debbie caused insured damages of more than \$3 billion, and the Queensland floods in 2010-11 resulted in insured losses of more than \$2.4 billion (The Treasury 2018). More recently, as at 27 August 2020, around 38,500 claims (including building and contents and commercial insurance claims) had been lodged as a result of the 2019/20 bushfires, totalling an estimated \$2.33 billion (Insurance Council of Australia 2020). In total, 38% of councils in New South Wales made insurance claims following natural disasters in 2019/20 (Audit Office of New South Wales 2021).

Figure 11: Clean up in the aftermath of the 2011 floods in Brisbane, Queensland.



Rising general insurance premiums will require councils to spend more to protect their assets. However, perhaps the most significant impact on councils will be the rising incidence of underinsurance and non-insurance in the community. When households that are uninsured or underinsured are affected by extreme weather events, they often face costs they cannot personally meet. If this happens, costs can be transferred to governments, such as through financial support claims and increased demands for governments to contribute to the costs of rebuilding. As observed by Eurobodalla Shire Council (2020, p.22) in NSW after the 2019/20 bushfires:

"It reported that up to one third of people are not insured ... The lack of insurance places increased pressure on governments, not for profit groups and the broader community to provide financial support to those impacted by natural disasters."

In North Queensland, the rate of non-insurance is 17% or more than 62,000 properties, with 95% of uninsured property owners citing cost as the reason (ACCC 2020; Insurance Business Australia 2021). The Northern Territory has a rate of non-insurance of 26%, amounting to more than 13,000 properties, and north Western Australia has a non-insurance rate of 40%, amounting to more than 10,000 properties (ACCC 2020).

Underinsurance occurs when policyholders do have insurance, but the sum insured "is insufficient to enable full replacement of the damaged or destroyed property" (NIBA 2020). There is less data available on underinsurance as it often only comes to light following a large-scale insurable event. After the 2019/20 bushfires, the Insurance Council of Australia estimated that 20-40% of bushfire-affected residents were underinsured (ABC News 2020). Underinsurance extends to businesses, with up to 15% lacking insurance for interruption to business caused by natural hazards (Tooth et al. 2020).

Figure 12: Firefighter observes the wreckage of a home in Kinglake Victoria after the 2009 bushfires.



The consequences of underinsurance and non-insurance extend beyond the individual to the greater functionality of insurance in managing risk because the benefits of risk pooling are reduced as insurance coverage decreases. Further, the consequences are not just financial but can be a matter of life and death. For example, a property owner's level of confidence in their insurance status could affect their decision-making during a bushfire event, and thus have a significant impact on the risk to their lives (The Senate 2020). The Senate Select Committee on Agricultural and Related Industries (2010) noted that:

"Insurance is an integral part of bushfire risk management, not because it protects assets from being destroyed by fire, but because it has an important effect on the risks people are prepared to take to

defend their properties. By providing property owners with the knowledge that their assets will be replaced in the event they are destroyed in a bushfire, adequate insurance cover encourages people to make sensible choices about self-protection in the critical moments of a bushfire disaster." (pp.101,106)

The risk mitigation activities that councils undertake, and the decisions they make, can also play a role in reducing risk exposure in the community, leading to reduced insurance premiums and increased insurance coverage. For example, in Roma Queensland the Maranoa Regional Council contributed to risk reduction infrastructure in the community that had the direct effect of reducing average home and contents insurance premiums.

Figure 13: 2012 Roma floods as seen from the air. Roma, Queensland has a long history of flood events.



CASE STUDY 9: BUILDING INFRASTRUCTURE THAT REDUCES PROPERTY RISKS

Roma, a rural town in south-west Queensland, has a long history of flood events due to its location along Bungil Creek, a tributary of the Condamine River. Roma experienced major flooding events in 2010, 2011 and 2012. The flood in 2012 resulted in a fatality and inundation of approximately 1028 properties, with 580 being flooded above the floor level of the building (ACCC 2020). The insured losses from the event amounted to \$137 million (normalised to 2017 values) (SECCA and ICA 2019) and, subsequently, several insurers announced an embargo on underwriting new insurance policies for Roma residents until flood mitigation works had been constructed. The Maranoa Regional Council commissioned studies of the floodplain in and around Bungil Creek, which informed a number of flood mitigation strategies including the construction of flood levees. The Roma Flood Mitigation Project, implemented in two stages, was designed to reduce flood risk for more than 500 properties (ACCC 2020).

By 2019 the two stages of the levee had been completed. The second stage of the project was completed with funding from the Commonwealth National Insurance Affordability Initiative, the Queensland Government Building our Regions Fund and Maranoa Regional Council. As a direct result of the project, more than 500 Roma properties have had their flood risk officially downgraded and insurers have returned to the market (ACCC 2020).

Modelling undertaken by The Cross-Dependency Initiative (XDI) and reported in 'Compound Costs' (Climate Council 2019) shows that, in the absence of adaptation and risk reduction measures being implemented, the annual average cost of damage from extreme weather and climate hazards to properties will rise to \$85 billion in 2030, with about one in every 19 properties projected to be "uninsurable" (Climate Council 2019). In this analysis, "uninsurable" refers to situations where insurance is either unaffordable (where insurance premiums cost 1% or more of the property value per annum) or unavailable (e.g. some hazards such as coastal inundation and soil subsidence are typically not included in insurance policies, but are included in this analysis). The major impact of increased costs will be geographically clustered around 5-6% of properties (Climate Council 2019).

The number of uninsurable addresses in Australia could reach one in 19 by 2030 – if nothing is done to address escalating risks from extreme weather and climate change.

4. Councils rising to the climate change challenge

HOW COUNCILS ARE REDUCING EMISSIONS, AND SAVING MONEY

Australia's national approach to emissions reductions has been out of step with global action for many years, and has been regularly criticised at home and abroad. While there has been a leadership vacuum from the federal government, state, territory and local governments, alongside business, industry and the community, have been stepping up. All states and territories now have net zero targets and have been strengthening commitments to renewable energy. Globally and in Australia, local governments and communities are aligning with the latest climate science and international agreements, and working towards 100% renewable energy goals and zero emissions targets. Local governments in urban areas have a particularly critical

role in global emissions reductions, with an estimated 70% of the abatement required to achieve the Paris Climate Agreement goals deliverable in urban areas (Echeverri 2018).

Local governments have an extremely important role to play in emissions reductions, and can contribute in at least three ways. First, they can reduce their operational emissions (and costs) that arise from council-owned buildings, infrastructure, vehicles and waste management facilities. Second, they can have a significant influence on reducing community emissions arising from industries, transport, waste, buildings and community behaviour choices within a local government area. Third, local governments can be instrumental in developing innovative solutions to the climate change challenge, and motivating increased climate action from higher levels of government.

Globally and in Australia local governments are working towards zero emissions targets and 100% renewable energy goals.

LOCAL GOVERNMENTS ARE CRITICAL TO

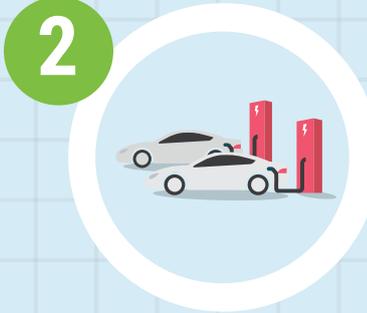
REDUCING EMISSIONS

IN AUSTRALIA

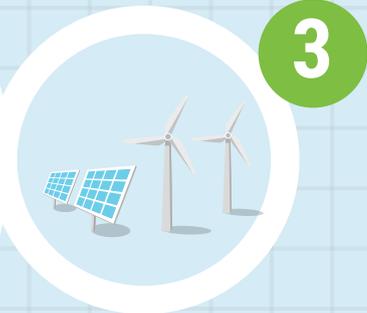
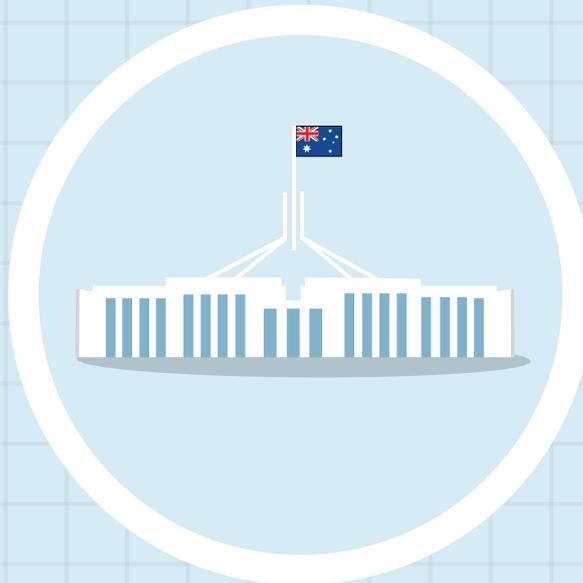
Councils can:



Reduce operational emissions (and costs) that arise from council-owner buildings, infrastructure, vehicles and waste management facilities.



Influence the reduction of emissions arising from industries, transport, waste, buildings and community behaviour choices within the local area.



Develop innovative solutions to the climate change challenge and motivate higher levels of government to act.

Figure 14: It's clear that local governments play a key role in slashing emissions in Australia.

In Australia, local governments have been leaders in climate action for around 20 years, through a range of different initiatives. For example, the Cities for Climate Protection (CCP) program run by Local Governments for Sustainability (ICLEI), which operated between 1997 and 2008, supported 233 councils to develop local action plans with a focus on renewable energy, sustainable transport, waste management and efficient lighting. It is estimated that this program helped councils and community members in Australia avoid 18 million tonnes of CO₂ emissions and save \$95 million in energy costs (Climate Works and MSDI 2020).

Building on this initiative, in 2016, 31 councils in Australia joined the Global Covenant of Mayors for Climate and Energy, forming part of a coalition of 10,000 cities and towns from 139 countries working to reduce emissions and adapt to climate change. The C40 cities initiative is another forum supporting global megacities (including the City of Sydney and the City of Melbourne) to reduce emissions to achieve the Paris goals and address climate change risks (C40 cities 2021). Beyond Zero Emissions' Zero Carbon Communities also supports local councils and communities around Australia on the transition.

The Cities Power Partnership, now Australia's largest network of cities and towns working to tackle climate change, has engaged over 150 local government areas. These local government areas represent more than half of Australia's population and to date the partnership has made more than 780 pledges to reduce emissions across five areas: renewable energy, energy efficiency, sustainable transport and working together for greater impact (CPP 2021).

A survey of Australia's 57 largest local governments (covering 52% of Australia's population) found that all are taking steps to reduce their operational or community emissions, and many have targets or aspirations to reach net zero by 2050 or sooner

(Climate Works and MSDI 2020). Thirty-three councils (58% of those assessed) had put in place a target to reach net zero for 'operational' emissions by 2050 (Climate Works and MSDI 2020). For example, the Cities of Sydney, Melbourne, Brisbane and Adelaide are already carbon neutral for their operational emissions as is Moreland City Council and Darebin City Council in the inner north of Melbourne. Many more councils have a goal of carbon neutrality for operational emissions by 2030, including the City of Darwin.

The 2021 Local Government Climate Survey found that 67% of responding Australian councils have set or are in the process of developing community emissions reductions targets, with an understanding that anything other than a net zero target is not acceptable from a climate risk or ambition perspective (Lynch et al. 2021). For example, the City of Port Phillip, Wollongong and Canada Bay have targets or aspirations for net zero for community-wide emissions by 2050 (Lynch et al. 2021). Councils aiming for the same in 2040 include Brimbank, Ku-ring-gai and Mornington Peninsula (Lynch et al. 2021). Recently, the City of Ballarat Council and the Shire of Augusta Margaret River both endorsed aspirational community-wide net zero targets by 2030 (BREAZE 2021; The Shire of Augusta Margaret River 2020).

Some councils have already achieved net zero emissions for their operations, with many more aiming to reach the goal in 2030 and 2040.

CASE STUDY 10: SETTING AMBITIOUS TARGETS FOR NET ZERO COMMUNITY AND CORPORATE EMISSIONS

Many councils are setting ambitious net zero targets for both corporate and community emissions. What's even more impressive is that these targets are being regularly achieved, or brought forward.

The City of Sydney was the first local government in Australia to become carbon neutral for its operations in 2007 with the Council's operations now powered by 100% renewable electricity.

The proposed new Environmental Strategy 2021-2025 sets out a target for the City of Sydney to reach net zero carbon emissions across the community by 2035 – five years earlier than previously planned.

Following closely behind Sydney as the second council to do so, Moreland City Council achieved carbon neutrality for its operational emissions in 2012. In 2014, Moreland City Council developed its Zero Carbon Evolution Strategy (2014-2020), setting a target to be on track to zero net carbon emissions across the community by 2020.

Figure 15: Solar panels on Turbine Hall, Cockatoo Island, New South Wales.



CASE STUDY 11: COUNCIL INITIATIVES THAT REDUCE EMISSIONS - AND CREATE JOBS

Renewable energy and storage for councils and communities that reduce power bills and increase energy independence and resilience.

Sunshine Coast Solar Farm

Sunshine Coast Regional Council (QLD)



The 15MW Sunshine Coast Solar Farm is providing enough energy to meet Council's entire electricity demand every year, including administration buildings, aquatic centres and sporting facilities, libraries and other public buildings. The facility is expected to deliver Council net savings of over \$22 million over a 30-year period (Sunshine Coast Regional Council 2020).

Sustainable transport solutions to future proof cities and better connect communities and regions.

Fifteenth Avenue Smart Transit Corridor

Liverpool City Council (NSW)



Fifteenth Avenue Smart Transit (FAST) Corridor is a visionary city-shaping project to deliver a sustainable public transport link between the Liverpool CBD and Western Sydney International Airport in time for its 2026 opening. High quality public and active transport options (like trackless trams) are critical for commuters, residents and airport visitors and the FAST Corridor will play a key role in the sustainable growth of the Liverpool LGA (Liverpool City Council 2020).

Energy efficiency measures to create jobs, reduce energy costs and create more comfortable homes and workplaces.

LED Street Light Project

Orange City Council (NSW)



Since December 2019, most streetlights in Orange have been replaced with energy efficient LEDs. The savings in electricity and greenhouse emissions are already proving substantial, with up to 50 percent energy reduction and an expected \$500,000 savings every year (Orange City Council 2020).

Revegetation and urban greening – and ecosystem restoration – to maintain unique biodiversity, clean air and water, and healthy communities.

Greening Onkaparinga

City of Onkaparinga (SA)



More than 35,000 trees have been planted in streets, parks and waterways since 2017 as part of Onkaparinga's accelerated greening program, which aims to plant 100,000 trees on council land. Council's ambitious targets for tree planting are inspired by mapping urban tree canopy and heat impacts, as well as a desire to increase habitat for wildlife. By 2045, there will be a 20% increase in both canopy cover and urban green cover, supporting 8 jobs every year (City of Onkaparinga 2020).

Circular economy principles' integration to close the loop on resource use (like enhancing organic waste collection and processing), create jobs and cut carbon emissions.

Your Waste – Got it Sorted?

Wagga Wagga City Council (NSW)



To reduce emissions, save money and cut waste to landfill, Wagga Wagga City Council introduced a food organics and garden organics collection as part of its three bin kerbside waste service. In its first two years, 20,268 tonnes of food and garden waste was diverted from landfill and over \$2M was saved in landfill costs (Wagga Wagga City Council 2020). The program also supported 32 jobs in the construction period and provides 7 ongoing jobs.

Support for local businesses to be more sustainable through key opportunities – like increasing the uptake of renewable energy, aiding energy efficiency upgrades and waste management support.

Sustainability Incentives Scheme (SIS)

City of Adelaide (SA)



The SIS provides financial rebates to the community to support adoption of sustainable technologies and actions that improve environmental performance. Since 2015, the Scheme has leveraged \$8.35 for every \$1 spent through rebates. During this time, the Scheme provided rebates for 106 energy storage and 302 solar PV systems (City of Adelaide 2020).

Community engagement to provide a clear understanding of the importance and benefits of taking action on climate change.

Whitsunday Climate Change Innovation Hub (The Hub)

Whitsunday Regional Council (QLD)



The Whitsundays Regional Council established The Hub in late 2018 to advance Council's ability to better respond to the challenges posed by climate change and build resilience. Lessons learned, information gathered, and techniques developed will be disseminated to other local communities nationally and globally (Whitsunday Regional Council 2020).

Prioritising local businesses, skills and supplies for new or ongoing projects and ensuring sustainability is at the core of council purchasing.

Melbourne Renewable Energy Project (MREP)

City of Melbourne (VIC)



For MREP, the City of Melbourne partnered with 13 organisations (local governments, cultural institutions, universities and corporates) to secure a 10 year renewable Power Purchase Agreement which supported the construction of an 80 MW wind farm in regional Crowlands, Victoria. Part of the evaluation criteria included a preference for using local goods and services, which saw the Crowlands wind farm construction deliver significant economic development for the region, including almost 150 local jobs (City of Melbourne 2020).

PROTECTING LIVES, PROPERTY AND PLACES: ADAPTATION

While mitigation actions to reduce emissions aim to slow and lessen future impacts of climate change, many impacts are already being experienced, and further impacts are locked in due to greenhouse gas emissions that have already been emitted. This means that to manage or reduce the direct, indirect and community risks of climate change, adaptation is also needed to protect lives, property and ecosystems.

Notably, adaptation costs will continue to increase into the future, and are influenced by the extent to which emissions reduction efforts are successful. For example, the difference between limiting warming to 1.5°C and 2°C is the difference between 14% and 37% of the world's population being exposed to severe heat at least once every five years (IPCC 2018). This difference means the heat impacts at 2°C are 2.6 times worse, and would require substantially higher investment to adapt to

if it is possible at all. The lack of clarity on the severity of future climate impacts makes it difficult for councils to adequately adapt, and demonstrates the importance of continued efforts to mitigate climate change.

There is significant diversity in the adaptation activities undertaken by councils, from climate change risk assessments to adaptation plans and implementation of a variety of discreet projects. These activities require councils to make or accept external predictions of the severity and frequency of future events, such as the height of sea level rise in 2030, 2040 and so forth. Adaptation activities also frequently raise competing priorities for councils, such as amenity, safety, cost and longevity. Some adaptation activities, such as urban greening and improving infrastructure resilience to extreme temperatures, also have the advantage of mitigating climate change. The following case studies are examples of councils being ambitious and innovative in their approaches to adaptation activities.

Figure 16: Burned forest after 2019/20 bushfires, Bendalong, New South Wales.



CASE STUDY 12: COUNCIL INVESTMENT IN URBAN GREENING TO REDUCE THE IMPACT OF HEATWAVES

Climate change is increasing the intensity, frequency and duration of heatwaves. In urban areas temperatures are often several degrees higher than in surrounding areas, due to surfaces such as concrete and asphalt absorbing and retaining heat (called the Urban Heat Island Effect). Urban greening is one very effective way to create cooler microclimates and keep cities and suburbs cooler during heatwaves, and local governments play a critical role in this adaptation strategy (Beecham et al. 2016). Trees can cool the air by several degrees compared to surrounding areas of concrete and asphalt. Green spaces can also help to manage the quantity and quality of stormwater (Coutts et al. 2013) and improve air quality (Nowak et al. 2014). For these reasons, urban greening is an effective and efficient way for local governments to support adaptation to climate change. Increasing vegetation biomass has the added benefit of storing carbon, as well as providing numerous other social, environmental and economic benefits.

The City of Melbourne's Urban Forest Strategy is widely viewed as a benchmark urban greening initiative. The strategy aims to increase tree canopy from 22%

to 40% by 2040 to mitigate and adapt to climate change and reduce the urban heat island effect, amongst other goals. To foster resilience in the face of climatic extremes, the strategy has also set diversity targets, specifying that planted trees should not comprise more than 20% from any one family, 10% from any one genus or 5% from any one species (City of Melbourne 2012).

The City of Melbourne further commissioned research into which tree species will be best able to adapt to Melbourne's future climate and is actively using this research to guide the selection and trialing of new tree species. This builds on the work of the Which Plant Where initiative shared by Hort Innovation, Macquarie University, University of Western Sydney and the New South Wales Government. *Which Plant Where* seeks to address "a key challenge for greening Australia's urban environments...to ensure that future plantings are made with trees, shrubs and turf that can tolerate the climate conditions that will occur in the near future" (Which Plant Where 2021).

Other councils are undertaking their own urban greening initiatives, such as Logan City Council which successfully increased tree canopy cover from 41% in 2016 to 53% in 2020 (ABC News 2021a). This accomplishment involved planting 100,000 trees during the 2019/20 financial year (City of Logan 2020).

Figure 17: Council staff planting trees in Onkaparinga, South Australia.



CASE STUDY 13: COORDINATING LAND SWAPS OR RETREAT TO PROTECT RESIDENTS FROM HAZARDS

In response to devastating floods in 2010 and 2011, the Lockyer Valley Regional Council introduced a ‘relocation policy’ in 2011. This policy enabled eligible landowners to voluntarily swap their flood-prone land for a new parcel of land of comparable size located in an elevated development area owned by the council (Productivity Commission 2012). The Lockyer Valley Regional Council acquired 378 hectares to facilitate the program, which was assisted by a new development scheme for the Grantham Reconstruction area by the Queensland Reconstruction Authority. This scheme allowed participants to be exempted from certain planning approval requirements provided new buildings were constructed in accordance with the Residential Living Zone Code (Macintosh et al. 2013). Those participating in the program were responsible for building their own homes. Grantham and surrounding areas were affected by flooding again in February 2013, but very few homes were affected with the reduced impacts attributed to the Lockyer Valley Regional Council’s scheme (Lynch 2013).

CASE STUDY 14: COUNCIL INVESTMENT IN SELF-SUFFICIENT BATTERY SYSTEMS TO BUILD RESILIENCE

Nillumbik Shire Council has installed one of Victoria’s largest solar battery systems on its Community Bank Stadium to ensure that the stadium can run off-grid during times of emergency. Given that it can operate off the grid, the stadium has also been made the main Bushfire Refuge Area for the region. The stadium roof has been fitted with a 100kW solar system, which powers facilities during the day and charges the 100-kWh battery system. Most of the time, the power stored in the batteries is used during the evenings to operate the local gym and sports facilities. However, during the bushfire season, advanced battery management technology prevents the batteries from discharging overnight so that there is power available in the event of an emergency. The solar battery system thus helps to keep communities safer in the face of elevated bushfire danger due to climate change, whilst simultaneously reducing greenhouse gas emissions, reducing reliance on fossil fuels and grid power, and reducing the council’s electricity bills (EnviroGroup 2020; Nillumbik Shire Council 2019).



Figure 18: Nillumbik Shire Council’s Community Stadium and Relief Centre in Victoria, featuring rooftop solar, a battery system and an electric vehicle charging station.

CASE STUDY 15: COORDINATING ADDITIONAL SERVICES DURING HEATWAVES TO KEEP RESIDENTS SAFE

Blacktown City Council in Western Sydney is trialing an Australia-first network of 'heat refuges' where vulnerable residents can seek shelter, and be provided for, during 'severe' or 'extreme' heatwaves (as classified by the Bureau of Meteorology). Vulnerable residents include older people, people with disabilities or pre-existing illnesses and young children without access to air conditioning.

Beginning a trial over summer 2021, the network initially included council-owned venues such as community and neighbourhood centres, and a few community-owned venues such as the Blacktown Workers Club and the Bidwell Uniting Church. The initiative is a partnership between Blacktown City Council and a range of not-for-profit organisations including Active Care Network, Red Cross, Meals on Wheels and Settlement Services International. The heat refuge strategy was set up with funding of \$54,500 from Resilience NSW through the Community Resilience Innovation Program (Mirage News 2021).

CASE STUDY 16: COMPULSORY ACQUISITION OR VOLUNTARY BUY-BACK OF HAZARD-PRONE LAND TO REDUCE RISK

Councils are faced with potentially risky, expensive and unpopular decisions in controlling development of at-risk land. In some areas particularly exposed to natural hazards such as floods or bushfires, councils have decided to purchase land, either through voluntary or compulsory buy-back schemes. Sometimes, buy-back schemes are the only feasible option to reduce risk to lives and property in the most hazardous areas. However, given the enormous expense of such programs, they are generally only considered if no other viable infrastructure option exists to reduce risk (e.g. the installation of pipes to remove a flooding problem) and are usually only implemented by larger councils.

In the aftermath of the 2009 bushfires in Victoria, a voluntary buyback program was established with the aim of reducing the number of dwellings that were rebuilt in areas of high bushfire risk, and facilitate the resettlement of affected landholders (Macintosh et al. 2013). The program was available to owner-occupiers whose principal place of residence was destroyed by the fires, who had not commenced rebuilding, and where a site was not available on the property that would enable a replacement dwelling to meet relevant standards (Macintosh et al. 2013).

Figure 19: Blacktown City Council in Western Sydney is trialing an Australia-first network of 'heat refuges'.



Value for money today, and in the future

The difficulty for councils, as the tier of government with the most constrained resources, is to find the money to fund more resilient (and therefore more expensive) assets today, versus picking up the damage costs as climate impacts occur. As the Municipal Association of Victoria wrote in their submission to the Productivity Commission (2012):

“Climate change is likely to reduce the lifespan of infrastructure and increase maintenance costs and repair costs... since many councils struggle to finance baseline capital expenditure requirements, the additional cost of climate-proofing infrastructure is too much.”

Part of the challenge for councils is large costs to properly prepare an asset for future extreme weather events. Many councils are now conducting asset vulnerability assessments and finding that where assets are ill prepared for extreme weather events, they face either preemptive expenditure, or potentially higher costs for rectification after damage has occurred. The types of upgrades required are diverse, from better insulation to withstand extreme heat, to backup power for evacuation facilities, to improved guttering to withstand major rainfall events (NAGA 2021).

A recent report by Infrastructure Australia warned that climate change risks must be better considered in relation to the construction of assets. Policy and research director Jonathan Cartledge pointed out: “it’s about delivering value for money for infrastructure investments we’re making not just today, but in the next 10, 15 and 30 years” (Courier Mail 2021).

Figure 20: Flooded roads, Mcgraths Hill, New South Wales 2021.



Avoiding negative adaptation outcomes

Some adaptation responses can fail to meet their objectives or even unintentionally increase vulnerability, an outcome known as 'maladaptation' (Barnett and O'Neill 2010). It has been suggested that there are at least

five types of maladaptation, specifically, actions that relative to alternatives: increase emissions of greenhouse gases, disproportionately burden the most vulnerable, have high opportunity costs, reduce incentives to adapt, and set paths that limit the choices available to future generations (Barnett and O'Neill 2010).

BOX 6: TYPES OF MALADAPTATION

While energy-intensive adaptations might address current needs, they create a positive feedback by increasing emissions of greenhouse gasses, thereby increasing the need for future adaptation. For example, the increased use of energy-intensive air conditioners in response to heat-waves.

Disproportionate burden to the most vulnerable

Sometimes adaptation actions designed to meet the needs of one sector or group can ultimately increase the vulnerability of those most at risk, such as minority groups or low-income households. This can take the form of adaptation-related development against the wishes of traditional landowners such as Indigenous Peoples, or higher costs for services such as water or electricity, which disproportionately impacts poorer individuals.

High opportunity costs

If the economic, social or environmental costs of an action are high, relative to alternatives, it may be maladaptive. For example, there are many possible responses to sea level rise with varying associated costs, ranging from planned retreat to building sea defences to improved coastal adaptation. The choice of a hard defence, such as a seawall, can be an expensive undertaking and eliminates the possibility of other softer coastal adaptation options such as mangrove planting, which may have fewer negative side effects.

Source: Adapted from Barnett and O'Neill (2010).

Reduced incentives to adapt

Maladaptive actions may reduce incentives for individuals to adapt, such as through encouraging unnecessary dependence on others or penalising early actors. For example, government intervention that reduces the cost of insurance premiums in a high risk area without simultaneously helping residents to improve their resilience to extreme weather events may discourage individuals to move away from the danger. This can expose individuals to harm, and over time, as disasters grow more frequent, individuals who have become reliant on insurance assistance may find themselves unable to sell and move because of lowered property values.

Set paths that limit the choices available to future generations

As discussed throughout this report, infrastructural responses to climate change can be expensive to undertake, creating a trajectory that can be difficult to change in the future. This can lead to decreased flexibility in the face of unforeseen changes in climatic, environmental, economic and social conditions. An example of this could be building a sea wall to a height inadequate to deal with future storm surges riding on higher sea levels – the expenditure to build the infrastructure is high, and retrofitting for additional height may be impossible.

5. Barriers to rapid action for councils

Despite the steps councils are taking to adapt to and mitigate climate change, there are a range of barriers to even more rapid action.

FUNDING

Doing more with less

In council submissions to the Productivity Commission's (2012) inquiry report into *Barriers to Effective Climate Change Adaptation*, inadequate funding was the most frequently identified barrier to effective implementation. Councils face not only increased expenditure to mitigate and adapt to more frequent and intense extreme weather events, but an ever-growing list of responsibilities and limited revenue opportunities.

Traditionally, local governments were expected to provide the three R's: 'roads, rates and rubbish'. Now, local governments are also expected to provide a raft of other services from welfare (e.g. childcare, aged care and health services), to retail (e.g. water, sewerage and transport), to recreation (including arts and culture), and to play a stronger regulatory role in relation to development and planning, environmental management and public health. With the additional pressures of local emergency management and climate change mitigation and adaptation, councils have to do more with the funding they have.

As stated by Deputy Mayor of MidCoast Council Claire Pontin:

"Every time we have to deal with a climate emergency, [higher tiers of Government] just pulls money out of the standard maintenance fund. We're expected constantly to do more, by and large, without extra funding." (ABC News 2021b)

Sources of funding vary between councils with the bulk sourced from rates, user charges and grants from the state, territory and federal governments (ALGA 2021b). Local government rates make up 3.4% of tax raised by all levels of government and is the only tax levied by local governments (ALGA 2021b). Rate income is tied to property value and number of properties, meaning that for some councils this represents a less resilient and consistent funding source. With climate impacts such as bushfires and sea level rise threatening property values, ironically some of the councils hardest hit by climate change risk losing proportionally more of the income required to adapt to its impacts.

Access to grants

Financial Assistance Grants from the Federal Government are a key source of funding for local governments, contributing 7% of the sector's total revenue (ALGA 2021a). This source of funding has declined from 1% of Commonwealth taxation revenue in 1996 to a level closer to 0.5% currently (ALGA 2021a). In fact, local governments in Australia now have the fourth lowest share

of taxation among the 30 industrialised nations of the Organisation for Economic Cooperation and Development (OECD), and a far lower share than in most other federations. This means that as councils' responsibilities have expanded, their access to tax revenue to deliver these responsibilities has shrunk considerably.

In addition to Financial Assistance Grants, there is a diverse network of specific-purpose grants and subsidies available to councils. These funds vary from year to year and differ between states and territories. Overall, grants and subsidies currently account for around 14% of total council revenue, but for some rural and remote councils where other revenue raising is limited, grants can account for more than 50% (ALGA 2021b).

While grant funding is sometimes considered the most straightforward way to support local governments, there are a number of problems. Many councils express concern that such funding is piecemeal, ad-hoc and is not always addressed to regionally or locally determined priorities (CVGA 2019). Further, this funding is not long-term, flexible or agile, and generally does not support cross-council projects that might address regional problems or opportunities. Smaller and less well-resourced councils may be disadvantaged in competitive grant rounds as they have fewer professional staff to prepare grant applications and implement funded programs (Productivity Commission 2012).

Need for funding before disaster strikes

Ad-hoc grant programs lend themselves to a boom-bust cycle where investment is generally only available after a disaster has caused harm, rather than building resilience in assets and communities before the event occurs. This is at odds with the substantial evidence that spending in advance of a disaster is a better return on investment than recovery spending. For example, research from the United States has found a benefit-cost ratio of \$6 for every \$1 spent through federal mitigation grants (NIBS 2019).

The Natural Disaster Funding Arrangements Inquiry by the Productivity Commission found that 97% of Australian disaster funding is spent after an extreme weather event has occurred with only 3% invested to prepare and potentially lessen impacts commenting:

"There is a longstanding concern that governments underinvest in mitigation and spend too much on recovery, leading to higher overall costs for the community. Furthermore, government responses to natural disasters can be ad hoc and emotionally and politically charged, resulting in reactive 'policy on the run' and inequitable and unsustainable outcomes."
(Productivity Commission 2014, p.4)

While council responsibilities have continued to expand, their access to tax revenue has shrunk to the fourth lowest share among the 30 industrialised nations of the OECD.

They further commented:

"Governments overinvest in post-disaster reconstruction and underinvest in mitigation that would limit the impact of natural disasters in the first place. As such, natural disaster costs have become a growing, unfunded liability for governments." (Productivity Commission 2014, p.2)

There have been recent reports of unfair communication about grant opportunities, unequal grant distribution and accusations of pork-barrelling (i.e. utilising project funds to help win votes) in the wake of the 2019/20 bushfires (Lloyd-Cape et al. 2021). While grant processes are not inherently prone to corruption, they are certainly subject to the winds of political objectives, particularly during community outcry after an extreme weather event. Furthermore, some climate impacts are missed in the boom-bust cycle because of the ongoing, pervasive nature of the event. A particularly expensive example of this is management for coastal impacts – a problem highlighted in responses to Australian Coastal Councils Association 2019 survey:

"Our council has more than 100km of coastline with 25km actively managed by Council. Over the past two years, Council's average coastal operating costs represented 37% of total operating expenditure." Kingston District Council (SA)

"Current grants schemes fall woefully short of what will be required by local governments. There is little to show this will change, leaving the onus on local governments and their ratepayers." City of Greater Geraldton (WA)

"Equity of funding for small rural councils with vast coastlines is needed, particularly in rural areas that do not have a large rates base. These councils have very little capacity to source their own funding." Glenelg Shire Council (VIC)

"Coastal problems are beyond the financial capacity of Councils to solve. There is a need for all layers of Government to be involved in providing solutions." Onkaparinga Council (SA) (Australian Coastal Councils Association 2019)

The return on investment is higher for spending in preparation for a disaster rather than in recovery, yet 97% of Australia's disaster funding takes place after an event has already occurred.

Insufficient grant funding

Moreover, grants specific to climate change are regularly oversubscribed. For example, the New South Wales Government's Resilience to Climate Change program offered funding to councils to encourage a variety of adaptation and climate risk assessment projects. Across three grant rounds, there were 92 applications requesting over \$11 million in funding. In total, the Climate Change Fund was able to award 31 grants totalling \$2.8 million, representing a third of the total applications and 25% of the requested funds (Local Government NSW 2021).

The story is similar in other states. In 2017, the Victorian state government established the Victorian Climate Change Innovation Partnerships Grant Scheme. Over 240 applications represented a request up to \$72

million, yet the \$4.3 million scheme could only support 24 projects – meaning 9 out of 10 applicants missed out on funding (Act on Climate 2018). In Queensland, the 2017-18 Natural Disaster Resilience Program and 2019 Queensland Disaster Relief Fund were oversubscribed eightfold (The State of Queensland 2020).

The competitive nature of grants, shrinking share of tax revenue and growing list of responsibilities paints a clear picture of the insufficient funding provided to councils to undergo essential climate change mitigation and adaptation work. It has been estimated that a \$10 billion fund is required to support local governments and communities across the country to address climate change, both in terms of improving the resilience of local communities and reducing emissions (ALGA 2019).

Figure 21: Damage from 2011 floods in Brisbane, Queensland.



Limitations to “building back better”

Beyond the limitations of funding for local governments themselves, the way funding can be used has been raised as a limitation when it comes to reducing emissions and adapting to the impacts of climate change. For example, under the current Disaster Recovery Funding Arrangements (Department of Home Affairs 2018b) the Commonwealth only provides funding equivalent to the reconstruction of an essential public asset to its *pre-disaster* function. This clause makes it difficult for the Commonwealth to fund Councils or State Government to “build back better”: replacing the asset with one that is better suited to local needs and better designed to withstand future extreme weather events. This “like for like replacement” means that a vulnerable asset may be replaced with another vulnerable asset, such as a timber bridge unlikely to withstand flood or fire. In the 2019/20 bushfires, Shoalhaven City Council experienced damage to seven timber bridges (Shoalhaven City Council 2020). In their submission to the Royal Commission they pointed out:

“Funding ‘like for like’ is an investment in a repeat of failure in the future. Inadequate infrastructure needs to be replaced with resilient and bushfire resistant alternatives. Shoalhaven City Council has the funding to replace damaged timber bridges, with timber bridges. Council would like to future proof these assets by constructing new bridges in concrete. Construction costs for concrete bridges is generally double what it would cost to build a timber bridge... Council needs financial support to upgrade and future proof these assets.” (Shoalhaven City Council 2020, p. 29)

Under the DRFA, funding is available to replace or repair an essential public asset which is “a transport or public infrastructure asset which is owned and maintained, or operated and maintained, by an eligible undertaking” (Department of Home Affairs

2018a). Essential assets include roads and road infrastructure (including footpaths, bike lanes and pedestrian bridges), bridges, tunnels, culverts, public hospitals, public schools, public housing, prisons, police and fire stations, levees, state, territory and local government offices, and stormwater infrastructure. However, there are a range of assets that fall outside of this description and are generally considered to be ineligible. Consequently, a significant number of council assets, including those important for community recovery and wellbeing, are not covered by the DRFA arrangements (ALGA 2021c), for example:

- › Sporting, recreational and community facilities (for example playgrounds and walking trails);
- › Environmental assets (such as rivers or beaches) except where they relate to the immediate protection or structural integrity of an eligible public asset (i.e. road or bridge);
- › Assets damaged due to contributing factors such as poor construction or inadequate maintenance;
- › Religious establishments and memorials;
- › Fire trails and roadside area structures;
- › Restoration or replacement of the contents or furnishings of an asset not permanently attached to the affected building (EMV 2018).

Council libraries are not considered essential public assets, even though they are used during natural disasters as evacuation centres, refuges, places where people can access information and the internet (ALGA 2021c). Similarly, water and waste-water (sewage) assets have, to date, not been classed as essential assets (ALGA 2021c). New South Wales councils and the majority of Queensland councils are responsible for the delivery of water and waste-water services to communities across these states (ALGA 2021c).

POLICY AND DECISION-MAKING POWER

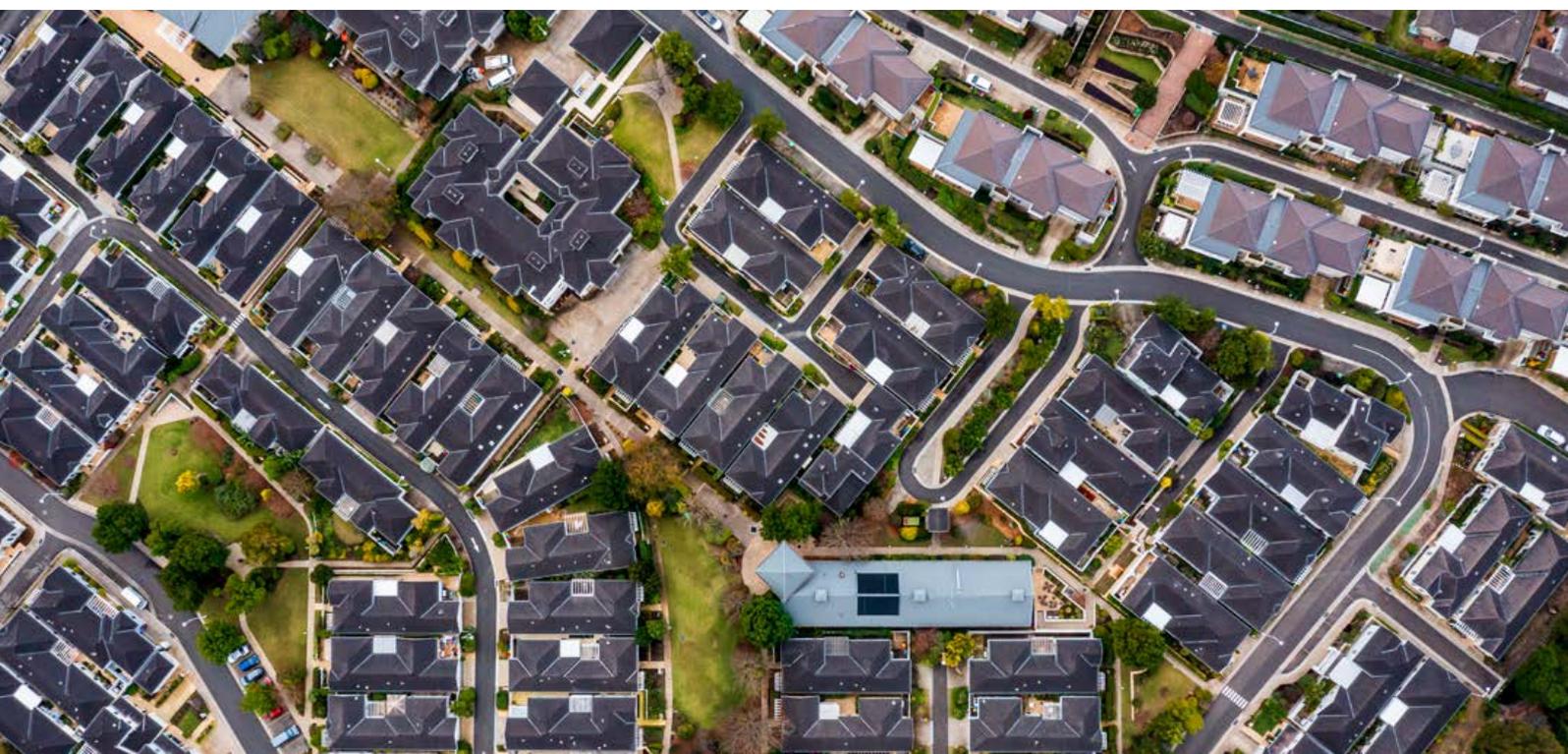
Councils have a great deal of responsibility for handling climate impacts, but even with the best local policies and investment, councils cannot be alone in meeting this existential risk. As part of a three-tiered government system decisions made by state, territory and federal governments affect councils, such as energy policy and investment in new electricity generating projects impacts the energy choices and carbon footprints of local communities.

Many councils are working to reduce emissions from the community, but higher tiers of government have significant control in this area. These higher tiers of government control the approvals and funding for energy projects, which in turn provide the source of electricity for individual households. Private individuals can exercise some control, such as opting for a clean energy source or adding solar panels to their roof, but the make-up of renewable

vs. fossil fuel power sources rests primarily with other tiers of government. Furthermore, the Federal Government, on behalf of state and territory governments, operates the National Construction Code and National House Energy Rating Scheme that regulates energy efficiency standards for homes. These tiers of government have the power to implement higher standards and policies for the Code that reduce the electricity demand of buildings, in turn reducing how much work there is for councils to do on reducing community emissions.

While councils have a role to play in emergency management, here too it is higher tiers of government that hold primary responsibility and decision-making power. This impacts not only the purchase and maintenance of emergency equipment and personnel, but relevant planning decisions. As our population grows and urban sprawl continues, urban communities are increasingly being built on fringes exposed to extreme weather risks, and constructed in ways that exacerbate those risks.

Figure 22: Dark rooftops and lack of vegetation contribute to the Urban Heat Island Effect.



For example, expansion of the Urban Growth Boundary, controlled by state and territory governments, can bring people unaware of the level of risk into proximity of bush and grass fires, sometimes without sufficient access to emergency services when they occur (NAGA 2014). Likewise, the intense clustering of some developments can increase runoff from impervious surfaces, contributing to flood risk, or inadequate provision of open space enhancing the Urban Heat Island Effect (NAGA 2014). In all of these examples, councils are faced with managing communities where extreme weather risks are built in by design.

While it is generally appropriate that higher tiers of government hold responsibility for these policy decisions, in the context of councils trying to protect communities from climate impacts, and act to mitigate climate change, leadership is needed to enact change. Stronger policies at a state, territory and federal level that address climate change reduce the risk and burden on councils.

As the primary recipients of tax revenue and with substantially more assets available, state, territory and federal governments also have a greater capacity than councils to muster the funds required to adequately mitigate and adapt to climate change. This includes some of the funding needed to undertake activities such as building back better after extreme weather events, or increasing renewable energy generation.

The lack of policy and decision-making power vested in councils is exacerbated by the fact that local governments and their peak bodies no longer have a seat at the federal level since the abolishment of the Council of Australian Governments (COAG). Local councils have expressed their concern at this change, but so far no corrective change has been made (ALGA 2021a).

Higher tiers of government can reduce the risk and burden on council through stronger climate change policies.

LACK OF CLEAR GUIDANCE AND CONSISTENCY

A related problem to the lack of policy and decision-making power can be a lack of consistency and clear guidance from higher tiers of government around climate change responses for local governments. Without clear directives from state, territory and federal governments, councils are left to independently determine the scale and nature of the risks that they face, and how to handle them. This can lead to inconsistent approaches between councils, and insufficient internal council capacity to be aware of and respond to the scale of the risk.

The inconsistency of approaches to climate change risk in Australia extends as far as the terminology and modelling relied upon by different levels of government to plan for the future. As the Royal Commission into National Natural Disaster Arrangements (2020) remarked:

“There is a patchwork of climate datasets across Australia. Australia does not have an authoritative agreed set of climate change scenarios for the nation nor standardised guidance on how to interpret and use these scenarios consistently.”

This lack of consistent definitions and policy extends to public warning systems such as for bushfires and hazardous smoke exposure levels (Royal Commission into Natural Disaster Arrangements 2020).

If there are activities that multiple councils should be, and are, taking to address and prepare for climate risks, guidance from higher tiers of government is key. A clear example of this is the development of climate change risk assessments and the development of climate change adaptation plans, which many councils are undertaking. The responsibility for carrying out these assessments, and the clarity of guidance varies from state to state, leading to diversity in outputs from councils.

Figure 23: Bushfire smoke blankets Sydney Harbour, New South Wales, 2019.



The Productivity Commission (2012) points out that this can even lead to differences in definitions, terminology and the focus and format of climate risk assessment reports between councils.

To perform their functions well, councils need clarity on their roles and responsibilities in relation to climate change adaptation. The National Climate Change Adaptation Research Facility found that:

“Local governments will better respond to the challenges of climate change in an environment where adaptive responsibilities are clear, response and evaluation frameworks are consistent across jurisdictions, approaches to mainstreaming climate change adaptation are implemented, and decisions are made on the basis of the best data and information.” (NCCARF 2013)

This clarity varies between states. For example, the Victorian Government has taken substantial steps in recent years to clarify these roles and responsibilities for local government decision makers (Department of Environment, Land, Water and Planning 2020).

The importance of clear guidance for councils highlights a further need for greater state, territory and national coordination, particularly when it comes to extreme weather events. Extreme weather does not respect local government boundaries, and in some cases the actions undertaken by one council to mitigate or adapt to a risk can affect neighbouring councils.

A particularly clear example of the need for national coordination is in coastal management, which involves a large number of councils across the country (the Australian Coastal Councils Association alone has 200 members). The options available to councils to manage sea-level rise, coastal inundation and associated problems are as diverse as they are complex in application. Currently, without a national framework, different councils are planning based on different levels of sea-level rise, including neighbouring councils in some cases. Further, some coastal management strategies have the potential to affect adjacent councils. In many comparable jurisdictions, the majority of the responsibility to legislate for and fund major protection works sits with state, territory and national governments (Fletcher et al. 2013). In the Netherlands, for example, the National Government has a legislative responsibility to act and ensure that its communities and settlements are protected from coastal flooding (Fletcher et al. 2013).

The Productivity Commission (2012) pointed out that while local government is the most appropriate level of government to undertake localised adaptation work, this is not the case where there are adaptation issues of regional or national significance, where there are spillovers or economies of scale associated with adaptation, or where diversity in approaches between local governments would impose costs that exceed the benefits. Coastal management is an example that clearly warrants a less localised, more coordinated response.

Climate impacts do not respect local government boundaries – coordination is needed.

The need for centralised coordination was reflected in survey responses by coastal councils to the 2019 Coastal Issues Survey by the Australian Coastal Councils Association, including:

"There should be a national policy framework and funding mechanism for agreed adaptation responses in order to ensure an equitable adaptation framework and response." Moreton Bay Regional Council (QLD)

"Coastal problems are beyond the financial capacity of Councils to solve. There is a need for all layers of Government to be involved in providing solutions." Onkaparinga Council (SA)

"An Intergovernmental Coastal Policy that clearly defines the roles and responsibilities of federal, state and local governments in regard to integrated coastal zone management is needed urgently." City of Busselton (WA) (Australian Coastal Councils Association 2019)

Councils also require help in understanding and being prepared for any legal liability they face, particularly around land-use planning and managing risks in existing areas of settlement (Productivity Commission 2012). The Productivity Commission (2012) noted that their lack of clarity around legal liability was a barrier to effective action, and that they had concerns both in terms of taking action and in failing to take action. The Gold Coast City Council submission noted that:

"In the absence of guidance on how and when to respond to the potential impacts of climate change, [Local Government Authorities] may be vulnerable to liability for both action and inaction and will continue to struggle with the question of what constitutes a reasonable response." (Productivity Commission 2012)

The "know-how" and capacity challenge

Councils can only reduce emissions and adapt to climate change as far as their capacity and institutional awareness of risks and opportunities stretches. With scarce funding support or opportunities to lean on the expertise of higher tiers of government, it is difficult for independent councils to do this work. Tracey Roberts, the president of West Australian Local Government Association, suggests that beyond resourcing, the key hurdle facing local governments is a "lack of knowledge, skills and expertise to address the challenges of climate change" (ABC News 2021a).

Multiple councils reported to the Productivity Commission that climate change projections are usually sufficient to undertake high-level, broad-scope risk assessments, but there is rarely sufficient localised detail to incorporate risks into specific plans or quantify impacts on assets (Productivity Commission 2012). For example, if a council knows its local government area is at risk of coastal inundation, to respond effectively and efficiently they need to know in what time period they are likely to see those impacts, to what extent and even which streets, properties and infrastructure are most at risk. The more specific that information is, the more likely it can be applied through planning.

Even where climate change information is sufficient, some councils may not have the in-house technical expertise to determine how that information should be used. A 2011 study of councils in the Sydney area asked individual council staff how they might apply their policies regarding climate adaptation and found that the most common response was that participants simply did not know how to go about it (Measham et al. 2011). Submissions to the Productivity Commission identified that gaps in expertise might include skills in geomorphology

and coastal processes, applying new planning options in an Australian context, or the interdisciplinary skills required to incorporate the complexity and uncertainty of climate change into decision-making frameworks across all local government disciplines (Productivity Commission 2012).

Finally, the level of awareness and buy-in from senior staff and elected councillors plays a significant role in a council's capacity to act on climate risks. A study examining the barriers to climate adaptation at council level, including interviews with council staff, identified that the opinions of the mayor in particular, as well as the CEO or general manager, made a strong difference to the opinions held by other participants (Measham et al. 2011). Quotes from interviews included:

"It's really vital that our councillors want to be seen to be a leader in this area and would regard that our place-based planning needs to have a vision for the prospect of climate change."

"I don't know that that's really reflected in the planning that we're doing at the moment. I think there's still an element of hope it won't happen."

An example of this barrier playing out in practice is the assessment of development applications. A council officer making this assessment is firstly reliant on climate risk data that is sufficiently specific to the development, such as potential sea level rise. Secondly, they require adequate expertise to understand those risks and how that might play out in practise on the development, such as whether flooding would occur regularly, or pose a risk to the building or its residents. They also need an understanding of the potential legal risks at play in their decision making. Thirdly, they need institutional support to be able to make the correct decision, even if it is against the immediate interests of the developer or local residents. This represents a complex and fraught decision making process without sufficient internal information, expertise and confidence.

SCALE OF THE CHALLENGE

All of the barriers highlighted are exacerbated by the scale of the challenge that councils now face – of more intense and more frequent extreme weather events. These events make it difficult for councils to plan and, in some cases, leave little time to recover in between one disaster and the next. A joint statement by 17 New South Wales and Queensland councils in March, 2021 stated:

"We are exhausted by the immediate costs and challenges, and we are worried about what's to come. Extreme weather disasters used to occur every few years. Now, we are facing them every few months." (ABC News 2021b)

The 2019/20 bushfires demonstrate how severe damage from extreme weather events can be at a local level. What is already a national, territory and state-wide significant fire is even more acute for the councils directly affected. For example, in New South Wales the local council areas of Bega Valley, Shoalhaven and Eurobodalla respectively saw 58%, 68% and 79% of their land masses burnt (Shoalhaven City Council 2020).

Figure 24: Massive bushfire threatens Batemans Bay, New South Wales, 2019.



CASE STUDY 17: COMPOUNDING DISASTERS LEAVE LITTLE TIME FOR RECOVERY

Recovery from major extreme weather events can take years for local communities, but when events occur with greater frequency the scale of the problem can feel insurmountable.

Floods in March, 2021 led the New South Wales government to declare a natural disaster in 24 local government areas that had also experienced floods or storms in 2019/20 (Nicholas and Evershed 2021). Six of those areas also had more than 40% of their area burned in the Black Summer bushfires at the end of 2019 (Nicholas and Evershed 2021). In total, 96 New South Wales councils were impacted by bushfires and storms in 2019/20 with 35 councils impacted by both in that time (Audit Office of New South Wales 2021).

For example, within 14 months, the Clarence Valley and town of Kempsey in Kempsey Shire experienced drought, floods and bushfires. Commenting on bridges destroyed in the flooding and bushfire events, Kempsey Shire Council Mayor, Liz Campbell, told Guardian Australia:

“The work all starts all over again. Six months of work on our roads and bridges are just gone. Just vanished.” (The Guardian 2021)

There is an increasing recognition of compounding disasters: the same areas being hit repeatedly by extreme weather events. As this phenomenon continues, it challenges traditional thinking about community recovery, and the work needed from councils to best respond.

Figure 25: Severe flooding in Kempsey, New South Wales, 2021.



6. Report recommendations

As climate change accelerates, and extreme weather worsens, the status quo won't do. Changes are needed at all levels of government to meet the scale of the challenge, keep communities safe and support councils to meet their responsibilities. Urgent and strong leadership is needed from the Federal Government to ensure a whole-of-system solution is delivered that directs the efforts of state, territory and local governments. The following recommendations are not an exhaustive list of what is required, but highlights priorities identified in this report.

RECOMMENDATIONS FOR LOCAL GOVERNMENTS

1. Increase operational net zero targets and efforts to mitigate climate change through emissions reduction activities.

To meet the challenge of climate change, it is essential we don't simply adapt, but also mitigate through deep and rapid emissions reductions. All councils should set net zero emissions targets for council operations and scale-up mitigation initiatives.

2. Work with local communities and businesses to support broader efforts to cut emissions; beyond council operations and infrastructure

Councils have an important role to play in broader emissions reductions through community education, setting community-wide net zero emissions reduction targets, and delivering programs to help drive down emissions in the community. Councils should facilitate the community and local businesses to develop plans to reach these targets.

3. Undertake a climate change risk assessment and implement plans for adapting to those risks.

All councils need to be undertaking climate risk assessments, creating action plans based on the findings and ensuring that implementation takes place across all areas of responsibility. This includes mainstreaming climate change across most aspects of council decision making, and ensuring that climate risks are part of councils' risk management frameworks. Importantly, this process is not a one-off activity but needs to be constantly reviewed to respond to changing information and risks.

4. Seek out opportunities for collaboration across multiple councils to reduce emissions and adapt to climate impacts

Council mitigation and adaptation activities can be enhanced through the sharing of resources, information and building of economies of scale through collaboration with other councils and state and territory governments where possible. Local governments should explore collaboration opportunities and establish the governance systems and processes needed to support this.

5. Encourage economic development units to explore how climate action can boost the local economy

Economic development units should endeavour to understand the impact of climate change on local economies, and incorporate climate change into plans and strategies. This can include risks to local economies, such as extreme weather or drought on agriculture and tourism, but it can also incorporate new opportunities for economic development in the region, such as large-scale renewables and innovations such as shifting agricultural commodities.

6. Upskill all council staff to ensure they are confident about the impact of climate change on their day-to-day work, including opportunities for adaptation and mitigation

To avoid risks and seize opportunities, all council staff require a working knowledge of climate change impacts and the mechanisms through which they can incorporate climate mitigation and adaptation into their policies. Local Government

Associations can play a critical role in providing training opportunities for members to ensure this confidence is widespread.

7. Ensure that all planning and development activity at a local level considers climate risks and opportunities to cut emissions

Councils should integrate climate change considerations into all aspects of planning and development for which they have responsibility. Better planning can help increase resilience across a range of physical assets and embed an understanding of climate risks to benefit the population (NAGA 2014). This should include a willingness to make decisions that are in the long-term best interests of their communities such as limiting development in areas of future high risk.

8. Advocate for other tiers of government to embrace stronger climate policies, emissions reductions targets and frameworks for mitigation and adaptation

There is a fundamental question as to how councils – particularly rural and regional councils with lower resources – can continue to service their communities as climate risks escalate. Councils should advocate other tiers of government about the urgent need for deep and rapid emissions reductions, as well as adaptation and resilience needs. This aligns with ALGA's Strategic Plan 2020-2023, which as a key priority identifies: "action by all levels of government to mitigate climate change and adapt to unavoidable change" (ALGA 2020).

RECOMMENDATIONS FOR STATE, TERRITORY AND FEDERAL GOVERNMENTS

1. Lead the country in responding to accelerating climate change at the scale and pace required; with a science-backed approach

Councils cannot address climate change alone: state, territory and federal governments must lift their ambitions. To make a fair contribution to the required global effort to reduce emissions, Australia should achieve net zero emissions by 2035, and reduce emissions by 75% below 2005 levels by 2030 (Climate Council 2021). The effort in Australia to help limit warming to well below 2°C must include several key elements. These include:

- Banning any new fossil fuel developments, including gas;
- Phasing out all existing fossil fuels and replacing them with other energy sources, built around renewable electricity;
- Contributing to building a stronger, more diverse economy, creating more jobs and spreading benefits to regional centres and communities;
- Stepping up as a global exporter of zero emissions energy, technology and expertise;
- Building resilience to future climate threats across all sectors;
- Using our influence internationally, through climate diplomacy, development assistance, and clean energy exports, to catalyse and support action beyond our shores.

2. Increase state, territory and federal funding sources to councils for responding to climate impacts, and cutting greenhouse gas emissions

Funding to councils to mitigate and adapt to climate change must be increased. At a minimum, Financial Assistance Grants should be restored to at least 1% of Commonwealth taxation revenue. This proposition is supported by ALGA (ALGA 2020).

3. Invest in preparing before climate disasters strike, rather than responding after the damage is done

Substantially more funding should be made available for pre-disaster funding in resilience and preparedness from all tiers of government. As a starting point, we support ALGA's proposition for the establishment of a natural disaster mitigation program at a level of \$200 million per annum, in line with the 2014 Productivity Commission recommendations (ALGA 2021c).

4. Ensure all disaster response funding incorporates the principle of "betterment"

Post-disaster funding needs to genuinely incorporate the principle of "build back better" by making a larger initial investment so that rebuilt infrastructure is ready to withstand the new climate reality. Damaged and destroyed assets should be assessed for opportunities to go beyond their pre-disaster function and a concept of "betterment" should be established in consultation with local governments to assist them in making a business case for investment.

5. Make funding available post-disaster for all damaged and destroyed council assets

We recommend a review of the definition of essential public assets in the DRFA, or dispose of the metric altogether to ensure that council assets impacted by extreme weather events are rebuilt. This should extend to a review of funding provisions to ensure they cover all sorts of climate impacts.

6. Support residents and businesses exposed to extreme weather events to build resilience

We recommend that state, territory and federal governments re-examine policies and invest in supporting private mitigation efforts. This includes robust building standards, community education and rebates and subsidies for energy efficiency and home resilience retrofits, especially for the most vulnerable in our communities. All policies responding to climate change impacts need to limit the risk and responsibility placed directly on individuals, who have far less resourcing, information and power than governments.

7. Look for cost sharing opportunities between local and state governments for asset upgrades

Cost sharing agreements should be formed to improve assets with interconnected responsibility across levels of government (such as bike lanes and street lighting). This process should be led by state and territory governments who have a higher level of control and access to greater resources.

8. Encourage and resource regional collaborations between councils to address climate change

All state and territory governments should ensure mechanisms and funding exists for the creation and ongoing work of cross-council alliances, such as the Greenhouse Alliances in Victoria which have been internationally recognised as a best practice governance model (CVGA 2019).

9. Ensure all planning and development activity at a state and territory level adequately accounts for accelerating climate risks

All planning and development policies and activities undertaken by state and territory governments must take climate change into account. This echoes recommendation 19.3 of the Royal Commission into National Natural Disaster Arrangements that “state, territory and local governments should be required to consider present and future natural disaster risk when making land-use planning decisions for new developments” (Royal Commission into National Natural Disaster Arrangements 2020).

10. Improve energy efficiency standards and invest in building upgrades to ensure Australian houses are safe and comfortable

Investing in better quality and more efficient buildings, including homes, helps protect residents from climate impacts and reduces emissions. State, territory and federal governments need to continue to raise standards through mechanisms such as updating the National Construction Code, introducing minimum standards for rental properties and mandatory disclosure of energy efficiency ratings

at point of sale. There should also be substantial investment in programs to retrofit existing homes to make them more energy efficient, including social and low-income housing.

11. Establish a national body, or expand the remit of an existing one, to support research on adaptation and act as a centralised hub for up-to-date climate change information

The federal government should expand an existing body, or establish a new one, to lead research on adaptation, with a dedicated arm focused on providing support and training to local governments in how to use, interpret and communicate climate change information. This body should assist councils in locating and using data that is sufficiently specific in timeframes and geographic scales to aid decision-making, and deal with the full spectrum of climate-fuelled risks. Establishing such a centralised and authoritative source of climate change information could help to reduce both the risk and fear of litigation for councils.

12. Take responsibility for coordination of climate impacts responses to ensure consistency and clearly delineated responsibilities between different levels of government

The climate impacts experienced by councils do not respect local government boundaries and cannot be handled by individual councils or ad-hoc agreements between neighbouring councils. State, territory and federal governments should formally recognise the role they have to play in coordination of responding to climate risks and provide better guidance to councils on how to approach different hazards.

13. State, territory and federal governments should urgently implement the findings of the Royal Commission into National Natural Disaster Arrangements

It is essential that state, territory and federal governments comprehensively and urgently review, accept and implement all recommendations of the Royal Commission into National Natural Disaster Arrangements. A large number of the 2020 recommendations of the Royal Commission were directed to state, territory and federal governments, but have significant implications for councils.

14. Support councils to undertake and regularly review climate change risk assessments

State and territory governments, through consultation with local governments, should develop clear mechanisms that ensure all councils are undertaking and regularly reviewing robust climate change risk assessments. This responsibility for councils should be matched with clear guidance on what needs to be done, including best practice examples.

7. Conclusion

While individual case studies and sections of this report can be shocking in and of themselves, their true significance emerges in the collective picture they paint. Australia has entered a new era of climate impacts and risks that are being acutely felt at the local level. Communities and the councils that support them are experiencing the brunt of more severe and frequent extreme weather events. These disasters risk human life, property, economies and councils' abilities to fulfill their myriad of functions within the community.

Despite the significant barriers facing local government areas in reducing emissions and adapting to climate change, many are appropriately escalating and prioritising the risk. These efforts should be applauded, but greater ambition and follow-through is needed from all levels of government if we are to meet the challenge ahead. There is no time to delay immediate action to reduce fossil fuel emissions, ramp up renewable energy production and develop resilience to climate threats.

We call on all levels of government to recognise that climate damage is here, now, and requires urgent and collective action. The non-exhaustive recommendations that conclude this report offer a first stepping stone toward a more equitable and consistent approach across Australia.

References

- ABC News, 2019. Port Fairy's decades-long push for wall to stop seaside tip spewing rubbish into the ocean to rise from the waves. ABC, 31 May 2019. Accessed at: <https://www.abc.net.au/news/2019-05-31/port-fairy-takes-steps-to-fix-old-tip-site/11159736>
- ABC News, 2020. Last Summer's bushfire season in top five disasters for insurance payouts. ABC, 23 August 2020. Accessed at: <https://www.abc.net.au/news/2020-08-23/bushfire-season-in-top-five-for-insurance-payouts/12578860>
- ABC News, 2021a. Climate change means more floods, fires and heatwaves. Some communities are already adapting. ABC, 22 August 2021. Accessed at: <https://www.abc.net.au/news/2021-08-22/climate-change-flood-fires-heatwaves-adaptations-australia/100389738>
- ABC News, 2021b. 'Exhausted' councils sign joint plea for urgent federal help to cover disaster clean-up costs. ABC, 4 March 2021. Accessed at <https://www.abc.net.au/news/2021-03-04/mayors-seek-federal-help-on-disaster-clean-up-and-climate-change/13211908>
- ACCC (Australian Competition and Consumer Commission), 2020. Northern Australia Insurance Inquiry. Accessed at: <https://www.accc.gov.au/system/files/Northern%20Australia%20Insurance%20Inquiry%20-%20Final%20Report%20-%2030%20November%202020.pdf>
- Act on Climate, 2018. The urgent need for a Victorian Climate Change Action Fund. Accessed at: https://www.actonclimate.org.au/victoria_needs_a_climate_change_action_fund
- AFR (Australian Financial Review), 2021. Wilson fights Noosa council's climate change hit to property. AFR, 23 April 2021. Accessed at: <https://www.afr.com/policy/economy/wilson-fights-noosa-council-s-climate-change-hit-to-property-20210423-p57lq9>
- ALGA (Australian Local Government Association), 2019. National General Assembly Motion: Climate Emergency.
- ALGA (Australian Local Government Association), 2020. Strategic Plan 2020-2023. Accessed at: <https://cdn.alga.asn.au/wp-content/uploads/ALGA-Strategic-Plan.pdf>
- ALGA (Australian Local Government Association), 2021a. 27th National General Assembly. Accessed at <https://cdn.alga.asn.au/wp-content/uploads/2021-NGA-Business-Paper-WEB.pdf>
- ALGA (Australian Local Government Association), 2021b. Local Government Key Facts and Figures. Accessed at <https://alga.asn.au/facts-and-figures/>
- ALGA (Australian Local Government Association), 2021c. ALGA submission to the Senate Finance and Public Administration References Committee. 11 February 2021. Accessed at <https://cdn.alga.asn.au/wp-content/uploads/ALGA-submission-to-the-Senate-inquiry-on-lessons-learned-following-the-2019-20-bushfire-season.pdf>
- Amundsen, H., Berglund, F., Westskog, H., 2010. Overcoming barriers to climate change adaptation: a question of multilevel governance? *Environment and Planning C* 28, 2:276–289. <https://doi.org/10.1068/c0941>
- Audit Office of New South Wales, 2021. Report on Local Government 2021. Accessed at: <https://www.audit.nsw.gov.au/sites/default/files/documents/Report%20on%20Local%20Government%202020.pdf>
- Australian Coastal Councils Association, 2019. Coastal Issues Survey. Accessed at: <https://stokes2013.files.wordpress.com/2019/03/fri-11.00-stokes.pdf>
- Baker & McKenzie, 2011. Local Council Risk of Liability in the Face of Climate Change – Resolving Uncertainties: A Report for the Australian Local Government Association 7, 132.
- Balston, J., Kellett, J., Wells, G., Li, S., Gray, A., & Iankov, I., 2012. Quantifying the cost of climate change impacts on local government assets. Accessed at: <http://www.nccarf.edu.au/publications/quantifying-cost-climate-change-impacts>
- Barnett, J., O'Neill, S., 2010. Maladaptation [Editorial], *Global Environmental Change* 20, 211-213. Accessed at: <http://www.asocam.org/sites/default/files/publicaciones/files/c8404a470b4795993070a353b8e3d67d.pdf>
- Beecham, S., Razzaghmanesh, M., Salemi, T., 2016. The role of green roofs in mitigating Urban Heat Island effects in the metropolitan area of Adelaide, South Australia. *Urban Forestry and Urban Greening* 15:89-102. <https://www.sciencedirect.com/science/article/abs/pii/S1618866715001788>
- Bell-James, J., Baker-Jones, M. and Barton, E., 2017. Legal Risk. A guide to legal decision making in the face of climate change for coastal decision makers: Information Manual 6. Accessed at: https://nccarf.edu.au/wp-content/uploads/2019/03/IM06_Legal_Risk.pdf
- Bell, P., 2007. Chapter 11: How Local Government Can Save Australia's Federal System In *Federalism and Regionalism in Australia: New Approaches, New Institutions?* (Eds. A. J. Brown and J.A. Bellamy), ANU E Press: Canberra.
- Bloch, M., 2021. WA's First Regional Climate Alliances Named. *SolarQuotes*, 7 July 2021. Accessed at: <https://www.solarquotes.com.au/blog/wa-climate-alliance-mb2065/>
- Boulter, S., 2016. Coastal councils are already adapting to rising seas – we've built a website to help. Accessed at: <https://theconversation.com/coastal-councils-are-already-adapting-to-rising-seas-weve-built-a-website-to-help-6448>
- BREAZE (Ballarat Renewable Energy and Zero Emissions), 2021. Achieving Ballarat Net Zero 2030. Accessed at: <https://breaze.org.au/editor/newest-articles/achieving-ballarat-net-zero-2030-how-you-can-help>

- C40 cities, 2021. Why Cities? Accessed at https://www.c40.org/why_cities
- City of Adelaide, 2020. Cities Power Partnership survey response, September 2020. For further project information see: <https://www.cityofadelaide.com.au/about-council/grants-sponsorship-incentives/sustainability-incentives-scheme/>
- City of Gold Coast 2019. Ocean Beaches Strategy 2013-2023: Summary of Mid-life Review. Accessed at <https://www.goldcoast.qld.gov.au/files/sharedassets/public/pdfs/policies-plans-amp-strategies/ocean-beaches-strategy-mid-life-review.pdf>
- City of Logan, 2020. Logan named 'Best on Ground' in national green spaces report, 13 November, Accessed at: <https://www.logan.qld.gov.au/news/article/504/logan-named-best-on-ground-in-national-green-spaces-report>
- City of Melbourne, 2012. Urban Forest Strategy. Accessed at <https://www.melbourne.vic.gov.au/SiteCollectionDocuments/urban-forest-strategy.pdf>
- City of Melbourne, 2020. Cities Power Partnership survey response, September 2020. For further project information see: <https://www.melbourne.vic.gov.au/business/sustainable-business/mrep/Pages/melbourne-renewable-energy-project.aspx>
- City of Newcastle, 2020. Solar farm powering City operations and revenue. 25 June 2020. Accessed at <https://www.newcastle.nsw.gov.au/council/news/latest-news/solar-farm-powering-city-operations-and-revenue>
- City of Onkaparinga, 2020. Cities Power Partnership survey response, September 2020. For further project information see: <https://www.onkaparingacity.com/Services-and-projects/Reserves-trees-and-verges/Trees/Urban-greening>
- Climate Council, 2019. Compound costs: How Climate Change is Damaging Australia's Economy. Accessed at: <https://www.climatecouncil.org.au/wp-content/uploads/2019/05/costs-of-climate-change-report-v3.pdf>
- Climate Council, 2021. Aim High, Go Fast: Why Emissions Need to Plummet This Decade. Accessed at: <https://www.climatecouncil.org.au/wp-content/uploads/2021/04/aim-high-go-fast-why-emissions-must-plummet-climate-council-report.pdf>
- Climate Works and MSDI (Monash Sustainable Development Institute), 2020. Net Zero Momentum Tracker: Local Government Sector. Accessed at: https://www.climateworksaustralia.org/wp-content/uploads/2020/01/ClimateWorks_NZMT_Local-Government-Report_Jan20.pdf
- Commonwealth of Australia, 2020. Royal Commission into National Natural Disaster Arrangements. Accessed at <https://naturaldisaster.royalcommission.gov.au/system/files/2020-11/Royal%20Commission%20into%20National%20Natural%20Disaster%20Arrangements%20-%20Report%20%20%5Baccessible%5D.pdf>
- Cooper, J.A.G. and Lemckert, C., 2012. Extreme sea-level rise and adaptation options for coastal resort cities: a qualitative assessment from the Gold Coast, Australia. *Ocean and Coastal Management*, 64: 1-14.
- Courier Mail, 2021. Threats that could leave \$225 billion in infrastructure 'redundant'. The Courier Mail, 20 August 2021. Accessed at <https://www.couriermail.com.au/news/queensland/threats-that-could-leave-225-billion-in-infrastructure-redundant/news-story/effa0cf626833a7cd8ad4d312bea0ac2>
- Coutts, A. M., Tapper, N. J., Beringer, J., Loughnan, M., Demuzere, M., 2013. Watering our cities: The capacity for Water Sensitive Urban Design to support urban cooling and improve human thermal comfort in the Australian context. *Progress in Physical Geography: Earth and Environment* 37, 1:2-28. DOI:10.1177/0309133312461032
- CPP (Cities Power Partnership), 2021. About. Accessed at <https://citiespowerpartnership.org.au/about/>
- CVGA (Central Victorian Greenhouse Alliance), 2019. Climate Change Inquiry Submission S113. 29 August 2019. https://www.parliament.vic.gov.au/images/stories/committees/epc-LA/Inquiry_into_Tackling_Climate_Change_in_Victorian_Communities/Submissions/S113_Central_Victorian_Greenhouse_Alliance.pdf
- DCC (Department of Climate Change), 2009. Climate change risks to Australia's coasts: a first pass national assessment. Accessed at <https://www.environment.gov.au/system/files/resources/fa553e97-2ead-47bb-ac80-c12adffea944/files/cc-risks-full-report.pdf>
- DCCEE (Department of Climate Change and Energy Efficiency), 2011. Climate Change Risks to Coastal Buildings and Infrastructure, DCC, Canberra. Accessed at http://www.climatechange.gov.au/sites/climatechange/files/documents/03_2013/risks-coastalbuildings.pdf
- DCCEE (Department of Climate Change and Energy Efficiency), 2012. Roles and Responsibilities for Climate Change Adaptation in Australia, report prepared for community discussion. Department of Climate Change and Energy Efficiency, Australian Government, Canberra. Accessed at <http://www.climatechange.gov.au/government/initiatives/sccc/discussion.aspx>. [Accessed: 12 November 2012]
- Deloitte Access Economics, 2016. Building resilient infrastructure. Accessed at <http://australianbusinessroundtable.com.au/assets/documents/Report%20-%20Building%20Resilient%20Infrastructure/Report%20-%20Building%20resilient%20infrastructure.pdf>
- Deloitte Access Economics, 2017. Building Australia's Natural Disaster Resilience. Accessed at <https://www2.deloitte.com/au/en/pages/economics/articles/building-australias-natural-disaster-resilience.html>
- Department of Home Affairs, 2018a. Guideline 1 - An essential public asset. Accessed at <https://www.disasterassist.gov.au/Documents/Natural-Disaster-Relief-and-Recovery-Arrangements/drfa-2018-guideline-1-an-essential-public-asset.docx>
- Department of Home Affairs, 2018b. Disaster Recovery Funding Arrangements. Accessed at <https://www.disasterassist.gov.au/disaster-arrangements/disaster-recovery-funding-arrangements>

- Department of the Prime Minister and Cabinet, 2020. A national response to national disasters. Australian Government. Accessed at <https://pmc.gov.au/sites/default/files/publications/national-approach-national-disasters.pdf>
- Dingle and Mallen, 2020. Community sports fields and atmospheric climate impacts: Australian and Canadian perspectives. *Managing Sport and Leisure*, DOI: 10.1080/23750472.2020.1766375
- Echeverri, L.G., 2018. Investing for rapid decarbonization in cities, *Environmental Sustainability*. 30: 42-51.
- EMV (Emergency Management Victoria), 2018. Natural Disaster Financial Assistance for local councils. Accessed at https://files-em.em.vic.gov.au/public/EMV-web/NDFACouncils_Reinstatement_of_essential_public_assets_guidance_for_local_councils.DOCX
- EnviroGroup, 2020. Nillumbik Council's Solar Battery System for Bushfire Refuge. Accessed at <https://envirogroup.com.au/projects/nillumbik-councils-solar-battery-system-for-bushfire-refuge/>
- Eurobodalla Shire Council, 2020. Lessons to be learned in relation to the Australian bushfire season 2019-20. Submission 23 To Senate Inquiry into 2019/20 bushfires. p. 22
- Fletcher, C., Taylor, B., Rambaldi, A., Harman, B., Heyenga, S., Ganegodage, R., Lipkin, F., McAllister, R., 2013. Costs and coasts: an empirical assessment of physical and institutional climate adaptation pathways - Final Report. National Climate Change Adaptation Research Facility, Gold Coast, pp. 59. Accessed at <https://apo.org.au/sites/default/files/resource-files/2013-05/apo-nid34006.pdf>
- Flocard, F., Carley, J. T., Rayner, D. S., Rahman, P. F., Coghlan, I. R., 2013. Future Coasts - Port Fairy Coastal Hazard Assessment. Water Research Laboratory (WRL), University of New South Wales. Accessed at <https://www.moyne.vic.gov.au/files/assets/public/documents/our-community/environment/portfairycoastalhazardassessment.pdf>
- Gasparinni, A., Guo, Y., Hashizume, M., Lavigne, E., Zanobetti, A., Schwartz, J., Tobias, A., Tong, S., Rocklöv, J., Forsberg, B., Leone, M., De Sario, M., Bell, M. L., Guo, Y. L., Wu, C., Kan, H., Yi, S., Coelho M. S. Z. S., Saldiva, P. H.,... Armstrong, B., 2015. Mortality risk attributable to high and low ambient temperature: a multicountry observational study. [https://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736\(14\)62114-0.pdf](https://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(14)62114-0.pdf)
- Harvey, N. and Caton, B., 2010. Coastal Management in Australia. University of Adelaide Press. Accessed at https://www.google.com.au/books/edition/Coastal_Management_in_Australia/4SnsYmZXLH0C?hl=en&gbpv=1&printsec=frontcover
- Hennessy, K., Fitzharris, B., Bates, B. et al., 2007. Australia and New Zealand. In: *Climate Change 2007: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Parry M, Canziani O, Palutikof J, D Lpv, Hanson C (eds.)]. pp.507-40 Cambridge University Press, Cambridge, UK.
- Humphrys, E., Newman, F., Goodman J., 2020. Heat Stress and Work in the Era of Climate Change: What We Know, and What We Need to Learn. Climate Justice Research Centre, UTS. Accessed at <https://apo.org.au/sites/default/files/resource-files/2020-11/apo-nid309639.pdf>
- Insurance Business Australia, 2021. Queensland councils call for federal insurance support. Accessed at <https://www.insurancebusinessmag.com.au/news/breaking-news/queensland-councils-call-for-federal-insurance-support-245327.aspx>
- Insurance Council of Australia, 2020. \$3.85 Billion Already Paid in Natural Disaster Claims as Insurers Overcome Pandemic Upheaval. Media Release, 27 August 2020. Accessed at: [https://insurancecouncil.com.au/wp-content/uploads/resources/Media%20releases/2020/2020_08/2020_08_\\$3.85billion%20already%20paid%20in%20natural%20disaster%20claims%20as%20insurers%20overcome%20pandemic%20upheaval.pdf](https://insurancecouncil.com.au/wp-content/uploads/resources/Media%20releases/2020/2020_08/2020_08_$3.85billion%20already%20paid%20in%20natural%20disaster%20claims%20as%20insurers%20overcome%20pandemic%20upheaval.pdf)
- IPCC, 2018. Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]
- IPCC, 2021a. Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J. B. R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. In Press
- IPCC, 2021b. Summary for Policymakers. In: *Climate Change 2021: The Physical Science Basis*. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. In Press.
- Kossin, J.P., Emanuel, K.A. and Vecchi, G.A., 2014. The poleward migration of the location of tropical cyclone maximum intensity. *Nature*, 509: 349-352.
- LGA of SA (Local Government Association of South Australia), 2020. Independent Review into South Australia's 2019/20 Bushfire Season. Accessed at https://www.lga.sa.gov.au/_data/assets/pdf_file/0022/670144/ECM_702991_v11_Review-of-the-State-Bushfire-Season-2019-20-Submission.pdf
- Liverpool City Council, 2020. Cities Power Partnership survey response, September 2020. For further project information see: <https://www.liverpool.nsw.gov.au/development/major-projects/fifteenth-avenue-smart-transit-fast-corridor>.

- Lloyd-Cape, M., Jackson, S., Lewis, A., 2021. Smokescreen: The rhetoric and reality of federal bushfire recovery funding. Accessed at [https://d68ej2dhub09.cloudfront.net/2798-Smokescreen-21_Feb_-_Edited_FINAL_\(1\).pdf](https://d68ej2dhub09.cloudfront.net/2798-Smokescreen-21_Feb_-_Edited_FINAL_(1).pdf).
- Local Government NSW, 2021. Increasing Resilience to Climate Change Grants. Accessed at https://www.lgnsw.org.au/Public/Public/Policy/IRCC-2/IRCC_grants.aspx.
- Lynch, A., Oke, C., Leavesley, A., 2021. State of play: Local governments and city networks accelerating climate action in Australia. ICLEI Oceania. Accessed at https://static1.squarespace.com/static/5c637f289b8fe8538ceb67fc/t/60d12355f86888732d059a41/1624318849057/State-of+Play-Status_Report_ICLEI+2021.pdf.
- Lynch, R., 2013. Grantham receives only minor damage. The Queensland Times, 8 February 2013. Accessed at <http://www.qt.com.au/news/grantham-receives-only-minor-damage/1747545/>.
- Macintosh, A., Foerster, A., & McDonald, J., 2013. Limp, Leap or Learn? Developing legal frameworks for climate change adaptation planning in Australia. National Climate Change Adaptation Research Facility, Gold Coast, 262 pp.
- McDonald, J. (2019) Girt by Sea: Antipodean Lessons in Coastal Adaptation Law, Sea Grant Law and Policy Journal, 10 (1).
- Measham T. G., Preston B. L., Smith T. F., Brooke C., Gorddard R., Withycombe G., Morrison C. 2011. Adapting to climate change through local municipal planning: barriers and challenges. *Mitigation and Adaptation Strategies for Global Change* 16 (5), 889-909. <https://link.springer.com/article/10.1007/s11027-011-9301-2>.
- Mirage News, 2021. Refuges to provide shelter in Blacktown City during heatwaves, 19 February, <https://www.miragenews.com/refuges-to-provide-shelter-in-blacktown-city-516593/>.
- Moyne Shire Council, 2018. Port Fairy Coastal Climate Change Adaptation Plan. Accessed at <https://www.moyne.vic.gov.au/files/assets/public/documents/our-community/environment/defend-port-fairy/2018-06-26-port-fairy-cap.pdf>.
- NAGA (Northern Alliance for Greenhouse Action), 2014. Adaptation in the North. http://www.naga.org.au/uploads/9/0/5/3/9053945/adaptation_in_the_north_volume_6.pdf.
- NAGA (Northern Alliance for Greenhouse Action), 2021. Building Vulnerability Assessment. <https://www.naga.org.au/building-vulnerability-assessment.html>.
- NCCARF (The National Climate Change Adaptation Research Facility), 2013. Policy Guidance Brief 5: Challenges of Adaptation for Local Governments. Accessed at: <https://apo.org.au/sites/default/files/resource-files/2013-02/apo-nid32950.pdf>.
- NIBA (National Insurance Brokers Association), 2020. Lessons to be learned in relation to the Australian bushfire season 2019-20 Submission 79, p. 7. From Senate Inquiry into 2019/20 bushfires.
- NIBS (National Institute of Building Sciences) 2019. Natural Hazard Mitigation Saves. Accessed at: http://2021.nibs.org/files/pdfs/NIBS_MMC_MitigationSaves_2019.pdf
- Nilumbik Shire Council, 2019. Council leads the charge in renewable energy. Available at: <https://www.nillumbik.vic.gov.au/News/Community-Bank-Stadium-solar-system>.
- Nowak, D.J., Hirabayashi, S., Bodine, A., Greenfield, E., 2014. Tree and forest effects on air quality and human health in the United States. *Environmental Pollution* 193, 119-129. Accessed at https://www.fs.fed.us/nrs/pubs/jrnl/2014/nrs_2014_nowak_001.pdf
- Orange City Council, 2020. Cities Power Partnership survey response, September 2020. For further project information see: <https://www.orange.nsw.gov.au/led-streetlight-project-to-provide-long-term-benefits/>.
- Productivity Commission, 2012. Inquiry Report - Barriers to Effective Climate Change Adaptation. Inquiry Report 59, Canberra. Accessed at <https://www.pc.gov.au/inquiries/completed/climate-change-adaptation/report/climate-change-adaptation.pdf>.
- Productivity Commission, 2014. Natural Disaster Funding Arrangements. Inquiry Report 74, Canberra. Accessed at <https://www.pc.gov.au/inquiries/completed/disaster-funding/report/disaster-funding-volume1.pdf>
- Rowlinson, S., YunyanJia, A., Li, B., ChuanjingJu, C., 2014. Management of climatic heat stress risk in construction: A review of practices, methodologies, and future research. *Accident Analysis & Prevention*, 66, 187-98.
- Royal Commission into National Natural Disaster Arrangements, 2020. Royal Commission into National Natural Disaster Arrangements Report. Accessed at <https://naturaldisaster.royalcommission.gov.au/system/files/2020-11/Royal%20Commission%20into%20National%20Natural%20Disaster%20Arrangements%20-%20Report%20%20%5Baccessible%5D.pdf>.
- Sabin Centre for Climate Change Law 2021 Non-U.S. Climate Change Litigation Database. Accessed at: <http://climatecasechart.com/climate-change-litigation/non-us-climate-change-litigation/>
- Sano, M., Golshani A., Splinter K.D., et al., 2011. Detailed assessment of vulnerability to climate change in the Gold Coast, Australia. *Journal of Coastal Research*, suppl. Special Issue; Fort Lauderdale SI.64: 245-249.
- SECCA and ICA (Southeast Councils Climate Change Alliance and the Insurance Council of Australia), 2019. Climate resilience, local government and their communities (working paper): Finding the funds needed to protect our built environment in an era of climate change. Working paper. Accessed at: https://www.secca.org.au/wp-content/uploads/2020/05/SECCA-ICA_Mitigating-Climate-Change-Impacts_-_Working-Paper.pdf.
- Senate Select Committee on Agricultural and Related Industries, 2010. The incidence and severity of bushfires across Australia. August 2010, pp. 101, 106.
- Shoalhaven City Council, 2020. Shoalhaven City Council Submission to the Royal Commission into National Natural Disaster Arrangements. Accessed at <https://doc.shoalhaven.nsw.gov.au/displaydoc.aspx?record=D20/151087>.

Sunshine Coast Regional Council, 2020. Cities Power Partnership survey response, September 2020. For further project information see: <https://www.sunshinecoast.qld.gov.au/Environment/Sunshine-Coast-Solar-Farm>.

The Guardian, 2021. For some areas hit by NSW flood crisis, it's the fourth disaster in a year. *The Guardian*, 24 March 2021. Accessed at <https://www.theguardian.com/news/datablog/2021/mar/24/for-some-areas-hit-by-nsw-flood-crisis-its-the-fourth-disaster-in-a-year>.

The Senate, 2020. Lessons to be learned in relation to the Australian bushfire season 2019-2020. Chapter 7. Accessed at https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Finance_and_Public_Administration/Bushfirerecovery/Interim_Report/section?id=committees%20reportsen%2024518%2073566.

The Senate Select Committee on Agricultural and Related Industries, 2010. The incidence and severity of bushfires across Australia, August 2010, pp. 101, 106.

The Shire of Augusta Margaret River, 2020. Climate Action Plan: Part 1 - Towards Zero Emissions 2020-2030.

The State of Queensland, 2020. Resilient Queensland in Action. March 2020. Accessed at https://www.qra.qld.gov.au/sites/default/files/2020-02/0501_Resilient%20Queensland%20in%20Action_V22_LR_February2020.pdf.

The State of Victoria Department of Environment, Land, Water and Planning, 2020. Local Government Climate Change Adaptation Roles and Responsibilities under Victorian legislation: Guidance for local government decision-makers, Accessed at: https://www.climatechange.vic.gov.au/_data/assets/pdf_file/0030/490476/Local-Government-Roles-and-Responsibilities-for-Adaptation-under-Victorian-Legislation_Guidance-Brief.pdf.

The Treasury, 2018. Background Paper 20: Natural Disaster Insurance. Accessed at <https://financialservices.royalcommission.gov.au/publications/Documents/natural-disaster-insurance-background-paper-20.pdf>.

Tooth, R., Li, W., McWha, V., 2020. National Insurance Project Final Report - For the Mitigation and Risk Sub-Committee of Australia-New Zealand Emergency Management Committee. Accessed at <https://naturaldisaster.royalcommission.gov.au/system/files/exhibit/NSW.507.001.0001.pdf>.

Wagga Wagga City Council, 2020. Cities Power Partnership survey response, September 2020. For further project information see: <https://wagga.nsw.gov.au/services/waste-and-recycling>.

Which Plant Where, 2021. The Which Plant Where Project, Accessed at: <http://www.whichplantwhere.com.au/about/>.

Whitsunday Regional Council, 2020. Cities Power Partnership survey response, September 2020. For further project information see: <https://www.innovationhub.whitsundayrc.qld.gov.au/>.

Wingecarribee Shire Council Media Centre, 2021. Mittagong Pool to remain closed for 2021/22 swim season, 5 August, Accessed at: <http://media.wsc.nsw.gov.au/mittagong-pool-to-remain-closed-for-2021-22-swim-season/>.

Yarra Ranges Council, 2021. Council Meeting Agenda, 24 August 2021. Accessed at: <https://www.yarraranges.vic.gov.au/Council/Council-meetings/Minutes-and-agendas>.

Image credits

Cover image: Farmer is consoled after the 2019-2020 bushfires in NSW. Sean Davey. AAP Images.

Page 11 - Figure 1: Roads and a new bridge submerged during a flood in Windsor, New South Wales, in 2021. Leah-Anne Thompson. Shutterstock.

Page 14 - Figure 2: Coastal erosion in Gold Coast, Queensland. By Flickr user Citt. Licensed under CC-by-NC-ND-2.0.

Page 15 - Figure 3 (left): Eurobodalla bridge destroyed by fire. Eurobodalla Shire Council.

Page 15 - Figure 4 (right): Eurobodalla bridge destroyed by flood. Eurobodalla Shire Council.

Page 18 - Figure 5: Damage and flooding at Mittagong Swimming Pool, 2020. Wingecarribee Shire Council.

Page 19 - Figure 6: Protective equipment makes hard work even hotter. Vadim Ratnikov. Shutterstock.

Page 24 - Figure 7: Current inundation risk modelling at highest tide in Silverleaves on Phillip Island, Victoria. Coastal Risk Australia.

Page 24 - Figure 8: Predicted inundation risk modelling at highest tide for 2100 with +0.74m sea-level rise. Coastal Risk Australia.

Page 26 - Figure 9: Holiday resort villas on Kangaroo island, South Australia destroyed by 2020 bushfires. BeyondImages. iStock.

Page 30 - Figure 10: Aerial Mike. Shutterstock.

Page 31 - Figure 11: Clean up in the aftermath of the 2011 floods in Brisbane, Queensland. Maythee Voran. Shutterstock.

Page 32 - Figure 12: Firefighter observes the wreckage of a home in Kinglake Victoria after the 2009 bushfires. By Flickr user Neil Creek

Page 33 - Figure 13: 2012 Roma floods as seen from the air. Roma, Queensland has a long history of flood events. By Flickr user Tatter. Licensed under CC-by-SA-2.0.

Page 38 - Figure 15: Solar panels on Turbine Hall, Cockatoo Island, New South Wales. By Flickr user Jason Wong. Licensed under CC-by-NC-ND-2.0.

Page 41 - Figure 16: Burned forest after 2019/20 bushfires, Bendalong, New South Wales. RugliG. Shutterstock.

Page 42 - Figure 17: Council staff planting trees in Onkaparinga, South Australia. City of Onkaparinga.

Page 43 - Figure 18: Nillumbik Shire Council's Community Stadium and Relief Centre in Victoria, featuring rooftop solar, a battery system and an electric vehicle charging station. Nillumbik Shire Council.

Page 44 - Figure 19: Blacktown City Council in Western Sydney is trialing an Australia-first network of 'heat refuges'. Jaaske M. Shutterstock.

Page 45 - Figure 20: Flooded roads, Mcgraths Hill, New South Wales 2021. Harley Kingston. Shutterstock.

Page 50 - Figure 21: Damage from 2011 floods in Brisbane, Queensland. Maythee Voran. Shutterstock.

Page 52 - Figure 22: Dark rooftops and lack of vegetation contribute to the Urban Heat Island Effect. Mikulas1. iStock.

Page 54 - Figure 23: Bushfire smoke blankets Sydney Harbour, New South Wales, 2019. Natsicha. iStock.

Page 58 - Figure 24: Massive bushfire threatens Batemans Bay, New South Wales, 2019. By Flickr user Beyond Coal and Gas. Licensed under CC-by-2.0.

Page 59 - Figure 25: Severe flooding in Kempsey, New South Wales, 2021. Jason O'Brien. AAP Images.

Thank you for supporting the Climate Council.

The Climate Council is an independent, crowd-funded organisation providing quality information on climate change to the Australian public.

CLIMATE COUNCIL

 facebook.com/climatecouncil

 twitter.com/climatecouncil

 info@climatecouncil.org.au

 climatecouncil.org.au

The Climate Council is a not-for-profit organisation. We rely upon donations from the public. We really appreciate your contributions.

DONATE

climatecouncil.org.au/donate