Australian Government

Department of Health and Aged Care

National Health and Climate Strategy

Front Cover

Kati Thanda–Lake Eyre, Maree, South Australia, Australia

Credit: Ignacio Palacios

Acknowledgements

Many individuals and organisations have given their time and expertise to the development of the National Health and Climate Strategy. The Chief Medical Officer's Advisory Group, composed of Australian experts in health and climate change, has guided its development. The Department of Health and Aged Care would also like to acknowledge the contributions of colleagues in all state and territory health departments, including through the Climate and Health State and Territory Network, the Healthy Environments and Lives Network, and other experts and practitioners from across the country and worldwide.

Acknowledgement of Country

The Australian Government acknowledges the Traditional Owners of Country throughout Australia, and their continuing connection to land, sea and community. We pay our respects to them and their cultures, and to Elders both past and present.

Cultural Advice

Please be aware this document may contain images, quotes and names of people who may have passed away.

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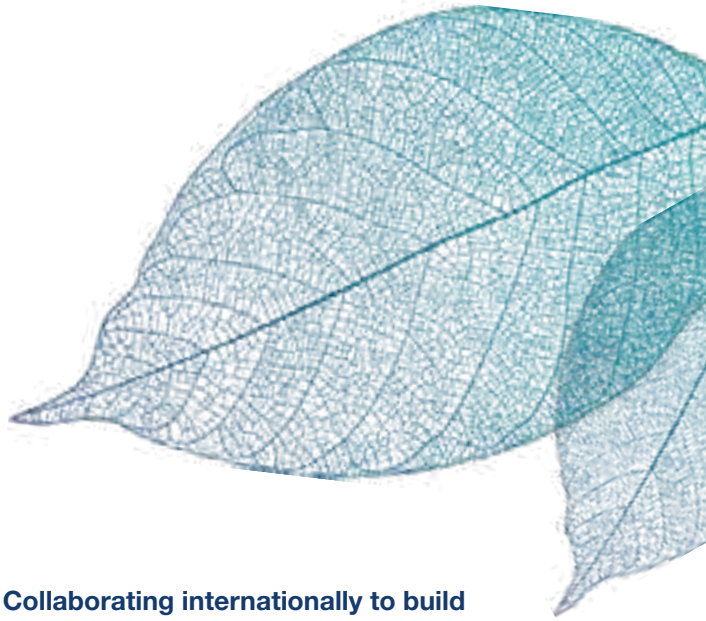
Contents



Ministers' foreword

The World Health Organization has described climate change as the greatest threat to public health in the 21st Century. People in Australia are already feeling the effects of a warming planet. In recent years, unprecedented droughts, fires and floods have taken their toll on lives. Longer and hotter summers, with more frequent and intense heatwaves, are regularly breaking temperature records. Illness, injury and death related to disasters and extreme heat represent just a few of climate change's impacts on health. Without action to reduce emissions, climate change will threaten food and water security, facilitate the spread of infectious diseases and worsen air quality with far-reaching and devastating consequences for health. Climate change is also having a profound impact on mental health across the country, particularly amongst our youth.

In recognition of the urgent need to address the health risks associated with climate change, we are proud to launch Australia's first National Health and Climate Strategy. Across the globe, health systems are a significant contributor to greenhouse gas emissions. As the Minister and Assistant Minister for Health and Aged Care, we understand and fully support the imperative for Australia's health system to play its part in Australia's transition to a net zero economy by 2050. However, even with global action to mitigate climate change, there is a pressing need to prepare the health system and communities for the inevitable health impacts of climate change. The Strategy sets out a plan for building a net zero health system and strengthening the climate resilience of our health system, recognising the interdependent relationship between climate adaptation and mitigation. The Strategy will build on the existing work at all levels of government and by health professionals and establish a path forward for Australia's international leadership on climate and health.

The Strategy adopts a Health in All Policies perspective, recognising that collaboration across different policy areas is crucial to the development of just and equitable responses to address the impact of climate change on health. Good climate policy is good public health policy. Emission reduction across all sectors is necessary to reduce the impact of climate change on our health and wellbeing. The Strategy also includes action to amplify the

relationship between Australia's climate and disaster policies and preventive health outcomes. Keeping people healthy and out of hospitals will support Australia's progress to reduce emissions. At the same time, preventing disease will help to ameliorate some of the negative health consequences associated with climate change.

Our health is dependent on the health of the environment. The Strategy addresses the interconnectedness between the health of humans, animals and the environment by adopting a One Health perspective. It also recognises the relationship between health and the environment by emphasising the need to elevate the leadership, wisdom and knowledge of First Nations people in the response to the health impacts of climate change. For tens of thousands of years, First Nations people have adapted to different climatic extremes. Tackling the health impacts of climate change requires us to rethink our relationship to the planet. It is vital we look to First Nations people's holistic understanding of health and ongoing custodianship of the land and seas as we work toward building a healthy and sustainable future for all.

This Strategy reaffirms our Government's strong commitment to genuine action on climate change, and further commits us to reduce the health system's contributions to climate change and outlines clear action to adapt to climate change.

The Hon Mark Butler MP
Minister for Health and Aged Care

The Hon Ged Kearney MP
Assistant Minister for Health and Aged Care

Executive summary

Australia's first National Health and Climate Strategy sets out a whole-of-government plan for addressing the health and wellbeing impacts of climate change, whilst also addressing the contribution of the health system – encompassing public and preventive health, primary and secondary health care, and aged care – to climate change. The Strategy commits to action over five years and lays out an ongoing program of work.

The Strategy's vision is 'Healthy, climate-resilient communities, and a sustainable, resilient, high-quality, net zero health system'. It is organised around four objectives in pursuit of this vision.

Objective 1 (Health system resilience) is to build a climate-resilient health system and enhance its capacity to protect health and wellbeing from the impacts of climate change – to ensure the health system provides high quality, equitable, and culturally safe care, and supports healthy communities in a changing climate. Key actions are to:

- Support and facilitate health-climate risk assessment and health adaptation planning at all levels of the health system
- Work in partnership with First Nations stakeholders to address the impacts of climate change on the health of First Nations people
- Build a climate-resilient health system that can deliver equitable, high-quality care in a changing climate
- Strengthen health system preparedness, response and recovery for climate-related disasters and extreme weather events, in particular by strengthening the role of primary care.

Objective 2 (Health system decarbonisation) is to build a sustainable, high-quality, net zero health system – to minimise environmental harm caused by the health system and contribute to the achievement of Australia's overall emissions reduction goals. Key actions are to:

- Establish regular reporting of health system greenhouse gas emissions, so progress in reducing these emissions can be tracked over time
- Develop a health system decarbonisation roadmap, and as part of this negotiate an emission reduction trajectory for the health system
- Reduce health system emissions by reducing demand for care, by keeping people healthy and by ensuring appropriate, equitable delivery of care and tackling unwarranted variations
- Decarbonise care delivery by tackling key sources of emissions: the built environment and energy; travel and transport; medicines and gases; food and catering; waste and resource use; and the supply chain.

Objective 3 (International collaboration) is to collaborate internationally to build sustainable, climate-resilient health systems and communities – to identify opportunities for knowledge sharing and the development of international standards as well as highlight the ways in which Australia can support its neighbours to protect and promote health in their climate change responses. Key actions are to:

- Work with health systems in comparable jurisdictions to align approaches to:
  - Procurement policy – to support decarbonisation of health system supply chains
  - Measurement and public reporting of environmental impacts of health technology products
- Join the Alliance for Transformative Action on Climate and Health
- Consider options for including health-related action in Australia's next Nationally Determined Contribution under the United Nations Framework Convention on Climate Change, due in 2025.

Objective 4 (Health in all policies) is to support healthy, climate-resilient and sustainable communities through whole-of-government action which recognises the relationship between health and climate outcomes – taking a Health in All Policies approach by promoting the health co-benefits of emissions reductions across society and adaptation action beyond the health system to protect health and wellbeing from climate change. Key actions are to:

- Tackle the health impacts of rising heat and air pollution through collaborative action with states and territories
- Support healthy, sustainable lifestyles through work on the National Dietary Guidelines and promoting active travel
- Promote the health benefits of climate-resilient housing through input to the National Housing and Homelessness Plan and updates to the National Construction Code
- Mobilise collaborative responses to climate-sensitive communicable diseases, as well as climate-related psychological distress and mental ill health.

The Strategy is informed throughout by five principles: Health Equity and the Right to Health, One Health and Planetary Health, First Nations Leadership, Population Health and Prevention, and Evidence-Informed Policymaking. These principles will help to ensure that action is informed by evidence, promotes linkages between human health and environmental health, and is undertaken in a culturally safe and just way. Crucially, the principles also uphold the leadership, strength, and wisdom of First Nations people, and reinforce the Australian Government's commitment to working in partnership to protect First Nations health and wellbeing from the impacts of climate change. The Strategy also outlines action in the following areas that will enable the achievement of the Strategy's objectives: workforce, leadership and training; research and innovation; communication and engagement; and collaboration and governance, including at the international level.

01

Why do we need a **National Health and Climate Strategy**?

People in Australia are already experiencing the impacts of climate change on their health. By 2022, Australia had warmed an average of 1.47 ± 0.24°C since national records began.[1] The most recent report of the Intergovernmental Panel on Climate Change projects Earth is likely to reach a global warming of 1.5°C from pre-industrial levels between 2030 and 2052 if climate change continues to increase at the current rate.[2]

Climate change is disrupting the environmental and human systems that play an important role in maintaining health. By increasing the frequency, intensity and duration of extreme weather events, climate change is leading to more deaths, disease and injury, as well as adversely impacting mental health and wellbeing. Warmer temperatures expand the geographic spread of food-, water- and vector-borne diseases, while threatening food and water security. Air pollution exacerbated by climate change aggravates a variety of respiratory and cardiovascular conditions, including asthma, lung cancer and ischaemic heart disease.

Climate change also affects health outcomes by disrupting productivity, workforce conditions and healthcare services, and through its impacts on housing and infrastructure, nature and biodiversity, and population displacement. Climate change interacts with many of Australia's other significant health and wellbeing challenges, such as an ageing population, a growing burden of climate-sensitive chronic disease and ongoing population health inequalities. There is therefore an urgent need to build community and health system resilience to the impacts of this climate emergency on human health and wellbeing.

While the health system has a crucial role to play in addressing the impacts of climate change, it also generates emissions in the delivery of care. Globally, the health care sector is estimated to be either directly or indirectly responsible for over 5% of total greenhouse gas emissions.[3] Under the Paris Agreement, Australia committed to work alongside other countries hold the increase in global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels. In 2022, Australia committed to reduce national emissions by 43% against 2005 levels by 2030 and achieve net zero emissions by 2050. Achieving these commitments will require decarbonisation across every sector of the economy, including the health system. Reducing health system emissions also aligns with the health profession's responsibility to 'first do no harm'.

The health system also has a role to play in highlighting the health benefits of emissions reductions more generally. Policies to mitigate emissions from housing, food production and agriculture, energy generation, industry, and travel and transport, have the potential to result in major public health benefits, for example through improved urban air quality, healthier diets and increased physical activity. The health system will also be particularly affected by the failure to mitigate or adapt to climate change, as increased mortality, disease and injury will lead to pressure on healthcare demand and capacity.

First Nations people's holistic understanding of health and wellbeing has a critical role to play in Australia's response to climate change. First Nations people have a unique connection to Country – their traditional lands, seas and waterways. For First Nations people, Country is more than just a physical place. Country is central to First Nations people's holistic understanding of health, where health is understood as the social, cultural and emotional wellbeing of the whole community. Caring for Country, including First Nations land and sea management, is strongly associated with the social-political, cultural, economic, physical and emotional wellbeing of First Nations people.[4] First Nations people often say if Country is healthy, then the People will be healthy.[5] There is growing recognition First Nations people's leadership on climate change adaptation and mitigation will not only improve health outcomes for First Nations people, but have benefits for all people in Australia.[6]

02

About the **National Health and Climate Strategy**

This document is Australia's first National Health and Climate Strategy. In recognition of the urgent need to take action, this Strategy outlines a national plan to reduce the impacts of climate change on population health and the functioning of the health system, and to guide the decarbonisation of the health system in a just and equitable way. Throughout this Strategy we use the word 'health' to encompass not just the absence of disease or injury, but a state of complete physical, mental and social wellbeing.[7] The vision statement motivating the Strategy is:

NATIONAL HEALTH AND CLIMATE STRATEGY – VISION STATEMENT

Healthy, climate-resilient communities, and a sustainable, resilient, high-quality, net zero health system.

The Strategy's purpose is to lay out a program of work on climate and health to be undertaken over the coming decades, and to identify priority action over the next 5 years to reduce emissions from the health system and to support adaptation to the impacts of climate change. Much of the work to protect health and wellbeing from the impacts of climate change is already underway across Australia. However, a number of actions will require further consideration, including where further funding is required. An update on progress in developing and delivering action in support of the Strategy's vision statement will be published by 2026.

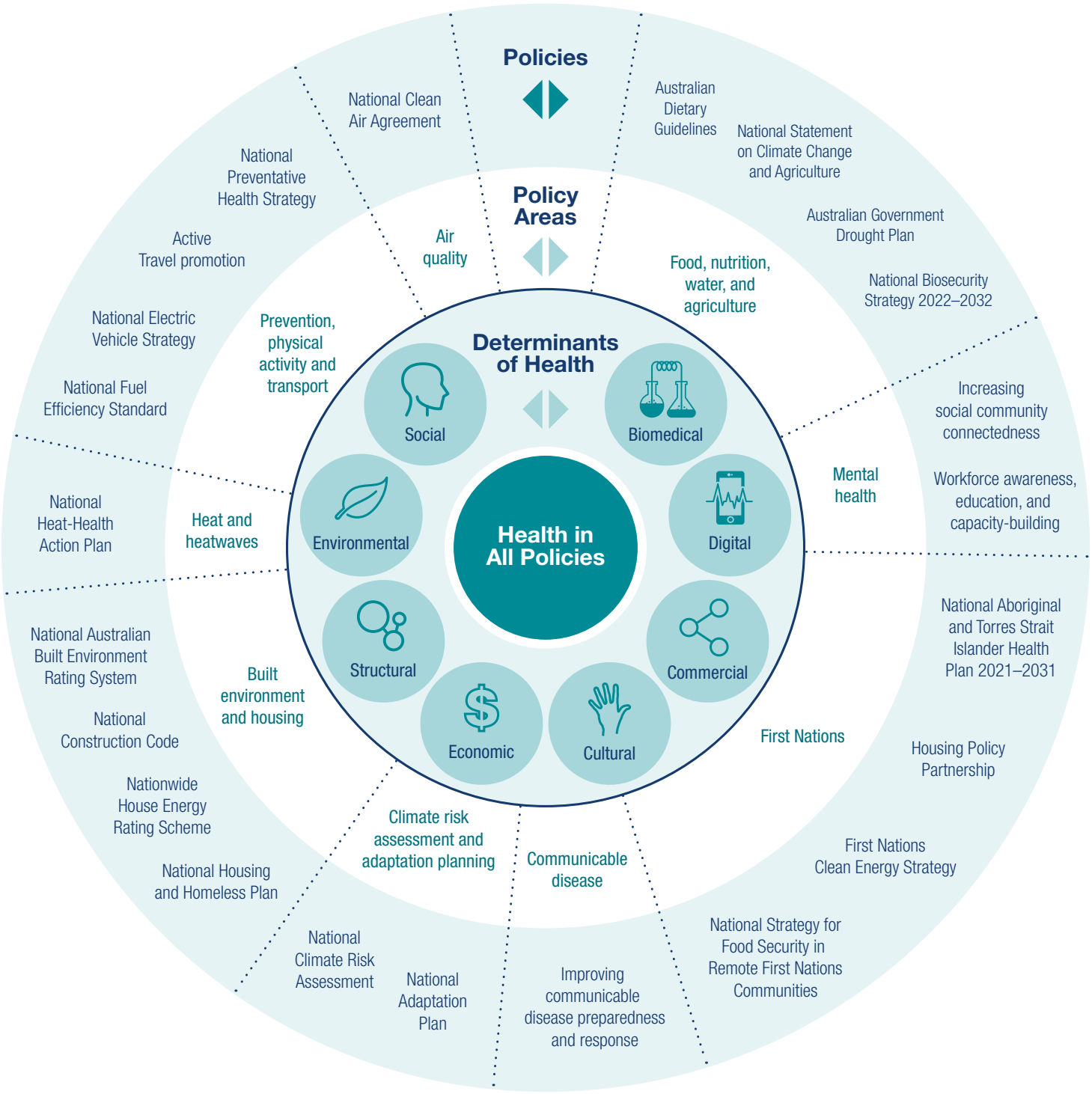
The Strategy recognises an effective response to the health impacts of climate change must encompass action by all parts of the health system, which includes:

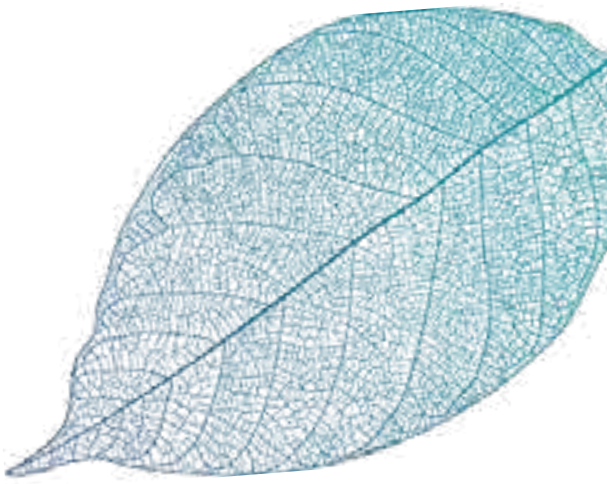
- Primary and community care, secondary and tertiary care, and aged care, including public health and preventive health.
- All levels of the health system, including national, state and territory, and local health systems.
- Private as well as public providers, including health and aged care providers, providers of diagnostic and pathology services, and providers of health-related education and training.
- Manufacturers, including manufacturers of health technology products and consumables used by the health system.

Delivering the Strategy will require collaboration across policy areas by all Australian Government and state and territory government departments. This is in line with a Health in All Policies approach, which underpins this Strategy. A Health in All Policies approach acknowledges that human health and health equity are influenced by more than the health system itself. This approach aims to maximise the synergies between good climate policy and public health policy by facilitating sectors outside of health to routinely consider and account for the health impact of their policies, plans and implementation. The World Health Organization defines Health in All Policies as "an approach to public policies across sectors that systematically takes into account the health implications of decisions, seeks synergies, and avoids harmful health impacts in order to improve population health and health equity."[8] The Strategy adopts a Health in All Policies approach by including action and commitments across a wide range of policy areas to ensure their initiatives consider health outcomes. This approach is illustrated in Figure 1, and discussed in further detail later in the Strategy.

Alongside this, a 'climate in all health policies' approach is needed to ensure that climate change impacts and sustainability are incorporated into health policy, the health system, and all areas of health and aged care delivery. As well as facilitating collaboration across levels and parts of government, the Government will involve patient and consumer groups, private providers, industry and suppliers in the delivery of the Strategy.

FIGURE 1: HEALTH IN ALL POLICIES APPROACH IN THE NATIONAL HEALTH AND CLIMATE STRATEGY





2.1 Objectives

The Strategy's vision will be achieved through the pursuit of four objectives.

OBJECTIVE 1
Health system resilience

Build a climate-resilient health system and enhance its capacity to protect health and wellbeing from the impacts of climate change.

The Strategy will inform and guide action by the health system to protect and promote population health while adapting to the impacts of climate change.

OBJECTIVE 2
Health system decarbonisation

Build a sustainable, high quality, net zero health system.

The Strategy will guide the development of a plan to decarbonise the Australian health system, informed by a comprehensive assessment of the emissions footprint of the Australian health system and existing state and territory strategies and plans.

OBJECTIVE 3
International collaboration

Collaborate internationally to build sustainable, climate-resilient health systems and communities.

The Strategy will identify opportunities for knowledge sharing and the development of international standards as well as highlight the ways Australia can support its neighbours to protect and promote health in their climate change responses.

OBJECTIVE 4
Health in all policies

Support healthy, climate-resilient and sustainable communities through whole-of-government action which recognises the relationship between health and climate outcomes.

The Strategy adopts a Health in All Policies approach, promoting the health co-benefits of emissions reductions across society and adaptation action beyond the health system to protect health and wellbeing from climate change.

2.2 Principles

Pursuit of the above four objectives will be informed throughout the Strategy by five interlinked principles to ensure that action is based on evidence and undertaken in a culturally safe and just way. These principles, not listed in any order of priority, are:

- Health Equity and the Right to Health
- One Health and Planetary Health
- First Nations Leadership
- Population Health and Prevention
- Evidence-Informed Policymaking.

PRINCIPLE 1: Health Equity and the Right to Health

Health is a fundamental human right that is undermined by climate change. Some populations are more susceptible to and have less capacity to adapt to the health impacts of climate change. Responses to climate change need to take account of disparities in health outcomes through strengths-based approaches.

Australia recognises the right to health, defined as the universal right to the enjoyment of the highest attainable standard of physical and mental health for all people without discrimination.[9] A health equity approach recognises that the fundamental right to health is undermined by climate change. Climate change affects everybody, but not everybody will be affected equally – some groups are at greater risk of experiencing adverse health impacts from climate change than others. These include pregnant women,* young children, the elderly, people with pre-existing and/or chronic health conditions, such as respiratory and cardiovascular diseases, people with poor mental health, and people with disabilities.

Existing inequities mean some groups – such as people experiencing socio-economic disadvantage and social marginalisation, First Nations people, culturally and linguistically diverse communities, outdoor workers and people living in rural and remote areas – are at a disproportionately increased risk of adverse health impacts from climate change. The Strategy therefore adopts a health equity approach to all action across its mitigation and adaptation plans, taking account of existing health disparities and ensuring they are addressed through strengths-based approaches. Climate change is also an issue of intergenerational equity, and there is an urgent need to act now to safeguard the planet for the health and wellbeing of future generations.

* The term 'woman' is used throughout this document to refer to a person who becomes pregnant and gives birth. It is recognised that individuals have diverse gender identities, and some people who become pregnant and give birth do not identify as a woman. When we use these words, it is not meant to exclude those who give birth and do not identify as female.

PRINCIPLE 2: One Health and Planetary Health

One Health and Planetary Health recognise thriving ecosystems as essential conditions for human health and the need to regenerate planetary health to create a healthy future.

One Health recognises human health is deeply interconnected with the health of animals and our shared environment. One Health acknowledges we cannot optimise global population health if food systems are unsustainable, the environment is polluted, or the risk of zoonotic disease is neglected. Transmission of infectious diseases at the animal–human–ecosystem interface highlights the need for multidisciplinary approaches. One Health also considers broader ecosystem health, including the role of microorganisms and plants in decomposition, soil enrichment, and medicine and oxygen production.[10]

One Health is a guiding principle of work currently underway to establish an Australian Centre of Disease Control (CDC). The commitment to establish an Australian CDC arose out of the COVID-19 pandemic. Reviews of the global response to COVID-19 highlighted the need for increased surveillance to identify emerging pathogens, including those influenced by climate change. The Australian CDC will lead One Health collaboration in areas such as disease prevention, detection, verification, containment and response.

One Health closely relates to the concept of Planetary Health, which addresses the impacts of human disruptions to Earth's natural systems on human health. Planetary Health contends that human health depends on the health of the planet.[11] Climate change, pollution, and a loss of biodiversity are major drivers of communicable diseases, chronic illnesses and mental health conditions.

PRINCPLE 3: First Nations Leadership

First Nations communities' knowledge and experience must be central to decision-making on climate and health policy at all levels.

The Strategy recognises that to support climate justice, climate and health policy at all levels must be informed by the leadership, knowledge and experience of First Nations people.

First Nations people have demonstrated their ability to adapt to a changed climate. For thousands of years, First Nations people protected and sustainably managed the resources on Country, passing their traditional ecological and scientific knowledge down through the generations. Colonisation and forced removals disrupted First Nations people's ability to adapt to climate change by dispossessing First Nations people of their land, seas and waterways, and by suppressing First Nations peoples' culture, knowledge and trading practices.[12] Despite the impacts of colonisation, First Nations people have continued to care for Country, develop their diverse knowledge systems and cultural practices, and provide leadership on sustainable land and sea management and holistic health and wellbeing.

In July 2020, the Australian Government signed the National Agreement on Closing the Gap (National Agreement) and committed to the implementation of the Agreement's four Priority Reforms:

- **Priority Reform 1:** Formal partnerships and shared decision making
- **Priority Reform 2:** Building the community-controlled sector
- **Priority Reform 3:** Transforming government organisations
- **Priority Reform 4:** Shared access to data and information at a regional level.

Together, the four priority reforms change the way governments work and offer a roadmap to overcome the inequities experienced by First Nations people and to provide health care that is accessible and culturally safe for First Nations people. The Strategy will align with the four priority reforms of the National Agreement and seek to ensure the Strategy's implementation – and any future iterations of the Strategy – are delivered in partnership with First Nations people and empower First Nations people to share in decision-making.

The Australian Government's commitment to co-designing health policy in partnership with First Nations people is also reflected in the development and implementation of the National Aboriginal and Torres Strait Islander Health Plan for 2021–2031[13] and the National Aboriginal and Torres Strait Islander Health Workforce Strategic Framework and Implementation Plan 2021–2023.[14] Section 3.3 provides further information about the Strategic Framework and the Australian Government's partnership with First Nations communities to support climate adaptation under the Health Plan.

At the same time, consultation with First Nations peak bodies and organisations identified a governance gap at the intersection between the health of First Nations people and climate change. The Lowitja Institute is leading work in this space and is in the process of engaging with First Nations representatives to identify the best models which will support First Nations people's leadership and self-determination in climate and health policy.

PRINCIPLE 4: Population Health and Prevention

The response to climate change must be underpinned by a public health perspective, recognising the prevention of disease and maintenance of good health across the lifespan assists both mitigation and adaptation.

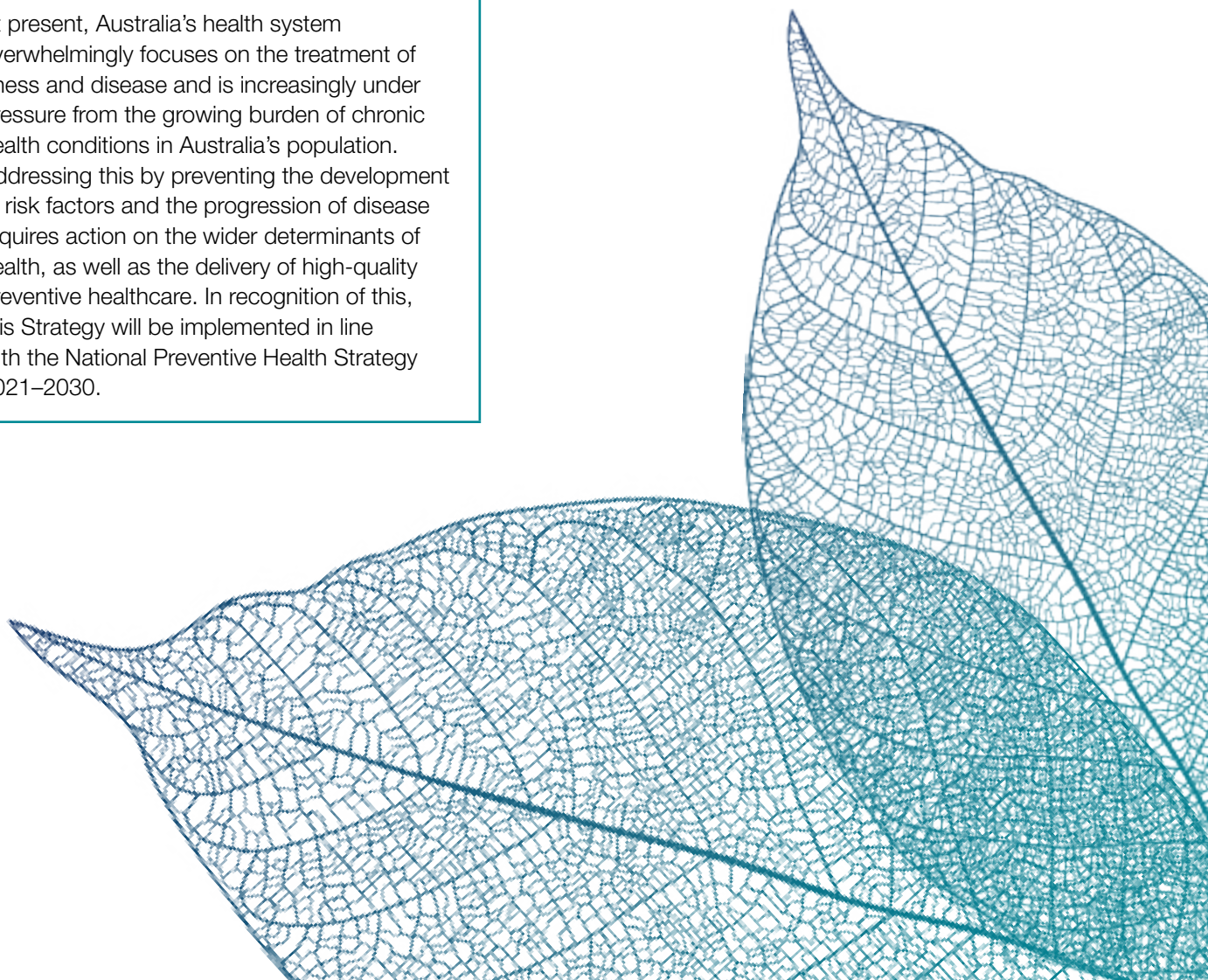
Maintaining good health and preventing disease is the starting point for reducing emissions in the health system because they reduce the need to provide care in the first place. Many health impacts of climate change take the form of exacerbation of pre-existing and/or chronic health conditions – so it follows that preventing these conditions from arising must be a key component of any Strategy to build community resilience to the health impacts of climate change.

At present, Australia's health system overwhelmingly focuses on the treatment of illness and disease and is increasingly under pressure from the growing burden of chronic health conditions in Australia's population. Addressing this by preventing the development of risk factors and the progression of disease requires action on the wider determinants of health, as well as the delivery of high-quality preventive healthcare. In recognition of this, this Strategy will be implemented in line with the National Preventive Health Strategy 2021–2030.

PRINCIPLE 5: Evidence-Informed Policymaking

The response to climate change must be based on the best available data, evidence and research – but we must also be willing to take action on a prudent and precautionary basis in the face of uncertainty and incomplete information.

Effective policymaking requires the consideration of existing robust scientific evidence, expert guidance and best practice nationally and internationally. Where possible, resources should be allocated to maximise population health gains, in line with the principles of cost-effectiveness analysis, while also taking account of health inequities and rights-based approaches.



2.3 First Nations people and climate change

First Nations people have a holistic understanding of health and wellbeing. The Lowitja Institute defines this understanding as the awareness that "good health is dependent on respectful and reciprocal relationships to Country, culture, spirituality, community and family."[15] First Nations people care for Country through sustainable management of land and resources, enabled by knowledge developed over tens of thousands of years.[16]

> Healthy Country and healthy people go hand in hand.
>
> **Maddison Miller**, Dharug woman and Lecturer in Ecology Knowledges, University of Melbourne

The Intergovernmental Panel on Climate Change recognises colonisation is a key driver of climate change.[17] Colonisation disrupted First Nation people's connection to Country by dispossessing them of their lands and interrupting inter-generational transfer of knowledge. Climate change affects First Nations people's health through its impacts on the cultural and social determinants of health, including connection to Country, housing, infrastructure, and food and water security. Extreme weather events, loss of biodiversity, and the destruction of Country caused by climate change can adversely impact First Nation people's physical, social and emotional wellbeing. Many First Nations people are concerned about the impact of climate change on their ability to practice culture and ceremony and maintain the connections to Country vital to First Nations people's health and wellbeing. Existing socio-economic disadvantage and high rates of chronic disease, rooted in colonisation, exacerbate the impact of climate change on the health of First Nations people and constrain First Nations communities' ability to adapt to climate change. The impacts of climate change on First Nations health are diverse, requiring community-led and place-based solutions.

First Nations people continue to draw on traditional knowledge and practices to keep communities and Country healthy, and contribute to climate change mitigation, adaptation, and disaster preparedness and response. First Nations land and sea management practices are based on deep and nuanced knowledges developed over tens of thousands of years of close observation and sustained custodianship of Country. Indigenous Rangers use traditional land and sea management practices to protect biodiversity, mitigate bushfires and maintain cultural sites.[18] Cultural burning is one form of land management practiced by First Nations people which is increasingly being recognised for its ability to reduce greenhouse gas emissions. Cultural burning involves 'cool' or small, frequent and low-intensity burns that are conducted in the early dry season to reduce the intensity and scale of wildfire. Cultural burning mitigates greenhouse gas emissions by reducing the number and severity of fires, as well as by protecting biodiversity and supporting carbon sequestration.

Consistent with a Health in All Policies approach, the Australian Government recognises the importance of working across policy areas in partnership with First Nations people to address the impact of climate change on the social and cultural determinants of health. The cultural determinants of health encompass connection to Country, community and family, the ability to practice culture and language, and self-determination. Centring the cultural determinants of health in policy is especially important to strengthen the health outcomes of First Nations people.[19] Feedback from the Strategy consultation process emphasised the need for collaborative, multi-sectoral approaches to climate adaptation and mitigation which empower First Nations people's wisdom and leadership and are co-designed in partnership with First Nations communities in line with the Priority Reforms under the National Agreement on Closing the Gap.

2.4 Priority populations

Certain population groups and communities are significantly more at risk of negative health effects associated with climate change and have been identified as priority groups in this Strategy.

The Australian Government acknowledges that these groups and communities should be empowered and prioritised in the development and delivery of the initiatives outlined in this Strategy. Importantly, their unique perspectives and strengths should be taken into account in assessing vulnerability, preparing for and responding to emergencies, increasing climate resilience and developing adaptation plans. Their needs must also be considered in the development and implementation of action to reduce emissions from the health system.

As discussed above in section 2.3, First Nations communities experience diverse impacts from climate change, and priorities vary across the country.

Due to Australia's diverse climatic zones and land use characteristics, certain communities are disproportionately affected by climate-related health impacts. People living in tropical and subtropical climates are at higher risk of exposure to high average temperatures and heatwaves that may worsen mental health, cardiovascular disease and renal disease.[20,21,22] People living in urban areas are particularly exposed to urban heat, and those who are socially isolated (such as older people living alone) are at increased risk of heat-related illness.

Rural and remote areas are vulnerable to a range of hazards including droughts, bushfire, cyclone, severe storms, and significant flooding, with associated health impacts including increased mortality and morbidity rates, mental health issues and injuries.[23,24] The elderly and those with disabilities or without access to transport in high-risk communities can be disproportionately affected.[25] Peri-urban communities are also at higher risk of being affected by bushfires and bushfire smoke. Most loss of life from bushfires occurs around the fringes of cities, where homes are commonly in close proximity to flammable vegetation.[26]

People with chronic illness, including physical and mental health conditions such as asthma, heart disease, chronic kidney disease or anxiety and depression, are at particular risk during bushfires, heatwaves, or floods.[27,28,29] People at risk of developing chronic conditions may also be negatively affected by these climate events, due to delaying or completely foregoing health screening assessments during these times. People with disability – for example, those with restricted mobility – and their carers – are more likely to be affected by flooding and to have less capacity to successfully adapt or relocate to safe long-term housing.[30]

Older people can be highly susceptible to the health impacts of climate change. Chronic diseases, medications and frailty mean many older people have heightened physiological susceptibility to climate hazards such as heat and air pollution. In addition, many older people face particular social and financial barriers to adapting to climate change on an individual level.

Adverse health impacts of climate change are disproportionately experienced by women and children. For example, there is evidence that domestic violence against women and children increases during and following climate-related disasters and extreme weather events.[31] Pregnant women and their growing foetus have increased vulnerability to climate-related emergencies, including extreme weather events, heat and bushfires.[32] High temperatures can increase risk of preterm birth, low birthweight and still birth.[33] There is also an established association between smoke inhalation from bushfires and adverse pregnancy outcomes.[34]

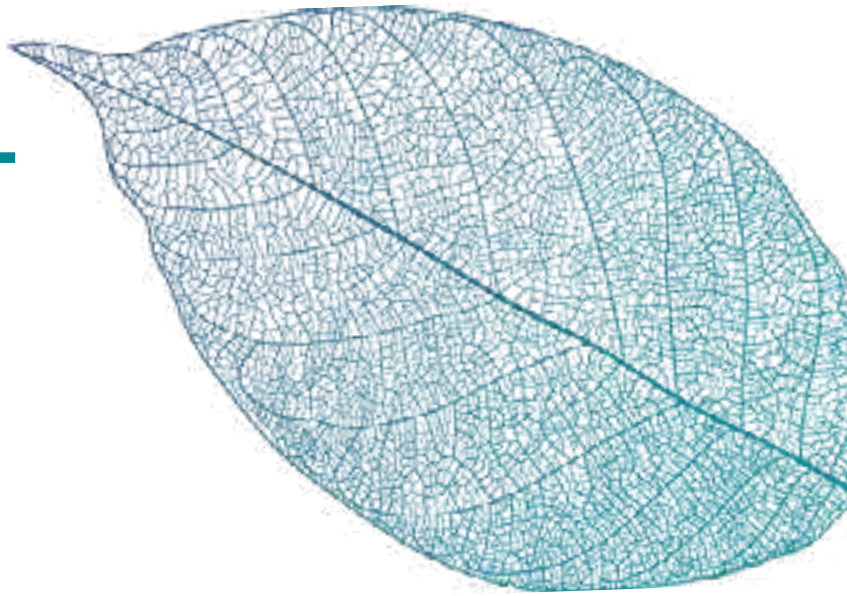
Infants, children and young people will have the greatest exposure to climate change across their lifetime, meaning they will disproportionately experience its adverse impacts. Children and young people are susceptible to an array of adverse climate-related health outcomes and are also especially likely to experience mental and emotional distress related to climate change.[35]

People of low socioeconomic status, including homeless people, are disproportionally affected by the negative impacts of climate change. This can be because they may not have access to good quality, climate-resilient housing to protect them from extreme weather. Poorer households are typically located in places with higher air pollution and noise levels near busy streets.[36]

Certain culturally and linguistically diverse groups, including migrants, may have relatively limited access to health protection advice and resources before, during and after hazards and climate-related disasters. These groups, as well as people with hearing or vision-related disabilities, can benefit from accessible health messaging and climate emergency advice.[37] Like First Nations people, culturally diverse groups have valuable insights into climate change adaptation from their inter-generational knowledge and experiences from different climatic zones.

Certain occupations also put individuals at higher risk from climate change, rising temperatures and extreme weather events. Outdoor workers such as farmers, rangers, construction and transportation workers, as well as those working in hot indoor environments, are at increased risk of heat-related illnesses, renal diseases and injuries.[38] First responders, including firefighters, paramedics and police officers, are at higher risk of exposure to floods, bushfires, heat and air pollution. Healthcare workers are potentially at higher risk of transmission of climate-related communicable diseases and can be affected by surges in healthcare demand during extreme weather events.[39] Targeted advice and resources, such as suitable personal protective equipment, education and training, should be made available to protect and empower these priority occupational groups.

Individuals can experience intersecting susceptibility to the health impacts of climate change. For example, First Nations people experience higher rates of disability and chronic illness, and responses must prioritise cultural safety. Culturally and linguistically diverse groups will experience different climate impacts, depending on factors like socio-economic status and whether they live in urban or rural regions. Policy responses must be sensitive to how lived experiences of the increased risk to the health impacts of climate change can overlap across priority populations.



2.5 Enablers

The Strategy will also develop action in the following areas, which will 'enable' achievement of the Strategy's four core objectives.

ENABLER 1

Workforce, leadership and training

The Strategy will support and engage the health and aged care workforce to further develop the skills and capacity to raise public awareness and understanding of the health impacts of climate change and take action to address these impacts. It will also support the workforce to strengthen the resilience of health services in providing care to affected populations and lead innovation in reducing health system emissions.

ENABLER 2

Research and innovation

Investing in and supporting coordinated climate and health research will improve the evidence base for responses to climate change.

ENABLER 3

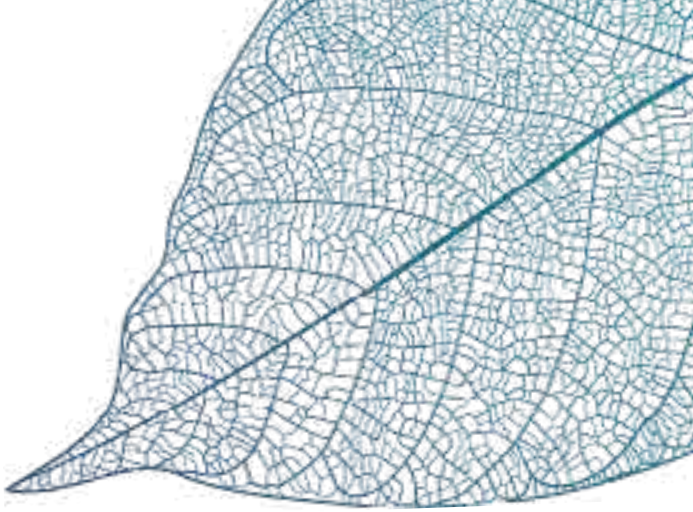
Communication and engagement

Improving and refining how agencies communicate and engage with a wide range of stakeholders and the general public will ensure action to address the health impacts of climate change and decarbonise the health system is widely understood and endorsed.

ENABLER 4

Collaboration and governance

Ensuring appropriate governance structures are in place – both cross-jurisdictional and beyond government – to facilitate regular collaboration with all stakeholders (including workforce, consumers and patients) will build ownership, define roles and responsibilities, and facilitate working partnerships where required to plan and deliver shared commitments to reduce emissions and strengthen climate resilience. These governance structures will also be used to measure and track progress in delivering the Strategy, inform future decisions, drive action and hold policymakers and stakeholders accountable.

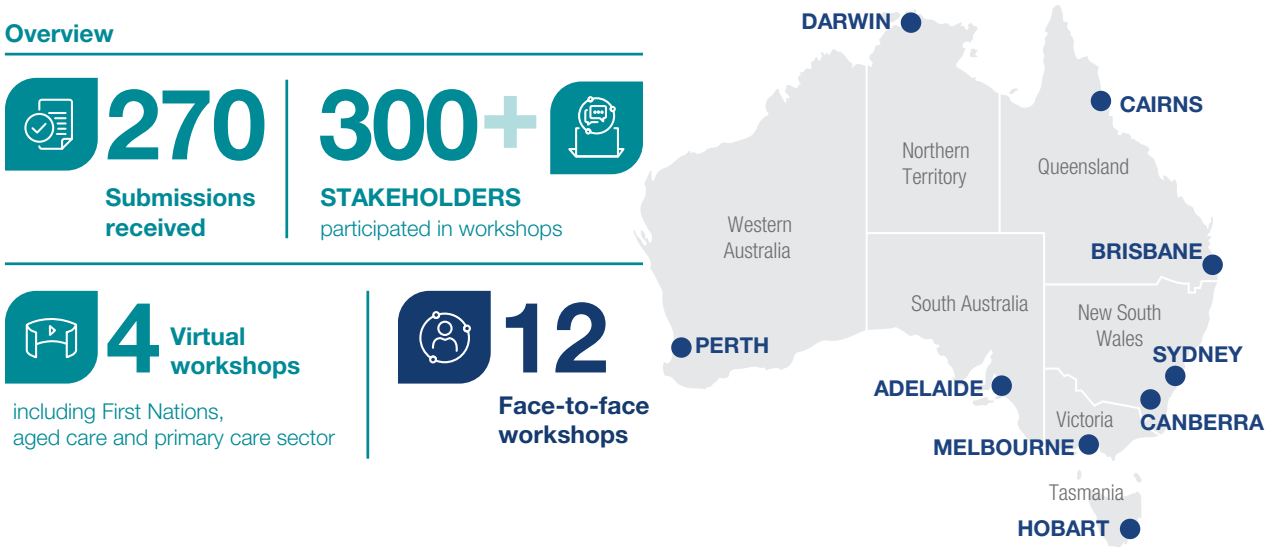


2.6 Consultation

The diverse views, ideas and experiences of stakeholders and the community have been a vital input into developing this Strategy. To capture these perspectives, the Department of Health and Aged Care released a Consultation Paper via the Department's Consultation Hub as a starting point for testing the proposed approach to Strategy development. The Consultation Paper posed 25 questions to frame conversations, and the Department invited written submissions and responses to online surveys.[40]

In addition to written responses, the Department undertook a range of stakeholder engagement activities, including face-to-face and online consultation workshops and Ministerial roundtables (see Figure 2). This included an online roundtable hosted by the Hon Ged Kearney MP, Assistant Minister for Health and Aged Care, on the impacts of climate change on the health and wellbeing of First Nations people. Relevant organisations, interest groups, state and territory governments and experts were consulted. Over 750 invitations were sent to organisations and/or individuals across the breadth of stakeholder groups (see Figure 3). More than 300 stakeholders, including those representing regional and rural organisations, attended and contributed to workshop and roundtable discussions.

FIGURE 2: CONSULTATION TO INFORM DEVELOPMENT OF THE NATIONAL HEALTH AND CLIMATE STRATEGY



The mixed-mode stakeholder engagement process provided an opportunity for a diverse range of voices to contribute and provide feedback on the Consultation Paper, as well as the scope and focus of the Strategy.

The invitation to written submissions and online surveys was open to public response from 2 June to 24 July 2023. The Department received 166 long submissions and 104 survey responses, from organisations and individuals across the diverse stakeholder landscape including medical professionals, primary care, advocacy organisations, academia, industry, and medical societies and colleges.

The workshops were designed to capture stakeholders' views on the proposed Strategy design including the scope, principles, objectives and enablers. Workshops were also used to identify sector- and stakeholder-specific focus areas and action to support the implementation of the Strategy. Specific workshops or roundtables targeted aged care, disability, First Nations communities and primary care.

FIGURE 3: STAKEHOLDER GROUPS ENGAGED AS PART OF THE CONSULTATION PROCESS

GOVERNMENT
- Commonwealth Government
- State and territory
- Councils, local health systems

HEALTH SERVICE PROVIDERS
- Public and preventive health
- Primary and community care
- Secondary and tertiary care
- Ambulance

INDUSTRY
- Research and development
- Manufacturing/production
- Distribution

ACADEMIA & RESEARCH
- Medical
- Public health
- Climate change and environmental health
- Climate science and policy

REPRESENTATIVE ORGANISATIONS
- Patients and consumers
- Disabilities
- Medical profession
- Allied health professions
- Nursing
- Pharmacy
- Climate/environment

RURAL
- Community groups
- Health providers

AGED CARE
- Health providers
- Peak bodies

FIRST NATIONS
- Community groups
- Health providers
- Environmental/land management
- Leadership and peak bodies

03

Building a **climate-resilient health system** and enhancing its capacity to protect population health

OBJECTIVE 1

Health system resilience

Build a climate-resilient health system and enhance its capacity to protect health and wellbeing from the impacts of climate change. The Strategy will inform and guide action by the health system to protect and promote population health while adapting to the impacts of climate change.

Climate change is already affecting health and wellbeing in Australia.[41] In the last decade, catastrophic floods, devastating fires, and intensifying heat have taken a physical and mental toll on people across the country.[42] In the years ahead, even with a rapid acceleration of global mitigation efforts, climate change will increase pressures on the natural and social systems that support human health and wellbeing.[43]

Integrated, comprehensive action, using a Health in All Policies approach,[44] will be required to alleviate these impacts, and to ensure that population health and health equity continues to improve even in an increasingly unstable climate. Feedback received during the Strategy consultation process highlighted the following key national-level risks to population health and wellbeing:

- Risks from climate-related disasters and extreme weather events, including bushfires and floods
- Risks from increased heat, including both heatwaves and incremental increases in temperature
- Risks from reduced air quality driven by climate change
- Risks from climate-sensitive non-communicable disease (such as respiratory and cardiovascular disease) and communicable diseases (such as tropical and vector-borne diseases)
- Risks to mental health and wellbeing
- Risks from reduced food and water security
- Risks from poor-quality or inappropriate housing and infrastructure.

Protecting and promoting health in a changing climate will require effective adaptation across Australia's health system, and beyond. Health system performance affects population health and wellbeing, and vice versa. However, many of the key determinants of population health – and thus, much of the work that will need to be done to protect it in a changing climate – lie beyond the control of the health system. Action on these 'wider determinants' is discussed in Chapter 6.

Wherever possible, work to increase resilience should pursue opportunities to reduce emissions, so that climate mitigation and adaptation efforts are complementary and synergistic.[45] It should also:

- Be place-based, community-led and values-driven, so that adaption is tailored to the specific areas and communities that will be affected
- Involve everyone, because different levels of government, households, businesses and community organisations all have different but complementary roles in an effective whole-of-nation response
- Be underpinned by science and analysis to inform decision-making, help prioritise areas for adaptation, and choose the best responses.[46]

Australia's national adaptation efforts are underpinned by an acknowledgment that climate risks should be addressed by identifying and empowering those who are best placed to manage them. The Council of Australian Governments' 2012 Select Council on Climate Change's Roles and Responsibilities for Climate Change Adaptation in Australia guides cross-government cooperation on climate change adaptation,[47] and highlights the specific roles and responsibilities of the Australian Government. These are:

1. Providing national leadership on adaptation reform
2. Providing nationally authoritative climate science and information, including updated climate projections and scenarios of future climate, to inform decision-making across the economy
3. Managing climate risks to Australian Government assets and services, including investments in public infrastructure
4. Maintaining a strong, flexible economy and a well-targeted social safety net to ensure resources are available to respond to climate change and groups in vulnerable situations are not disproportionately affected.

Many states, territories, and local governments and health systems are already well progressed in assessing and addressing the health impacts of climate change in their jurisdictions.[48,49] For example, in 2019 the Western Australian Government held the world's first statutory inquiry into climate change and health, which provided a robust, evidence-based foundation for state-wide action on climate and health.[50] The Strategy will seek to leverage and complement these approaches.

This chapter outlines action that will be taken to protect and promote health in a changing climate from within the health system. Wherever relevant, this action will be undertaken in partnership with First Nations stakeholders, prioritising a strengths-based, culturally safe approach to First Nations people's health, consistent with implementation of the National Agreement on Closing the Gap's four Priority Reforms. The first section of this chapter outlines action on climate and health risk assessment and adaptation planning (which will underpin adaptation efforts across both the health system and the wider determinants of health). The second section discusses the role of prevention in building health system resilience and improving population health. The third section outlines the Australian Government's partnership with First Nations communities and workforce to address the impacts of climate change on First Nations health. The final two sections outline measures to build resilience in the health and aged care sectors.

3.1 Health and climate risk assessment and health adaptation planning

Undertaking climate and health risk assessments and health adaptation planning is widely recognised as the starting point for evidence-based, strategic action to build a climate-resilient community and health system, and protect human health and wellbeing from the impacts of climate change.

Climate and health risk assessments, and/or vulnerability, capacity and adaptation assessments, identify, analyse, and ideally quantify the impacts of climate change on health and wellbeing; assess the capacity of health and health-determining systems to manage these risks; and identify and prioritise measures to manage risks over various timeframes and population groups – thus providing the key input into health adaptation plans.[51]

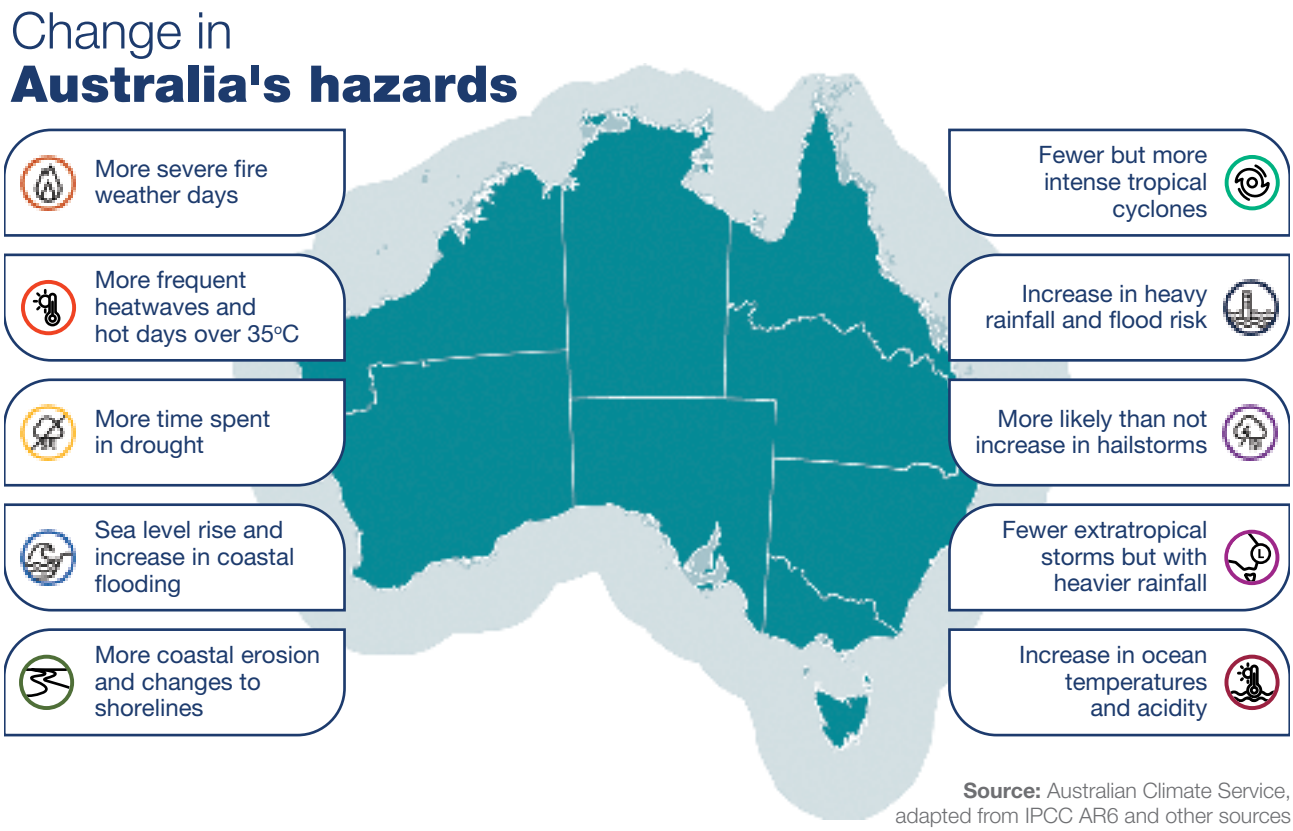
Climate risk is broadly defined as a function of hazard, exposure, and vulnerability.[52,53] Definitions of these terms are included in Box 1.

BOX 1[54,55]

- **Hazard:** the actual or potential occurrence of a physical event, trend or physical impact that may cause health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources.
- **Exposure:** the presence of either of the following in places and settings that could be adversely affected by a hazard:
  - People, livelihoods, species or ecosystems, environmental functions, services
  - Resources, infrastructure, or economic, social, or cultural assets.
- **Vulnerability**: the propensity or predisposition to be adversely affected by exposure to a hazard. This encompasses:
  - **Adaptive capacity:** the ability of a system, population or individual to adjust to the impacts of climate change
  - **Sensitivity:** the degree to which a system, population or individual is likely to be affected by a given exposure to a hazard.

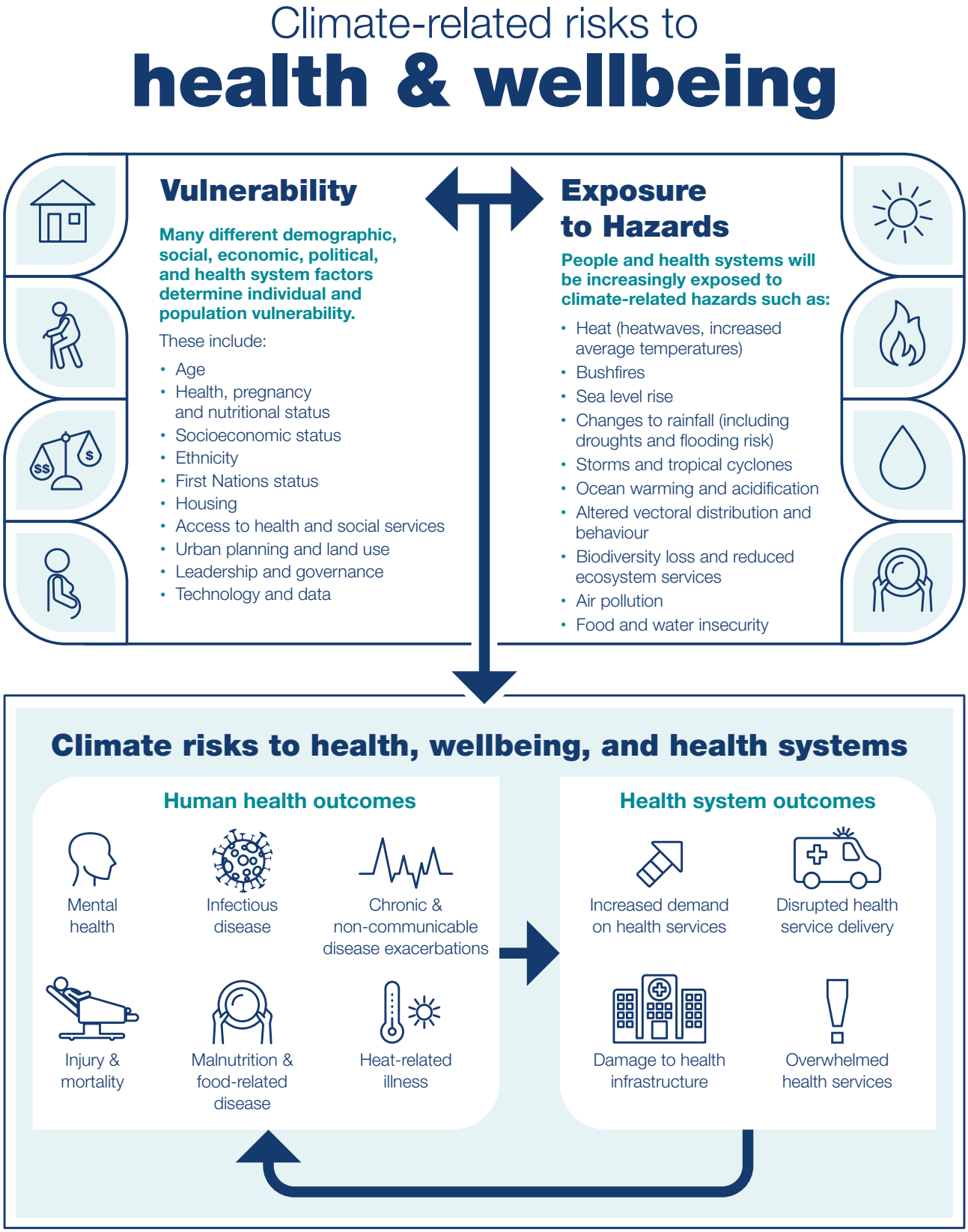
Climate change affects the frequency, intensity, and duration of a range of hazards (see Figure 4). The degree of climate risks to health due to increasing hazards depends on the extent of exposure to the hazard, and the vulnerability of the exposed person, population, or system. The relationships between hazards, exposures, and vulnerabilities in terms of climate risks to health and wellbeing are summarised in Figure 5.

FIGURE 4: PREDICTED CHANGES IN HAZARDS FOR AUSTRALIA



Source: Australian Climate Service, adapted from IPCC AR6 and other sources

FIGURE 5: CLIMATE-RELATED RISKS TO HEALTH AND WELLBEING



The National Climate Risk Assessment lays the foundations for future health and climate risk assessments in Australia. It will identify and prioritise key national risks and impacts to Australia from climate change. The Australian Government has allocated $27.4 million over 2 years from 2023-24 to support delivery of the National Climate Risk Assessment and accompanying National Adaptation Plan, which will outline an agreed national response that prioritises Australia's adaptation action and opportunities. The National Climate Risk Assessment and the National Adaptation Plan – both led by the Department of Climate Change, Energy, the Environment and Water – are considering the effects of climate change on health, wellbeing, and health and social systems at a national level.

ACTION 3.1

Undertaking a National Health Vulnerability, Capacity and Adaptation Assessment

The Australian Government will undertake a National Health Vulnerability, Capacity and Adaptation Assessment, starting with an analysis of the Health and Social Support System within the National Climate Risk Assessment. The National Health Vulnerability, Capacity and Adaptation Assessment will holistically assess the health and wellbeing impacts of climate change across society, with impacts on health system functioning forming one area of focus.

ACTION 3.2

Developing a National Health Adaptation Plan

The Australian Government will develop a National Health Adaptation Plan as part of the National Adaptation Plan, expected to be published by the end of 2024.

In addition to national climate and health risk assessment and health adaptation planning, comprehensive local and regional risk assessments and adaptation plans, developed in consultation with local communities and priority populations, will be crucial in effectively addressing climate-related risks to health and wellbeing. The geographic, demographic, and meteorological diversity of Australia means that climate and health risk profiles will differ significantly between regions and localities, requiring tailored and place-based responses to address risks. Furthermore, the wide variation in health system capacity and capability across Australia needs to be accounted for in risk assessments and adaptation plans.

To support local and regional health systems and communities to conduct vulnerability and adaptation assessments in a place-based but nationally consistent manner, the Australian Government will collaboratively develop guidance and implementation support tools, noting that some jurisdictions have already made progress in this space. There may also be a need to explore options for building the capacity of the health sector to conduct and implement health and climate risk assessments. Particular consideration will be given to developing guidance and tools in partnership with and for use by Aboriginal Community-Controlled Health Services (ACCHS), while acknowledging and addressing the capacity constraints and workforce shortages which impact ACCHS' participation in wider climate risk assessment and adaptation planning processes.

ACTION 3.3

Developing guidance on risk assessment and adaptation planning

The Australian Government will develop guidance and implementation support tools in partnership with states, territories, Aboriginal Community-Controlled Health Services and other relevant stakeholders to enable state and territory health systems, local health systems, Aboriginal Community-Controlled Health Services and hospitals to undertake climate risk assessment and develop adaptation plans in a nationally consistent way.

The Strategy consultation process identified that ACCHS are often well-placed to participate in community-led and place-based climate risk assessment and adaptation planning processes. However, they are limited by critical capacity constraints and workforce shortages across the sector. There is an opportunity to build the capacity of ACCHS to participate in climate risk assessment, adaptation planning and emergency preparedness, response and recovery, in line with the priority reforms of the National Agreement.

ACTION 3.4

Building the capacity of Aboriginal Community-Controlled Health Services

In partnership with the Aboriginal community-controlled health sector, the Australian Government will work to identify options to support the capacity of Aboriginal Community Controlled Health Services to participate in place-based climate risk assessment and adaptation planning and emergency preparedness, response and recovery for climate-related disasters.

3.2 Prevention: the starting point for health system adaptation

Preventing ill health underpins this Strategy's approach to building an equitable, climate-resilient health system, and enhancing its capacity to protect population health. This is because people with ill health and with chronic conditions can be more susceptible to the health impacts of climate change. Recent data indicate that 47% of all Australians live with one or more chronic conditions, while 18.6% live with two or more conditions.[56] As many health impacts of climate change risk increasing pre-existing and/or chronic conditions (for instance, rising temperatures and more frequent heatwaves contribute to increased cardiovascular and respiratory morbidity and mortality),[57,58] many of these negative effects can be avoided or ameliorated by preventing the onset of disease, or ensuring existing disease is detected early and well managed. Prevention reduces individual and population vulnerability to climate change health impacts and builds climate resilience.

Good health, wellbeing and disease prevention depend on the wider determinants of health, such as safe, affordable, climate resilient and comfortable housing; transport and access to health and social services; clean air and water; sound and stable education and employment; cultural expression and continuity; technology; and functioning family, friends and community networks. Environmental determinants, including climate change, biodiversity, air pollution and the built environment also play a strong role in health and wellbeing, as do the commercial and cultural determinants of health (discussed in Chapter 6). Although they are critical to health and wellbeing, many of these wider determinants sit outside the direct responsibility of the health system, and effectively addressing them to prevent ill health requires a whole-of-government approach. This Strategy is committed to such an approach, with action on the wider determinants of human and planetary health discussed in Chapter 6.

The cornerstone of the Australian Government's current approach to preventing ill health is the National Preventive Health Strategy, which outlines a vision to "improve the health and wellbeing of all Australians at all stages of life through prevention."[59] Focus areas of the National Preventive Health Strategy include reducing tobacco use and nicotine addiction, improving access to and the consumption of a healthy diet, increasing physical activity, increasing cancer screening and prevention, improving immunisation coverage, reducing alcohol and other drug harm, and promoting and protecting mental health. The National Preventive Health Strategy also identifies key system enablers that are critical to creating a more effective and integrated prevention system, including health literacy and building strong partnerships and community engagement. The National Health and Climate Strategy will complement and augment the priorities outlined in the National Preventive Health Strategy, to improve population health and reduce pressure and demand on health services.

Although many of key drivers of ill health lie beyond its remit, the health system has a central role to play in disease prevention – and, by extension, in building resilience to the health impacts of climate change. In particular, primary care (the health care people seek first in their community, such as general practitioners, nurses, pharmacists and allied health professionals)[60] will be crucial in providing preventive care and chronic condition management to ameliorate the health impacts of climate change.[61] For example, updating asthma action plans can help safeguard patients against asthma events during thunderstorms,[62] thereby enhancing patients' resilience to environmental hazards. Similarly, providing heat health information (such as advice on recognising hot weather conditions and staying cool), or 'social prescriptions' to relevant community services can build resilience to extreme heat and heatwaves.[63]

Australia's Primary Health Care 10 Year Plan 2022-2032, and the RACGP's 'Putting prevention into practice' guidelines,[64] highlight that primary health care providers have an important role to play in delivering preventive health interventions and helping slow or reverse the progression of chronic disease.[65] Primary health care reforms outlined in the Primary Health Care 10 Year Plan, such as Medicare Benefits Schedule funded telehealth; GP funding reform; and Closing the Gap will help prevent ill health and strengthen the health system's response to climate change. In addition, the Australian Government is exploring how alternative models of care could help address ill health and a lack of wellbeing (such as housing, employment, income or social support issues).[66] The Australian Government has commissioned a feasibility study (to be completed in 2024) that will investigate how social prescribing could be integrated into the Australian health system. Evidence suggests that social prescribing can play a role in preventing ill health and reducing healthcare needs, thereby improving population health and strengthening both health system and broader community resilience.[67,68]

ACTION 3.5

Considering climate impacts in implementing the National Preventive Health Strategy

The Australian Government will consider the impact of climate change in implementing the National Preventive Health Strategy 2021-2030, recognising the role of preventive health in:

- Reducing demand on carbon-intensive health services and therefore reducing greenhouse gas emissions from the health system
- Building population and health system resilience to the health impacts of climate change and extreme weather events.

3.3 Working in partnership to protect the health of First Nations communities

The Australian Government is committed to working in partnership with First Nations communities to improve the health outcomes of First Nations people, including by empowering First Nations people's shared decision-making in climate and health adaptation.

In line with the National Agreement on Closing the Gap, the Australian Government developed the National Aboriginal and Torres Strait Islander Health Plan 2021–2031 (the Plan) in partnership with First Nations people. The Plan recognises climate risks for Aboriginal and Torres Strait Islander people's physical, social, emotional and cultural wellbeing and identifies 'Healthy environments, sustainability and preparedness' as a key objective including the following priorities:

- Growing the First Nations environmental health workforce
- Housing and infrastructure solutions
- Food security
- Disaster planning, preparedness and recovery.[69]

The Department of Health and Aged Care plans to establish a governance body under the Aboriginal and Torres Strait Islander Health Plan in consultation with the Aboriginal Community-Controlled Health Sector. This governance body will provide an ongoing mechanism for First Nations leadership in implementing the Plan, in line with Priority Reform One: Formal Partnerships and Shared Decision Making under the National Agreement on Closing the Gap. In section 2.2 we also discuss the Lowitja Institute's work to improve governance in relation to First Nations climate and health policy.

ACTION 3.6

Supporting leadership of First Nations communities on health and climate change

The Australian Government will work in partnership with First Nations organisations to support First Nations leadership on action and investment in climate change adaptation, including through its collaboration with Aboriginal Community Controlled Health Services to implement the following priorities under Objective 7 of the National Aboriginal and Torres Strait Islander Health Plan 2021–2031:

- Growing the First Nations environmental health workforce
- Housing and infrastructure solutions
- Food security
- Disaster planning, preparedness and recovery.

The Strategy recognises the leadership of the First Nations health workforce in providing culturally safe and responsive care to support the capacity of First Nations communities to adapt to a changing climate. The Aboriginal and Torres Strait Islander Health Workforce Strategic Framework and Implementation Plan, co-designed with First Nations people, sets a roadmap for growing the First Nations health workforce. It includes action to attract, recruit and retain workers across the health sector, a key factor in building the capacity to close the gap in health and life outcomes and quickly respond during climate-related disasters and pandemics.

The First Nations environmental health workforce provides frontline capacity to respond to the environmental health risks faced by First Nations communities, including those driven by climate change. In 2021, the Australian Government funded the National Aboriginal Community Controlled Health Organisation to deliver a National Strategic Roadmap to establish an Aboriginal and Torres Strait Islander Environmental Health workforce. This presents a valuable opportunity to ensure the environmental health risks associated with climate change are factored into future planning and capacity building for the workforce.

Climate change affects the social and cultural determinants of health, which are important enablers of First Nations people's capacity to adapt.[70] Chapter 6 outlines action the Strategy will take to work in partnership with First Nations communities to address the impact of climate change on the social determinants of health, including food security and housing and infrastructure.

3.4 Protecting health by building a climate-resilient healthcare sector

The healthcare sector has a vital role to play in protecting and promoting health and wellbeing in a changing climate. It is critical that, despite the mounting pressures of climate change, people in Australia can access high-quality, equitable, culturally safe healthcare. Health services can also serve as 'anchors' in their communities to build broader climate resilience.[71]

The Australian Government is committed to achieving the World Health Organization's vision of a climate resilient health system: "one that is capable to anticipate, respond to, cope with, recover from and adapt to climate-related shocks and stress, so as to bring sustained improvements in population health, despite an unstable climate."[72] This section outlines action to build a climate-resilient healthcare sector, and enhance its capacity to protect health and wellbeing from climate change.

In addition to the measures outlined below, achieving this objective will be supported by the Environmental Sustainability and Climate Resilience Healthcare Module being developed by the Australian Commission on Safety and Quality in Health Care and discussed in section 4.2 of this Strategy. The Module will pilot voluntary accreditation standards for health service organisations, with a view to informing the next edition of the National Safety and Quality Health Service Standards due for release in 2027.

3.4.1 Climate and health data collection, monitoring, and surveillance

Monitoring and surveillance systems that capture and integrate data on both environmental hazards and human health are essential building blocks in preparing for and responding to the impacts of climate change on health and wellbeing. Climate change monitoring systems provide important information to track and forecast changes in weather and environmental conditions (such as atmosphere, ocean and terrestrial systems).[73] Surveillance (the continuous collection, analysis and interpretation of data related to health) helps track and identify trends in disease and support health system preparedness and response.[74]

Monitoring and surveillance of high-risk weather and environmental hazards is already taking place. Examples include the National Heatwave Warning Service, the Epidemic Thunderstorm Asthma Forecasting System (see case study 1) and air quality monitoring systems. These systems provide critical information about climate-related environmental hazards, enabling health services, emergency services, and individuals to prepare and respond.

Case Study 1

Epidemic thunderstorm asthma risk forecast

Thunderstorm asthma is a significant public health risk in Australia and is likely to become more frequent and widespread as climate change advances.[75] Thunderstorm asthma events are triggered by an uncommon combination of a certain type of thunderstorm and high grass pollen levels.

In November 2016, Victoria experienced the world's largest epidemic thunderstorm asthma event. Within 30 hours, this resulted in significant public health impacts with 3,365 more respiratory-related presentations (a 672% increase) to public hospitals in Melbourne and Geelong, an estimated 476 admissions, 30 intensive care admissions and 10 deaths.[76,77]

The response to the 2016 event was reviewed by the Inspector-General for Emergency Management. The review identified emergency services had limited ability to adequately meet the extraordinary and rapid increase in demand on the health care system.[78] As a result, the Victorian Government implemented the Epidemic Thunderstorm Asthma Risk Forecasting System, which provides health services, emergency services and communities with information to inform decisions, avoid exposure and know when to practice protective behaviours. Forecasts will enable emergency services to increase staff availability to better meet the anticipated demand and assist in planning and deploying resources. The forecast supports the Victorian health system to prepare for and respond to epidemic thunderstorm asthma events. There are plans to roll out the forecast system to other jurisdictions.

Systematic monitoring of health system climate preparedness and performance, relevant environmental hazards, and the population burden of climate-sensitive disease (including both communicable and non-communicable disease) will help to develop a more accurate assessment of climate-related risks to health and health systems and ensure that adaptation measures are effective and tailored to these risks. This includes strengthening monitoring and surveillance for both public health (including communicable and non-communicable diseases) and environmental hazards related to climate change and enhancing data integration to improve preparedness and response. Although many elements of a climate-health monitoring and surveillance system are already in place, there is a need to build on these, identify and fill data gaps, develop relevant indicators, and establish routine data collection and reporting. Where relevant, this work must respect the principles of Indigenous Data Sovereignty.

ACTION 3.7

Developing options for climate and health monitoring, data and indicators

The Australian Government will work with relevant stakeholders to explore options for developing a framework for routine data collection, monitoring, and reporting on the impacts of climate change on population health and health system functioning. This will be based on World Health Organization guidance[79] and will include indicators of (a) relevant determinants of health; (b) the association between climate-related exposures and climate-sensitive health outcomes; and (c) health system resilience. The Government will work with stakeholders to improve the availability, collection and reporting of data to support this work.

3.4.2 Health workforce

A climate-resilient healthcare sector relies on a capable and adaptable workforce with the knowledge, skills and capability to recognise, prepare for, and respond to health risks linked to climate change. Key strategies for building workforce resilience and adaptability include:

- **Education and training:** Workforce technical and professional capacity can be developed through climate-specific education and training tailored to workforce knowledge and skill gaps, as well as to anticipated local climate-related health risks.
- **Recruitment and retention:** Adequate numbers and availability of health workers are also necessary to enable the health system to adapt and respond to climate change. Climate change is increasing health workforce shortages, particularly in rural and remote areas that are already vulnerable to inequitable healthcare access.[80,81] This is exacerbated when crises, such as extreme weather events, affect a particular community. Challenges to retention include heavier workloads for remaining staff, service discontinuity, and financial burdens on health services. Given these challenges, effective recruitment and retention strategies are critical in establishing and sustaining a climate-resilient health workforce.
- **Innovative models of care:** The health workforce will increasingly need to be adaptable and flexible in preparing for and responding to climate-related events. The growing and shifting demands on the health workforce due to climate change will necessitate adoption of alternative and innovative models of care to support more effective use of existing health workers.[82]

Later in the Strategy, under the 'Workforce, leadership and training' enabler (section 7.1), we outline action the Government will take to strengthen workforce resilience from the impacts of climate change.

Case Study 2

National Emergency Worker Support Service

Climate-related disasters can have a negative impact on the mental health of people in Australia. The emergency services workers and volunteers who respond to these disasters are at greater risk of developing mental illness. 39% of emergency responders are diagnosed with a mental health condition at some point in their life, and these workers are diagnosed with post-traumatic stress disorder (PTSD) at a rate two times higher than the general Australian population.

The Australian Government has funded the establishment of mental health services for people affected by disasters, of which $8 million was provided to the Black Dog Institute for the establishment and delivery of the National Emergency Worker Support Service. This service is available to all emergency services workers – including volunteers and those who are retired – who respond to disasters such as bushfires, floods, and the COVID-19 pandemic.

Through the National Emergency Worker Support Service, emergency services workers can access up to twelve sessions with a clinical psychologist free of charge, either face-to-face or via telehealth. They can also access a quick and confidential online mental health check to see how they are feeling and receive a report that identifies their symptoms and provides recommendations for support. The service also provides free evidence-based training to GPs and other health professionals to help diagnose and treat PTSD in emergency services workers.[83]

©Black Dog Institute

3.4.3 Health infrastructure and supply chains

Ensuring resilience of health system infrastructure and supply chains is a precondition of a climate-resilient health system. This includes ensuring land use and facility location decisions, storage of medical supplies, records, and information, and building codes account for current and future climate risks. Essential environmental services and critical infrastructure such as electricity, clean water and sanitation need to be resilient to extreme weather events. Measures to progress opportunities to embed climate resilience principles in minimum requirements for the design, construction and performance of new buildings are discussed in Chapter 6.

Well-functioning, resilient supply chains are critical for ensuring ongoing access to essential goods and services for Australians. Over the past few years, Australia's supply chains have experienced unprecedented disruptions including a global pandemic, extreme weather events and skills shortages. Climate-related supply chain disruptions have the potential to impact the movement of life-saving pharmaceuticals, medical devices and personal protective equipment around the country, and in turn affect Australia's health systems. The Office of Supply Chain Resilience leads whole-of-government coordination to identify and manage critical vulnerabilities in Australia's supply chains. This includes working with industry, government, and international partners to build resilience in vulnerable and critical supply chains, which if disrupted, would

materially impact the health, safety and wellbeing of the community, or threaten economic stability or national security. Other government resources that support supply chain resilience include the National Coordination Mechanism, which can be utilised for both crisis response and recovery efforts; and the National Medical Stockpile, which provides a strategic reserve of medicines, vaccines, antidotes and personal protective equipment for use in national health emergencies.

Both infrastructure and supply chain resilience are important considerations in climate and health risk assessment and adaptation planning and will be considered in the development of relevant guidance by the Australian Government, including that discussed in Action 3.3.

Case Study 3

Purple House: recycling water for remote haemodialysis

For First Nations people living in rural regions, accessing haemodialysis treatment can be a challenge. Individuals who require haemodialysis must undergo five hours of treatment three times a week. Haemodialysis treatment requires around 400 litres of very clean water per patient per week to operate.[84] Where treatment is unavailable locally because of water insecurity, First Nations individuals diagnosed with kidney failure must permanently relocate to town or frequently travel great distances to access life-saving treatment.

Purple House, also known as Western Desert Nganampa Walytja Palyantjaku Tjutaku Aboriginal Corporation, established a new model of care to resolve this problem. Purple House runs 19 remote dialysis clinics, meaning people can receive treatment whilst remaining in community. For those requiring more hands-on care, the Purple Truck mobile dialysis unit allows patients to travel home to spend time with family or attend festivals or funerals. Being able to spend more time at home supports patients to maintain health, which is compromised by being away from Country.

In 2022 Purple House biomedical engineer Michael Smith discovered that the water used in dialysis could be purified through a process called reverse osmosis. This technology was adopted by Purple House in all their newly built remote clinics and retrofitted in clinics facing water insecurity.[85] A large amount of the dialysis water could be reused to offset Purple House's town water consumption. Purple House's innovation has strengthened water security in many communities, allowing residents to preserve water for drinking and household use. The water recycling technique and the mobility of the Purple Truck ensures access to essential treatment in remote communities where there are water shortages due to drought or other reasons.

3.4.4 Health emergency preparedness, response, and recovery

A consequence of increased climate-related disasters and severe weather events (such as storms, fires, floods, and droughts) is more frequent and severe health emergencies. These events can have significant direct impacts on health and wellbeing, including injuries and mortality, increases in climate-sensitive non-communicable disease, communicable disease outbreaks, and psychological distress, and so increase demand for health and care services. These events can also disrupt health system performance through impacts on essential services, supply chains, infrastructure, ambulance services, and workforce. In this context, proactive, effective, and efficient health emergency planning, preparation, response, and review is increasingly important.

The Australian Government is working to reduce disaster risks and strengthen resilience across the disaster continuum – from response and recovery to overall risk reduction. The National Health and Climate Strategy will contribute to and support numerous other initiatives to optimise emergency preparedness, response, and recovery.

Case Study 4

Fire to Flourish – First Nations community-led disaster resilience

Disasters have uniquely local impacts. Not everyone will be affected the same way, depending on where they live or who they are. Local communities therefore need to be supported to lead their own recovery efforts.

Established by Monash University after the 2019/20 bushfires, Fire to Flourish is working with local communities, including First Nations people, to trial and scale innovations to enable community-led resilience while addressing systemic disadvantage. Fire to Flourish takes a holistic approach, recognising that social capital, economic wellbeing, natural and built environments, and health and wellbeing all work together to strengthen a community's resilience.

Fire to Flourish is co-designed with community, and First Nations people are embedded in its leadership, operations, community and research teams. Three of the community leads are First Nations women. First Nations colleagues are sharing their holistic knowledges and ensuring that First Nations leadership is central across the program. This has involved fostering strong relationships, deeply listening to First Nations voices, and critically working at a speed that enables trust to be built.

As the world's oldest living culture, Australia's First Nations people are strong and resilient. First Nations community members have led activities that support the whole community to recover. Examples include creative recovery activities like basket weaving and possum skin making that invite people to connect and share their stories.

The National Emergency Management Agency was established in 2022 to manage Australia's disaster and emergency management efforts, and is administering the Second National Action Plan to implement National Disaster Risk Reduction Framework, which aims to coordinate and align "whole-of-nation" efforts to reduce systemic disaster risk to create stronger, more secure, and more resilient communities before, during and after disasters.[86] Other key initiatives include the National Disaster Mental Health and Wellbeing Framework[87] and the first National Mental Health Plan for Emergency Services Workers 2024-2027, which is currently being developed. These will complement and support work arising from this Strategy to strengthen the capacity of the health system to prepare for, respond to, and recover from climate related disasters and extreme weather events.

At present, the Department of Health and Aged Care maintains a series of health emergency response plans that provide guidance on how the Australian health system should work collaboratively to prepare for and manage the consequences of health emergency incidents of national significance, including climate-related disasters and extreme weather events. State and territory governments have primary responsibility for emergencies in their jurisdictions, with the Commonwealth providing additional support when required. Work is currently underway to review and consolidate existing health emergency response plans into an overarching health emergency response plan, to ensure more effective coordination and cooperation. This plan will support state, territory, and local governments to execute their leading roles in health emergency response, with additional support from the Australian Government as required.

ACTION 3.8

Developing a National Health Emergency Response Plan

The Australian Government will work with states and territories to develop an 'all hazards' National Health Emergency Response Plan, which will consider health emergencies for climate-related disasters and extreme weather events. This plan will update and consolidate existing health emergency response plans to provide a single source document to guide Australia's response to, and recovery from, emergency incidents of national significance.

Primary care has a vital role to play in health system preparedness and response to climate-related disasters. In the immediate aftermath of these disasters, many people's needs for care are focused on primary care, such as being able to access a GP, community pharmacy, reproductive healthcare or mental health support. At present, primary care is not systematically integrated into emergency preparedness, response and recovery processes. This means primary care providers such as GPs may not be able to provide the level of care and support that patients and communities need before, during and after disasters. In addition, primary care providers are also likely to be affected by the same hazards and risks as the public. The 2020 Royal Commission into National Natural Disaster Arrangements recommended that: "Australian, state and territory governments should develop arrangements that facilitate greater inclusion of primary healthcare providers in disaster management, including: representation on relevant disaster committees and plans and providing training, education and other supports."[88]

Strengthening the role of primary care in emergency preparedness, response and recovery will help to build the resilience of both the health system and broader communities. If effectively mobilised and supported, primary care providers are well placed to deliver appropriate care in community settings in the aftermath of disasters. This ensures health needs are met as quickly as possible and alleviates pressure on other components of the health system.

Primary Health Networks also have a vital role to play in disaster preparedness and response. Their role includes coordinating with existing providers to ensure continuity of access to primary care, and commissioning new services to meet emerging needs (such as for increased mental health support). Many Primary Health Networks already play a role in emergency planning, preparedness, response, and recovery, and their large geographical footprint makes them potentially suitable for inclusion in wider incident response/command governance structures. However, the Australian Government recognises the importance of supporting and strengthening the roles of Primary Health Networks in these areas – including by incorporating climate risk into existing health needs assessment processes.

Case Study 5

Healthy North Coast Primary Health Network Disaster Resilience Hub

Following several challenging years marked by bushfires, the COVID-19 pandemic and devastating floods in the NSW Northern Rivers region, Healthy North Coast Primary Health Network released its inaugural Disaster Management Framework and Action Plan in December 2022. The Framework offers guidelines for disaster management, and clearly defines the role that primary health plays in enhancing the region's population health resilience against the impacts of climate change.

Under the Disaster Management Framework, a Disaster Resilience Hub was established to provide health care professionals and community members with access to a suite of resources on readiness, response and recovery. A community driven, strengths-based initiative, the Hub enables communities to connect with health services in the wake of a disaster. The Hub also provides primary care practitioners with integrated tools to assist with disaster medical management education and post-traumatic stress disorder training.

Healthy North Coast has introduced the Community Wellbeing and Resilience program, recognising the importance of community resilience in improving health and wellbeing following natural disasters. This program directly invests in location-based initiatives, supporting communities in building resilience and fostering social capital.[89]

OzGREEN trained and supported local people in Kyogle and Richmond Valley to deliver its award-winning Resilient Communities program. ©OzGREEN

ACTION 3.9

Strengthening the role of primary care in emergency response

The Australian Government will work with relevant stakeholders to strengthen the resilience and availability of primary care during and after climate-related disasters and extreme events by strengthening the role of Primary Health Networks in emergency preparedness and response. This will involve:

- Supporting Primary Health Networks to consider climate risks in the health needs assessment process and in planning and commissioning of local health services.
- Supporting Primary Health Networks to strengthen their functions in emergency preparedness, response and recovery. These functions encompass both:
  - Coordinating existing primary care services – for example, providing guidance and practical coordination and support to ensure continuity of access to relevant clinical care and preventive activities (including mental health support) during climate-related emergencies, particularly to communities in vulnerable situations
  - Commissioning new services to support additional community needs before, during, and after climate-related emergencies.
- Seeking to define clear roles for primary care and Primary Health Networks in emergency preparedness, response, and recovery activities – including by securing a role for Primary Health Networks in local incident response/command governance structures for climate-related emergencies.

Indigenous Rangers, Aboriginal Community-Controlled Health Services (ACCHS) and other First Nations organisations play a critical role responding to the health impacts of climate change, including climate-related disasters and extreme weather events. First Nations people demonstrated their leadership of community responses and support during recent disasters including the COVID-19 pandemic, the 2019-20 Black Summer Bushfires and the 2022 and 2023 Eastern and Northern Australia Floods. Despite this, First Nations organisations are not often supported to participate in disaster planning coordination mechanisms. Action 3.4 in section 3.1 will support the capacity of ACCHS in health emergency planning, preparedness, and response.

3.5 Protecting health by building a climate-resilient aged care sector

Australia's aged care system provides services and support to more than a million people each year, and residential care to around 188,000 people at any given point in time.[90] As Australia's population ages, ensuring the aged care sector is resilient to the impacts of climate change will be a crucial challenge. Action taken to improve the health system and community resilience more broadly will have flow-on benefits that contribute to the climate resilience of aged care. However, the aged care

sector faces a unique set of challenges and accordingly requires specific measures to improve its resilience. To protect the health of older people, and to ensure the aged care sector keeps pace with the Australia-wide transition to net zero, the Australian Government will ensure climate resilience and environmental sustainability are embedded in reforms to aged care in the years ahead.

3.5.1 Aged care emergency preparedness, planning, and response

It is critical the aged care sector (including both private and government-run aged care services) is adequately prepared to manage the increased frequency and intensity of climate-related disasters and extreme weather events. The COVID-19 pandemic and recent extreme weather events have highlighted a need for improved guidance, support, and coordination for aged care providers in emergencies. To protect clients' health and wellbeing during climate-related extreme weather events, aged care providers must plan for and prepare to respond to these situations, while respecting the rights of older people and their choices.

The Department of Health and Aged Care, Aged Care Quality and Safety Commission and National Emergency Management Agency support the sector to be prepared for extreme weather events, particularly in the lead up to the high-risk weather season. The Australian Government is working to ensure aged care providers have greater clarity, guidance and support in emergency response, including during climate-related extreme weather events. The Government provides ongoing information and advice to aged care providers and can link providers to other services for increased support during and after emergencies. The Aged Care Quality and Safety Commission provides guidance materials on their website. Quality assessors provide education and advice to providers to encourage their emergency preparedness, and in addressing gaps identified in audits against standards.

ACTION 3.10

Improving aged care emergency preparedness and response capability

The Australian Government will take the following action to improve aged care emergency preparedness and response capability:

- Continue to provide guidance through effective communication to support aged care providers in emergency preparedness and response, with the expectation of increased frequency and severity of extreme weather events impacting on older people. This will be in conjunction with the Aged Care Quality and Safety Commission who has existing resourcing for direct engagement with aged care providers.
- Surveillance, monitoring and reporting of extreme weather events, with early identification of potential risks to quality of care to aged care residents, and timely information sharing when risks escalate, in collaboration with the Aged Care Quality and Safety Commission.

3.5.2 Aged care quality standards

Following the Royal Commission into Aged Care Quality and Safety, the Australian Government is undertaking a broad package of reforms to ensure aged care at home and in residence is a safe place, where people have the quality of life they deserve. A key component of these reforms is to introduce a modernised, person-centred and rights-based Aged Care Act, along with a strengthened set of Quality Standards outlining the essential systems

and controls that aged care providers must have in place to ensure delivery of safe and quality aged care. The new Aged Care Act, planned for 2024, will incorporate a strengthened set of Quality Standards that will include requirements for aged care providers to prepare for and respond to emergencies and disasters and to manage environmental risks to care and services. These updated Quality Standards will help to ensure aged care providers have greater clarity, guidance, and support on how to manage climate-related risks to the health of older people.[91]

ACTION 3.11

Strengthening aged care quality standards

From July 2024, the new Aged Care Act will give effect to a strengthened set of Aged Care Quality Standards, which will include requirements for providers for (a) emergency and disaster management, and (b) managing environmental risks relevant to care and services for older people. The Australian Government and the Aged Care Quality and Safety Commission will work together to develop accompanying guidance and implementation support tools, including to reduce climate-related risks to older peoples' health.

3.5.3 Aged care accommodation

It is vitally important that aged care accommodation is climate-resilient and able to protect residents' health from climate-related extreme weather such as heatwaves and flooding. In response to Recommendation 45 of the Royal Commission report, the Australian Government has been working with older people, the aged care sector and design experts to improve the design of residential aged care accommodation.[92] The Government is developing a new Residential Aged Care Accommodation Framework, which includes National Aged Care Design Principles and Guidelines, to provide a comprehensive, evidence-based resource for design of aged care accommodation. Draft Principles and Guidelines (which were released in September 2023 for consultation) recognise the importance of environmental sustainability and incorporating sustainable design principles into aged care homes.[93]

ACTION 3.12

Introducing aged care design principles and guidelines

From 2024, the Australian Government will introduce the National Aged Care Design Principles and Guidelines, which will include considering environmental sustainability and options for climate resilience when designing aged care homes.

04

Building a **sustainable, high-quality, net zero** health system

OBJECTIVE 2

Health system decarbonisation

Build a sustainable, high-quality, net zero health system. The Strategy will guide the development of a plan to decarbonise the Australian health system, informed by a comprehensive assessment of the emissions footprint of the Australian health system and existing state and territory strategies and plans.

As greenhouse gases concentrate in the atmosphere, they lead to further rises in global temperature and climate-related health risks, which amplify with every increment of warming. Carbon dioxide (CO_2) from fossil fuel combustion and industry is the largest contributor, accounting for 64% global emissions (in CO_2 equivalent, CO_2-e) in 2019. Methane contributes the next largest proportion at 18%, followed by net CO_2 from land use, land-use change and forestry. Nitrous oxide and fluorinated gases are also greenhouse gases, contributing 4% and 2% respectively to global emissions.[94]

Globally, healthcare makes a substantial contribution to climate change, directly or indirectly contributing 5% of total global greenhouse gas emissions.[95] The figure in Australia is similar – data from the Department of Climate Change, Environment, Energy and Water suggests that counting direct and indirect emissions, the health system contributes 5.3% of Australia's emissions.[96] Therefore, decarbonising the health system is also critical to achieving Australia's net zero target. The key challenge involved in delivering this objective is to improve health, equity, and patient experience, whilst reducing waste and emissions.

In addition to emitting greenhouse gases, the drivers and consequences of climate change also contribute to other environmental harms, such as biodiversity loss, pollution and waste. The multiple facets of climate change mean that there are also multiple benefits to climate change mitigation, 'co-benefits' that can be realised locally and in the short-term. For example, the electrification of ambulances and hospital transport vehicles will reduce air pollution emissions at the tailpipe and hence reduce the risk of respiratory diseases in adjacent areas. Where appropriate, given the individual's circumstances, active travel to healthcare facilities (such as walking and cycling) would also have a positive impact in reducing air pollution, whilst also lowering the risk of cardiovascular disease and diabetes, and leading to improved mental health outcomes. Such interventions also have wider benefits – for example, active travel will benefit the Australian economy through increased productivity from reduced disease and mortality attributed to physical inactivity. The health co-benefits of mitigation are discussed further in Chapter 6.

Objective 2 of the Strategy is to build a sustainable, high-quality net zero health system. This chapter first discusses the measurement of health system greenhouse gas emissions – the sources of emissions; how Australian health system emissions are currently measured; and what is required to better measure, understand and report on health system emissions. This chapter then outlines interventions to equitably reduce health system emissions, by reducing demand for care and by decarbonising delivery of care. The delivery of high-quality healthcare is first and foremost and will underline each of these actions.

4.1 Measuring health system greenhouse gas emissions

To measure and track our success in reducing health system greenhouse gas emissions, we need robust, periodically updated, consistent and sufficiently granular estimates of current emissions levels. This section lays out how greenhouse gas emissions are categorised, explaining what is included in scope 1, 2 and 3 emissions, and how health system emissions can be measured at both the organisation level and at the product level, through life cycle assessments. It then reports

on how health system emissions are currently measured through the Government's National Greenhouse Accounts and National Greenhouse and Energy Reporting scheme and by states and territories.

4.1.1 Scope 1, 2 and 3 emissions

Sources of greenhouse gas emissions are commonly categorised as follows:[97]

- **Scope 1 emissions** (direct emissions) are produced from sources within the boundary of an organisation, and as a result of that organisation's activities, and are calculated at the point of emission release. These include emissions from the use of anaesthetic gases and natural gas for heating by hospitals, and fuel use in vehicles owned by hospitals, such as ambulances and other patient transport.
- **Scope 2 emissions** (energy-related indirect emissions) occur outside the boundary of an organisation from the generation of electricity consumed by the organisation. They are physically produced by burning fuels (such as coal and natural gas) at the power station to create the electricity – for instance, the emissions associated with producing electricity purchased for use in hospitals.
- **Scope 3 emissions** (other indirect emissions) are indirect emissions, other than electricity (scope 2) occurring outside the boundary of an organisation because of action by the organisation. Scope 3 emissions may occur:
  - Upstream: For example, a hospital's upstream scope 3 emissions include those emissions generated in the manufacture of medical equipment used by the hospital, or by hospital staff commuting to work.
  - Downstream: For example, a hospital's downstream scope 3 emissions include those emissions generated from the incineration of its waste offsite.

Some greenhouse gas emissions associated with health system functioning fall outside the traditional definition of scopes 1, 2 and 3, such as patient and visitor travel to and from health and aged care facilities using private vehicles or public transport. It is still important to consider patient travel emissions as part of the broader perspective of health system 'value chain' emissions, as a component of the functioning of the health system.

Effective action to reduce greenhouse gas emissions requires collaboration between producers and consumers. For instance, off-site incineration of hospital medical waste is classified as scope 3 emissions (where the hospital is consuming incineration services produced by a third party), but one of the actions required to reduce these emissions is training hospital staff to appropriately separate medical and non-medical waste, to minimise the amount sent for incineration. Similarly, air, rail and bus transport by health system staff for work purposes, such as conferences and meetings, is classified as scope 3 emissions. While transport providers have an important role to play in reducing emissions, the health system also has an important role to play as a consumer in reducing its demand for staff transport and changing the transport mix it consumes.

In recognition of the important role of both consumers and producers in reducing greenhouse gas emissions, the Strategy's efforts to achieve a net zero health system will encompass scope 1, 2 and 3 emissions. The Strategy will also encompass patient travel to and from health and aged care facilities, irrespective of mode of transport.

Including scope 3 emissions in the Strategy's efforts to achieve a net zero health system will be particularly important in supporting evidence-based procurement decisions. For example, if only scope 1 emissions were considered, switching from disposable to reusable hospital gowns would appear to result in an increase in emissions, because the emissions generated in production of the gowns would not be considered, and reusable gowns involve increased use of steam sterilisers which are currently largely gas powered. However, considering emissions across scopes 1, 2 and 3 would reveal reusable gowns generate fewer emissions across the life cycle.

FIGURE 6: SCOPE 1, 2 AND 3 EMMISSIONS AND METHODS OF MEASUREMENT

4.1.2 Ways to measure health system emissions

Health system greenhouse gas emissions can be estimated in a 'bottom-up' or 'top-down' way.

'Bottom-up' estimates are based on the measurement of units of activity or other physical quantities – for instance, litres of fuel consumed, tonnes of waste incinerated, or prescriptions of metered dose inhalers dispensed. These physical quantities are then multiplied by an 'emissions factor' to obtain an estimate of the resulting greenhouse gas emissions.

'Top-down' estimates start at a more macro level, for example, using expenditure in a given area, multiplied by an emissions factor, to yield an emissions estimate. Top-down estimates often make use of environmentally extended input-output models to map emissions based on one sector's consumption of another sector's goods.

Bottom-up estimates are more resource-intensive and are not always possible, given data availability limitations. However, they generally yield more meaningful estimates than top-down methods. The major limitation of top-down estimates is that they are confounded by price differences that are unrelated to embodied emissions. For example, an otherwise equivalent generic medicine 10 times cheaper than a branded medicine would be assumed to have a tenth of the emissions of the branded medicine. As such, top-down estimates are of limited value in identifying sources of emissions by activity/product and monitoring progress in reducing emissions.[98]

The National Health Service (NHS) in England uses a hybrid model, combining bottom-up data (buildings scope 1 and scope 2 emissions, anaesthetic gases, metered dose inhalers and staff, patient and visitor travel) with top-down modelling of supply chain, fleet and commissioned services emissions.[99] Hybrid models are also used in Australia's National Inventory suite of products.

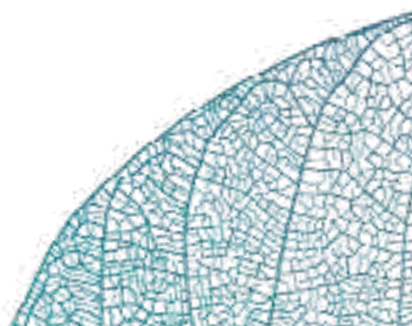
Emissions footprinting at the product or service level, or life cycle analysis, can be undertaken by applying bottom-up methods to estimate the emissions associated with all the inputs that go into the production of a good or service, including raw material extraction, manufacturing, use and end of life management. Life cycle assessments have been undertaken for a range of health system products and services, including personal protective equipment, instruments, surgeries and diagnostic testing.[100,101,102] Such assessments can be helpful in making decisions on whether to use disposable or reusable equipment and what medicines, technologies and approaches to use when clinical outcomes are equal.

4.1.3 How are emissions measured in Australia?

The Department of Climate Change, Energy, the Environment and Water (DCCEEW) compiles Australia's National Greenhouse Accounts (the Accounts). The Accounts are a suite of reports and datasets on Australia's greenhouse gas emissions and are used to fulfil Australia's domestic and international emission reporting obligations, track progress towards Australia's Paris Agreement emission reductions targets, and inform and monitor government policy and future national emissions reduction targets. The Accounts are compiled consistent with Paris Agreement rules and guidelines, including the Intergovernmental Panel on Climate Change guidelines for emission estimation.

Wherever possible, the Accounts draw on facility-level data. Where facility-level data is not available, other data sources are used. The Accounts include an annual National Inventory by Economic Sector, which provides accurate scope 1 emissions data disaggregated by the Australian and New Zealand Standard Industrial Classification.

The Accounts' continuous improvement program, based on latest available data, research, technologies and practices, is expected to improve the accuracy of more granular emissions estimates over time, supporting measurement and tracking of existing and forthcoming health system emissions reduction initiatives.



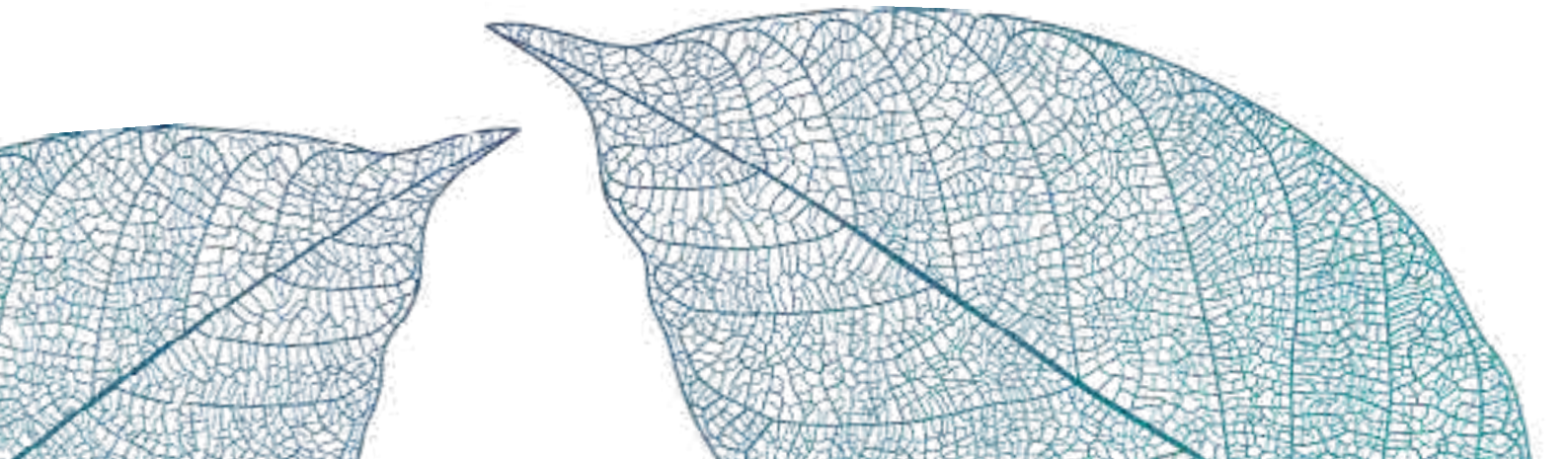
ACTION 4.1

Reporting of estimates of health system greenhouse gas emissions

The Australian Government will publish baseline emissions estimates for the health system (inclusive of health and aged care) in 2024 and will seek to publish regular emissions estimates thereafter to track progress in emissions mitigation efforts. To the greatest extent possible, emission estimates will be drawn from Australia's National Greenhouse Accounts or based on methods and factors consistent with those Accounts. Where practicable, estimates will be disaggregated by source, scope, state or territory and whether the emissions occurred within or outside Australia.

A number of existing or planned Australian Government schemes involve organisation or facility-level emissions measurement and reporting. New initiatives under the Government's Powering Australia plan are likely to increase existing health system participation in such schemes.

- The Government's National Greenhouse and Energy Reporting (NGER) scheme focuses on scope 1 and 2 emissions. It requires facilities covered by the scheme to report annually on their greenhouse gas scope 1 and 2 emissions and energy production and consumption. These data are a key input to Australia's emissions reporting under the Paris Agreement and Australia's National Greenhouse Accounts, including the National Inventory by Economic Sector.[103]
- Climate Active is a voluntary Australian Government program that certifies credible carbon neutral achievements by businesses who measure, reduce, offset, verify and report their emissions. Certification is available for organisations, products and services, buildings, events and precincts. Businesses seeking certification must set their emissions boundary and measure emissions in accordance with the Climate Active Carbon Neutral Standard, which is adapted from the GHG Protocol and ISO 14000 series. Climate Active provides businesses seeking certification with an inventory template for reporting emissions which includes emission factors for common emission sources, such as emissions factors sourced from DCCEEW.[104]
- Under the Powering Australia plan, the Government committed to reduce Australian Public Service emissions to net zero by 2030 (APS Net Zero by 2030). The plan is under further development, with the initial focus on scope 1 and 2 emissions. The 2030 target will initially apply to most non-corporate Commonwealth entities. Corporate Commonwealth entities and Commonwealth companies are encouraged to reduce their emissions, with further consideration being given to these types of entities.[105]
- Under the Powering Australia plan, the Government has committed to ensuring large businesses provide people in Australia with greater transparency and accountability when it comes to their climate-related plans, financial risks and opportunities. As part of this commitment, the Government is introducing standardised, internationally aligned reporting requirements for large businesses and financial institutions to make disclosures on governance, strategy, risk management, targets and metrics – including greenhouse gases.[106]



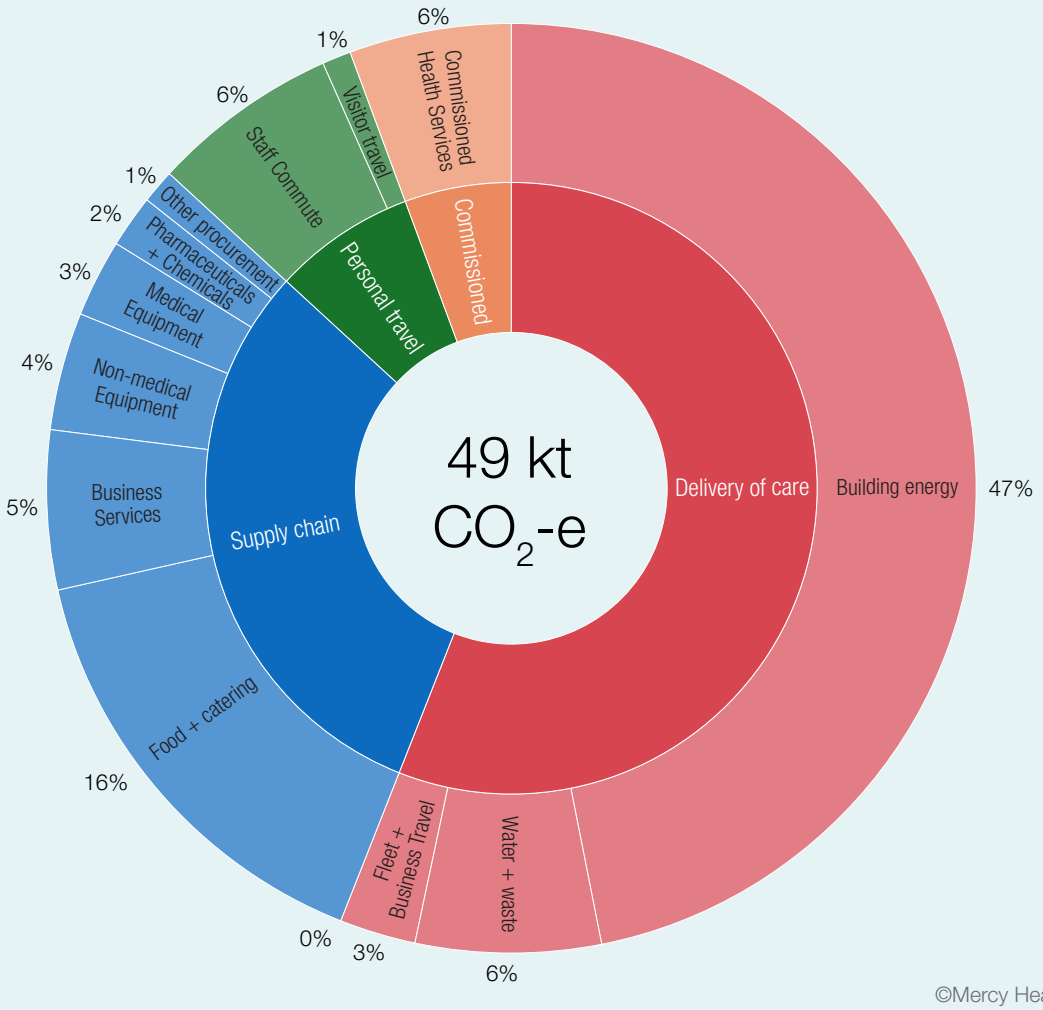
Case Study 6

Mercy Health's emissions footprint

Mercy Health is a Catholic provider of public health and aged care services operating across four Australian states and comprising a network of around 820 acute point of care and 2,500 residential aged care places, delivered from around 60 sites.

In 2022, Mercy Health undertook a comprehensive study of the organisation's full emissions footprint. This work was undertaken as part of Mercy Health's Caring for People and Planet Strategy, which commits to addressing climate change via sustainable models of care, and ethical and social responsibility.[107]

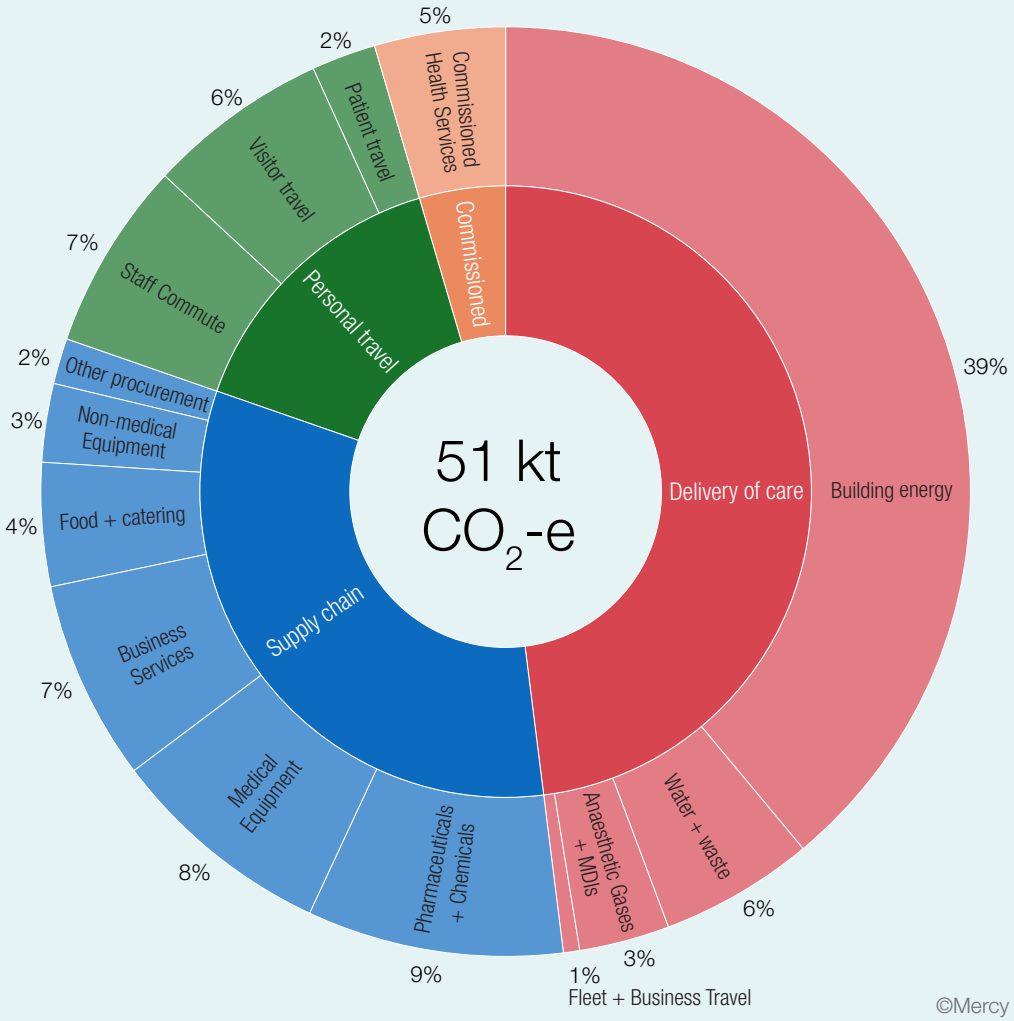
FIGURE 7: TOTAL GREENHOUSE GAS EMISSIONS FOR MERCY HEALTH'S AGED AND COMMUNITY CARE SERVICES IN 2020/21.



As Mercy Health is an NGERS reporting organisation, the organisation had good visibility of Scope 1 and 2 emissions at commencement of the study, however there was little understanding of Scope 3 emissions. The study found that Mercy Health's emissions for the 2020–21 financial year totalled 103 kt CO_2-e. Scope 1 comprised 11% of emissions, Scope 2 30% and Scope 3 59%. Health Services contributed 49.16% of emissions and Aged Care 47.81%.

Building Energy was the largest emissions category (42.03%), with electricity comprising 33.06% of total emissions. This finding highlights the opportunity for Mercy Health to significantly reduce emissions by transitioning to renewable electricity sources.

FIGURE 8: TOTAL GREENHOUSE GAS EMISSIONS FOR MERCY HEALTH'S HEALTH SERVICES IN 2020/21.



State and territory health ministries have individually made significant progress to estimate their health system emissions, and all intend to establish a regular reporting scheme. This is in parallel to the Australian Government's established common approach to national and facility-level emission estimation that will support the baseline emissions estimation and reporting for the health system. All states and territories are collecting and reporting health system emissions data on most scope 1 and 2 emissions sources and, to a varying degree, on scope 3 emissions sources, with each taking different approaches to their measurement, in line with their own jurisdictional reporting requirements and emissions reductions targets. There is great value in working with all states and territories to align emissions measurement and reporting.

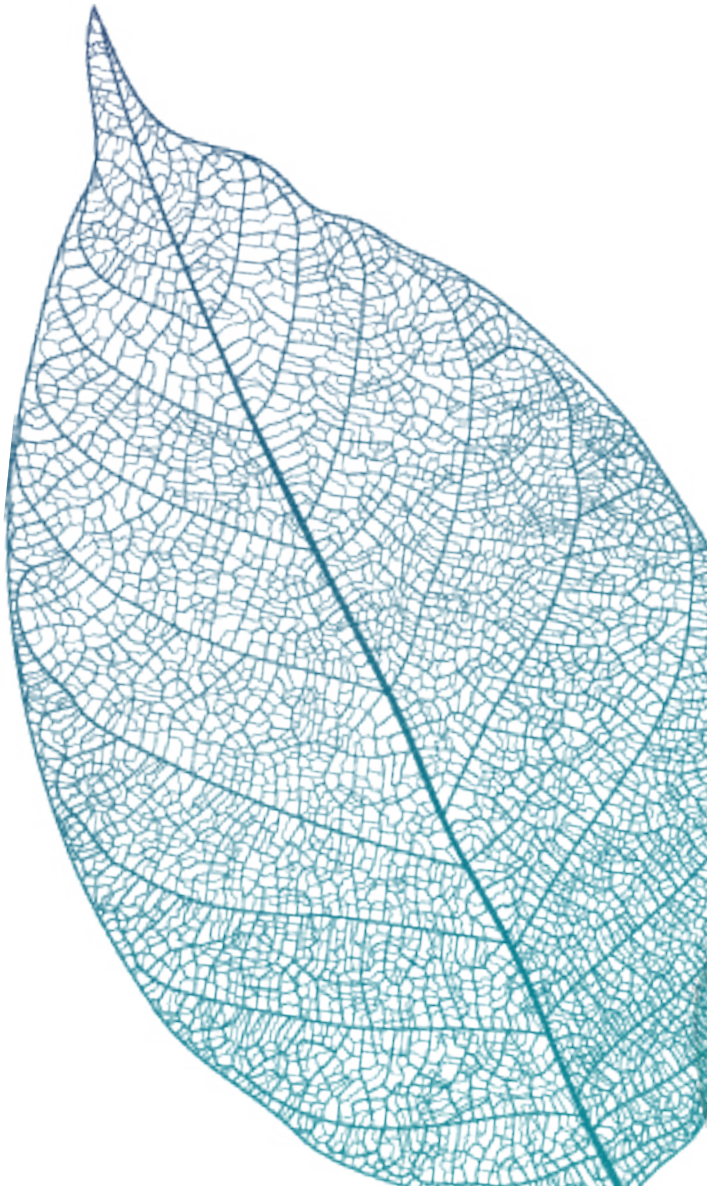
This Strategy provides the opportunity for more granular and robust bottom-up emissions measurements that can feed into both the national baseline emissions estimate as well as ongoing reporting. This will be particularly important in accurately monitoring progress along a national health system emissions reduction trajectory.

More standardised data would allow benchmarking and comparison between jurisdictions as well as between comparatively sized and located health services. Jurisdictions and health services will have the opportunity to demonstrate progress in alignment with the emissions reduction trajectory. Standardised data will enable the identification of jurisdictions and health systems that are leading in emissions reductions to then share best practice with other jurisdictions and health services. Such sharing of consistent data reporting and best practice will help accelerate mitigation action to help achieve progress in line with an agreed health system emissions reduction trajectory.

ACTION 4.2

Alignment of approaches to reporting health system greenhouse gas emissions

The Australian Government will work together with state and territory health departments to align emissions estimation approaches by state and territory health systems, leveraging, to the extent possible, National Greenhouse Accounts methods and frameworks and data already reported by states and territories through their own reporting mechanisms.



4.1.4 What do we know about health system emissions?

TABLE 1: HEALTH SYSTEM EMISSIONS BY SCOPE

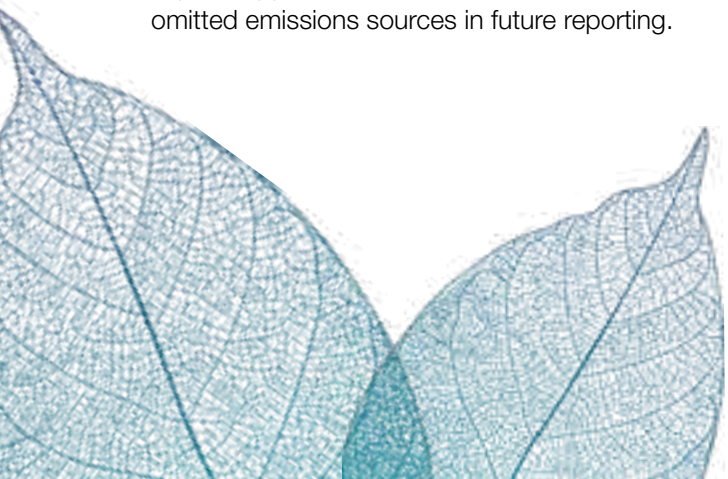
Category	kt CO_2-e
Scope 1 (FY 2020-2021)	
Hospitals and medical and other health care services (total)	**714**
Fuel combustion for stationary energy purposes	299
Road transport	237
Commercial refrigeration	153
Mobile air-conditioning	4
Stationary air-conditioning	21
Residential care services (total)	**440**
Fuel combustion for stationary energy purposes	290
Road transport	97
Lubricant use	2
Commercial refrigeration	43
Mobile air-conditioning	2
Stationary air-conditioning	6
Pharmaceutical and medicinal product manufacturing (total)	**12**
Fuel combustion for stationary energy purposes	7
Road transport	5
Clinical waste incineration (total)	**15**
Medical nitrous oxide use (total)	**300**
TOTAL HEALTH SYSTEM SCOPE 1 ESTIMATE	**1,481**

Category	kt CO_2-e
Scope 2 (FY 2020-2021)	
TOTAL HEALTH SYSTEM SCOPE 2 ESTIMATE	**4,732**
Scope 3 (FY 2019-2020)	
Metered dose inhalers (FY2020-2021) (total)	**127**
Other scope 3 emissions (total)	**18,144**
TOTAL HEALTH SYSTEM SCOPE 3 ESTIMATE	**18,271**
Total Health System Emissions	
TOTAL HEALTH SYSTEM EMISSIONS ACROSS SCOPES 1, 2 AND 3	**24,484**

Scope 1 emissions were obtained from the National Inventory by Economic Sector,[108] which provides information on national emissions, disaggregated by the Australian and New Zealand Standard Industrial Classification 2006 and the residential sector. Scope 1 emissions are estimated to be approximately 1,481 kilotonnes of carbon dioxide equivalent (kt CO_2-e), or 0.3% of Australia's total 2021 emissions of 464.8 million tonnes of CO2-e reported under the Paris Agreement.[109] As scope 2 emissions data are not currently disaggregated within industrial sectors to the level most relevant to the health and aged care sector, the estimates provided above were imputed using scope 1 and scope 2 emissions data from health and aged care entities reported under the National Greenhouse and Energy Reporting Scheme. Assuming the health system as a whole has the same ratio of scope 1 to scope 2 emissions as National Greenhouse and Energy Reporting Scheme health facilities, implies total health system scope 2 emissions of approximately 4,732 kt CO_2-e, or 1.0% of Australia's total 2021 emissions reported under the Paris Agreement.

Scope 3 estimates were obtained from the Department of Climate Change, Energy, the Environment and Water's consumption inventory which includes emissions from the entire supply chain both in Australia and overseas to support the consumption of goods and services by Australians.[110] The consumption inventory differs from the production-based inventory reported under the Paris Agreement that must include only emissions that occur in Australia. Scope 3 emissions are estimated to be approximately 18,271 kt CO_2-e. This estimate is equivalent to 3.9% of Australia's total 2021 emissions reported under the Paris Agreement. Estimated scope 3 emissions were calculated by subtracting FY 2020-2021 scope 1 and scope 2 emissions from the aggregated FY 2019-2020 consumption inventory total use emissions for the health system (comprising human pharmaceutical and medicinal product manufacturing, health care services and residential care and social care services). This estimate includes emissions associated with social assistance services as this data was unable to be disaggregated from residential care, and thus may slightly overestimate the health system's scope 3 emissions. Overall, emissions associated with the health system are estimated to be approximately 24,484 kt CO_2-e. This estimate is equivalent to 5.3% of Australia's total 2021 emissions reported under the Paris Agreement.

These estimates do not include some health system emissions, including those associated with the construction of health system buildings and infrastructure (these are associated to the construction sector in the National Greenhouse Accounts and further work is needed to disaggregate them); those associated with fluoridated anaesthetic gases (which are not reportable under the Paris Agreement); and those associated with patient travel. The Government will explore opportunities to include these and other omitted emissions sources in future reporting.



4.2 Reducing health system greenhouse gas emissions

The Australian Government has committed to reduce national emissions by 43% below 2005 levels by 2030, and to achieve net zero national emissions by 2050. These targets apply to all parts of the Australian economy, including the health system.

The states and territories have also each set targets:

- Australian Capital Territory – 65-75% below 1990 levels by 2030 and net zero by 2045[111]
- New South Wales – 50% below 2005 levels by 2030 and net zero by 2050[112]
- Northern Territory – net zero by 2050[113]
- Queensland – 30% below 2005 levels by 2030 and net zero by 2050[114]
- South Australia – 50% below 2005 levels by 2030 and net zero by 2050[115]
- Tasmania – net zero or lower by 2030[116]
- Victoria – 45-50% below 2005 levels by 2030 and net zero by 2045[117]
- Western Australia – 80% below 2020 levels by 2030 for all government agencies.[118]

The development of this National Health and Climate Strategy is an opportunity to build on the work of states, territories, health services and individuals, to set an ambitious strategic direction for decarbonisation of the health system, support achievement of Australia's national emissions reduction targets, and to be a leader in the growing international community of countries committed to transforming their health systems to be low carbon and sustainable. A priority action of this Strategy is therefore to set a national emissions reduction

trajectory for the Australian health system. This trajectory will be supported by a health system decarbonisation roadmap, which will build on state and territory plans and also address scope 3 emissions. This roadmap will also be developed in alignment with the economy-wide Net Zero 2050 plan and associated sectoral decarbonisation plans (which focus on electricity and energy, industry, resources, the built environment, agriculture and land, and transport).

ACTION 4.3

Establishing a national health system emissions reduction trajectory

The Australian Government will seek to negotiate a national emissions reduction trajectory for the Australian health system. The trajectory will encompass all levels of the health system (inclusive of aged care) and will encompass scope 1, scope 2 and scope 3 emissions and build on existing state and territory trajectories.

ACTION 4.4

Developing a health system decarbonisation roadmap

By 2025, the Australian Government will develop a health system decarbonisation roadmap encompassing all levels of the health system (inclusive of aged care). The roadmap will encompass scope 1, 2 and 3 emissions as well as patient travel, and will be developed in alignment with the Australia-wide Net Zero 2050 plan and state and territory strategies and plans. The Government will seek to develop the roadmap in partnership with stakeholders in state and territory health systems, and invite participation by private providers, industry and suppliers.

Health system emissions reduction strategies will focus on ways to improve health, equity, and patient experience, whilst reducing waste and emissions. For instance, as discussed later in this section, the first step in tackling emissions from asthma patients' inhalers is to optimise their care by ensuring they are on the appropriate treatment to prevent their asthma symptoms. Digital solutions, such as telehealth for outpatient specialist appointments, should focus on improving access to services, particularly in remote communities, with the co-benefit of also reducing transport-related emissions. Attention will also be paid to ensuring that measures to reduce emissions also enhance the health system's resilience to the impacts of climate change.

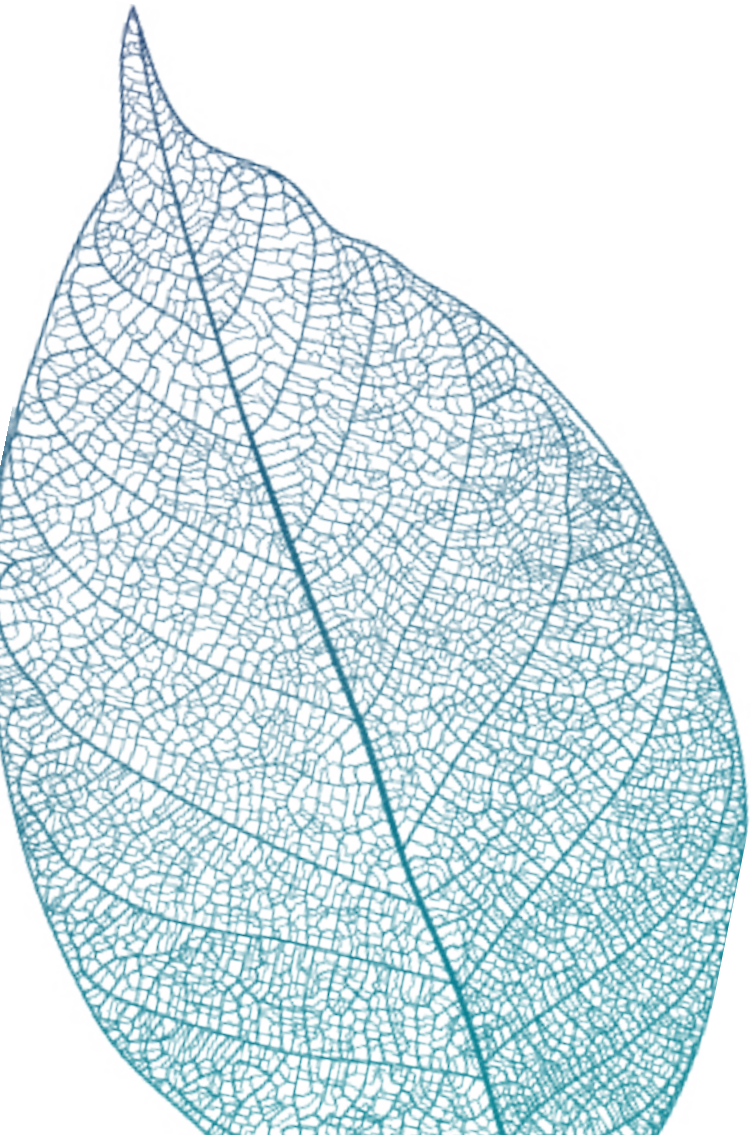
Three pillars underpin this Strategy's approach to health system decarbonisation.[119,120] The first is to reduce demand for health services by preventing ill health. The second is to ensure the care provided matches what is required, with investigation and treatment undertaken when they are clinically indicated. The final pillar is that, where provision of care is necessary, it should be delivered in a manner that ensures high-quality care, whilst minimising any associated greenhouse gas emissions. This involves identifying the sources of emissions from all aspects of care delivery – from the transport of patients to the management of health care waste – and designing interventions that reduce emissions while maintaining care quality. This section outlines how health system emissions will be reduced, walking through each of these three pillars.

The National Safety and Quality Health Service Standards provide a nationally consistent statement of the level of care consumers can expect from health service organisations. The Standards – developed by the Australian Commission on Safety and Quality in Health Care in collaboration with the Australian Government, states and territories, private sector providers, clinical experts, patients and carers – are used to accredit health service organisations to provide care for patients, and as such represent a unique lever for embedding emissions reduction in delivery of healthcare across the country. In 2024, the Commission intends to pilot a framework that health service organisations can use to address environmental sustainability, as well as on climate resilience, with a view to informing the next edition of the standards due for release in 2027.

ACTION 4.5

New sustainability and climate resilience standards for health service organisations

In 2024, the Australian Commission on Safety and Quality in Health Care will, with input from the Australian Government and states and territories, pilot the Environmental Sustainability and Climate Resilience Healthcare Module – a framework of action focused on environmental sustainability and building climate resilience. Implementation of the Module will inform action in future national safety and quality standards developed by the Commission.



4.3 Preventing ill health

Preventing ill health is the foundation of the health response to climate change. We can reduce the demand for emissions-intensive forms of health care by supporting people to be healthy, well and independent in their homes and communities, and by preventing the onset of disease and the exacerbation of chronic conditions.

Data suggests that 47% of Australians have one or more chronic conditions. Approximately 38% of the disease burden is potentially preventable if all modifiable risk factors such as tobacco smoking, insufficient physical inactivity, poor diet, overweight and obesity can be better addressed.[121] An estimated $320 million annually is spent on avoidable hospital admissions for chronic conditions. Poor health and chronic conditions are not shared equally among Australia's population – the highest and lowest socioeconomic groups in Australia are separated by a difference in life expectancy at birth of 5.9 years for males and 3.9 years for females.[122]

All levels of prevention can improve health equity, quality of life and reduce pressure on the health system, as described in section 3.2. This is addressed by the National Preventive Health Strategy through its focus on harm due to tobacco, alcohol and drug use; healthy diets and physical activity; and immunisation and cancer prevention.

Primary care is also key for providing preventive care, supporting chronic condition management and slowing and sometimes reversing the progression of chronic diseases. Access to and use of primary care services therefore not only improves people's wellbeing and quality of life – it also reduces the need for more emission intensive hospital-based care. Indeed, a high-quality, effective and evidence-

based primary healthcare system provides a backbone for a sustainable health system. Primary healthcare reforms, as identified in Australia's Primary Health Care 10 Year Plan 2022-2032,[123] will support preventive interventions and the delivery of high-quality primary healthcare.

4.4 Providing appropriate care and tackling unwarranted variations

Opportunities to reduce emissions by providing value-based care are increasingly being recognised, including by avoiding overdiagnosis, overtreatment and unnecessary imaging and pathology tests.[124] Improving health care management will improve patient outcomes and help to avoid 'adverse events' such as medication errors and hospital-acquired infections, which increase the duration of hospital stays and associated emissions.[125]

Low value care is defined as healthcare interventions with a risk of harm and uncertain or no benefit. This can be at an individual level for the patient, or at a health system level for specific populations when resources are not targeted to those with the greatest clinical need. Assumptions about what might be considered low value care must be aligned with the self-determined health priorities of First Nations communities. Appropriate care reduces waste and can lead to more equitable health care delivery by prioritising health care for people who need it most.

There is some evidence in areas of healthcare such as mental health and orthopaedics, that for some health conditions, treatments such as exercise programs and physical activity provide equal or superior health outcomes, when compared with medication or surgery. They also have fewer risks and side-effects and are low cost and low carbon.[126,127] In these cases, non-pharmacological and non-procedural options should be given greater consideration in treatment plans.

Variations in the level of care delivery should not necessarily be seen as a negative. It may be appropriate if such differences reflect health services responding to inequities, or differences in patient preferences or underlying needs. When a difference in the use of health services does not reflect these factors, it is unwarranted variation and represents an opportunity for the health system to improve.

The Australian Atlas of Healthcare Variation series, published by the Australian Commission on Safety and Quality in Health Care, maps the use of health care according to where people live, providing data and direction for health services to identify and address unwarranted variation and improve the appropriateness of care.[128]

Inappropriate antimicrobial use is low value care because it increases the risk of antimicrobial resistance and infection caused by antimicrobial resistant organisms, increasing the need for hospitalisation. The forthcoming Australian report on antimicrobial use in human health shows antimicrobial use in Australian hospitals is higher than in Canada and comparable European countries.[129]

Case Study 7

Addressing low value care in emergency departments

In 2022, a team within the Royal Melbourne Hospital Emergency Department identified arterial blood gas testing and coagulation profile testing were routinely being undertaken when not required. In response, the team embarked on a systematic review, out of which educational materials were developed to differentiate between patients who did and did not need these tests. These materials were strategically positioned within the Emergency Department, and were incorporated into the department's educational initiatives using 'Choosing Wisely' principles.

As a result of this initiative, over 1200 unnecessary blood tests were avoided each month, corresponding to annual cost savings of $240,000 and emissions reductions of 900kg CO_2-e.[130]

This work served as an inspiration, fostering a culture of innovative problem-solving within the Emergency Department. Projects following a similar model have been initiated subsequently. This initiative underscores the importance of evidence-based practice in reducing low value care.

The selection of strategies to reduce low value care should be tailored to account for contextual factors relevant to the different tests and treatments being targeted, and closely involve health professionals, patients, and consumers.[131] The Commission has published guidance to address unwarranted variation, including a User Guide[132] for reviewing clinical variation. Health professional organisations are also working to provide better care and ensure better use of healthcare resources through initiatives such as the RACP Evolve program and the RACGP's 'First do no harm: A guide to choosing wisely in general practice'.[133,134] Work to reduce low value care arising from this Strategy will seek to complement these existing initiatives.

ACTION 4.6

Tackling unwarranted variations in clinical governance

The Australian Commission on Safety and Quality in Health Care will develop guidance for health service organisations' governing bodies and leadership teams on the delivery of appropriate, high value care, focusing on reducing unwarranted healthcare variation and low value care by prescribing:

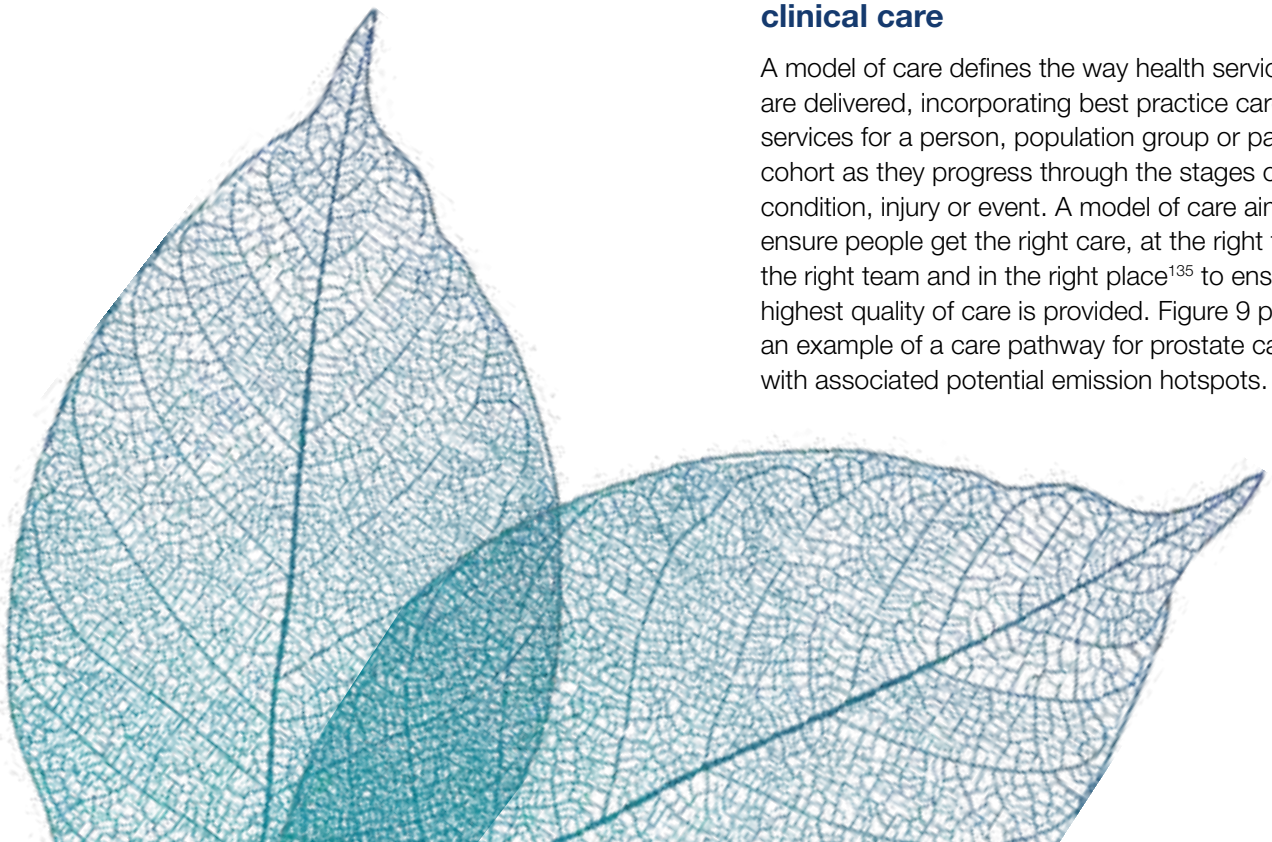
- Model roles, responsibilities and accountabilities of members of governing bodies and leadership teams for delivering appropriate care
- Approaches to identify, measure and address unwarranted healthcare variation in line with an organisation's risk management framework
- A framework to invest, disinvest and reinvest resources to improve outcomes and shift resources from lower value to higher value activity
- Strategies to support monitoring and evaluation of local approaches to reducing low value care.

ACTION 4.7

Tackling unwarranted variations with health service organisations

The Australian Commission on Safety and Quality in Health Care and the Australian Government will work together to identify opportunities to support health service organisations reduce unwarranted healthcare variation and low value care by:

- Identifying clinical priority areas where there is evidence of low value care or unwarranted healthcare variation and take action to align care with evidence-based practice
- Developing measures to review the appropriateness of healthcare delivery with patient-reported outcome measures and patient-reported experience measures
- Describing stewardship programs for the quality use of medicines to reduce overuse and inappropriate prescribing
- Developing a framework and tools to monitor and evaluate systems for providing and improving the appropriateness of care.



4.5 Reducing greenhouse gas emissions from the delivery of care

In addition to reducing health system emissions by preventing ill health and reducing the delivery of inappropriate care, delivery of appropriate care needs to be decarbonised. This section first outlines work to understand emissions for different patient pathways. Second, it discusses different sources of emissions in health and aged care, and action to address them – for the built environment, energy and water; travel and transport; medicines and gases; food and catering; waste and resource use; and in the supply chain.

4.5.1 Understanding emissions from clinical care

A model of care defines the way health services are delivered, incorporating best practice care and services for a person, population group or patient cohort as they progress through the stages of a condition, injury or event. A model of care aims to ensure people get the right care, at the right time, by the right team and in the right place[135] to ensure the highest quality of care is provided. Figure 9 presents an example of a care pathway for prostate cancer, with associated potential emission hotspots.

FIGURE 9: UNDERSTANDING EMISSIONS FROM CLINICAL CARE – PROSTATE CANCER CARE PATHWAY

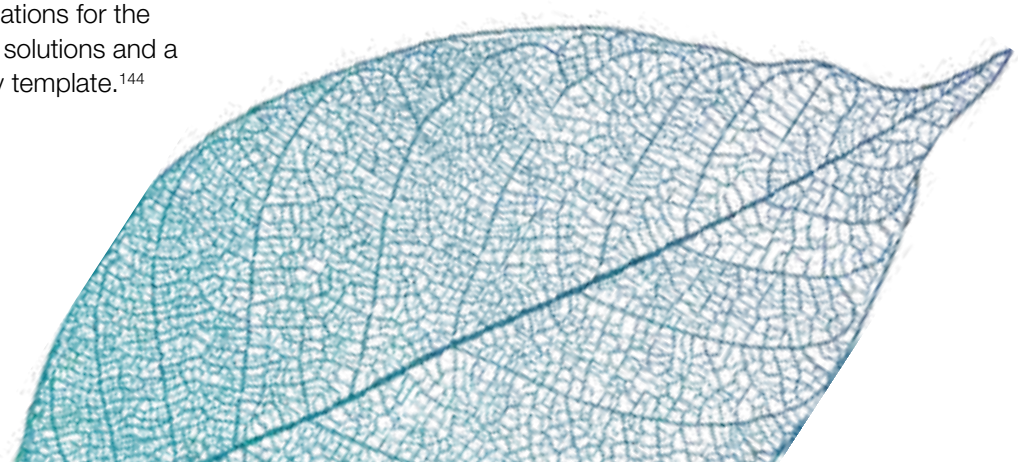
Source: Cancer Council, *Optimal Care Pathway For Men With Prostate Cancer*, June 2021

With growing recognition of the impact of care delivery on climate change, health professionals have begun work to understand how the models of care they adopt can not only provide high-quality care and maximise health outcomes, but also minimise environmental impacts and build climate resilience. There have been many studies examining the emissions footprint of reusable versus disposable products, such as ureteroscopes, central venous catheter insertion kits, and anaesthetic equipment.[136,137,138] There are also many studies examining emissions from different approaches to care, for example providing haemodialysis in a centre or a suburban satellite, undertaking skin excisions in clinic or in hospital, and using spinal versus general anaesthesia for a total knee replacement.[139,140,141] There has also been work to change the way in which care is delivered. For example, the telehealth team at Royal Melbourne Hospital facilitated over 83,000 outpatient telehealth appointments, preventing an estimated 12 million km of travel, saving an estimated 2.4 million kg CO_2-e emissions and preventing the use and disposal of an estimated 100,000 N95 masks.

Professional bodies are also working to reduce the greenhouse gas emissions of the care they deliver. For example:

- The Australian College of Nursing has developed Nursing Leadership in Emissions Reduction Guiding Principles, which identifies the role played by nurses in controlling clinical waste and leading on environmental stewardship.[142]
- The Australian and New Zealand Society of Nephrology has developed environmentally sustainable guidelines for kidney care facilities aimed at design and construction teams, facility managers, and clinical staff.[143]
- Optometry Australia is developing a Sustainability Roadmap, which identifies opportunities to decarbonise optometry, particularly through setting decarbonisation expectations for the industry and designing circular solutions and a sustainable procurement policy template.[144]
- The Royal Australian College of General Practitioners has developed an 'Environmental sustainability in general practice' resource to support GP practices to reduce their environmental footprint.[145]
- The Royal Australian and New Zealand College of Obstetricians and Gynaecologists is establishing an Environmental Sustainability Working Group, which aims to advocate for the reduction of the environmental footprint within the obstetrics and gynaecology profession and health services more broadly.
- The Royal Australasian College of Surgeons has promoted the use of telehealth for outpatient appointments where appropriate.[146]
- Doctors for the Environment Australia and the Australian Medical Association have developed Green College Guidelines, which advise research and quality improvement in environmental sustainability and the development of an audit tool for clinicians and departments to evaluate environmental impact.[147]
- The Australian Psychological Society has produced the Climate Change Empowerment Handbook, which provides psychological strategies to tackle climate change, including personal and collective action.[148]

Moving forward, there is a need to scale up and replicate existing good practice in healthy, resilient, sustainable models of care across the health system. As much as possible, innovation across the health system should be informed by the need to reduce emissions. Active consumer engagement – particularly with priority populations – on the health and environmental benefits of optimised models of care will be important in achieving widespread change.



Case Study 8

Emissions footprint of different dialysis options

Peritoneal dialysis is a common and increasingly used treatment for kidney failure, yet there is a lack of information about its emissions footprint. For the first time in Australia, greenhouse gas emissions were quantified, associated with delivery of both automated peritoneal dialysis (APD, where a machine provides dialysis overnight) and continuous ambulatory peritoneal dialysis (CAPD, where patients do their own dialysis exchanges). APD was responsible for approximately 64% more greenhouse gas emissions per person than CAPD. The main source of emissions was the manufacture and disposal of fluid and consumables used during treatment. However, the transport of these was also important, particularly to patients living in rural and remote areas. Recycling the plastics used during treatments could significantly reduce emissions. These findings will inform the kidney care community's search for models of care that improve outcomes and while also reducing emissions where clinically appropriate.

©The Royal Melbourne Hospital

ACTION 4.8

Developing a framework for reducing emissions by optimising models of care

The Australian Government will work with professional bodies to develop and pilot a framework for mapping emissions hotspots across patient care pathways of clinical specialties and the National Health Priority Areas to identify opportunities to reduce emissions while optimising patient care. This will build on the framework planned for development by the National Health Service in England.

4.5.2 The built environment, energy and water

The built environment consists of all the human-made aspects of people's surroundings, including hospitals, facilities, roads and other connecting transit systems. Buildings contribute to climate change through their construction, maintenance and daily operation. This includes the materials they use; their location; and electricity, gas and water usage. Malik et al estimated capital expenditure for health care buildings, including expenditure on the building of new hospitals and retrofitting or upgrading of established hospitals, represents 8% of total Australia health care emissions.[149] However, this figure only considers emissions from physical construction and upgrades and not building energy use.

It will be important to measure emissions from the ongoing operation of buildings across health and aged care. Emissions from heating and cooling of buildings and refrigeration of food and medicines will include both scope 2 emissions from energy use and scope 1 emissions from refrigerants and gas heating. Health care facilities also consume large quantities of water and use energy to heat, pump and dispose of it. The Strategy will seek to utilise and build on existing government schemes, including the National Australian Built Environment Rating System (NABERS) Energy and Water Ratings, which are available to both public hospitals and

residential aged care facilities, and the National Construction Code, to identify emissions reduction opportunities and track progress.

Work is also underway within the states and territories to decarbonise buildings within the health system. For example, the Victorian Health Building Authority *Guidelines for sustainability in capital works* provide guidance on how to build sustainable and resilient health facilities. The guidelines support the Victorian's Government's commitment for all new public hospitals to be all-electric and use 100% renewable electricity in Victorian public hospitals by 2025.[150] Healthcare buildings less than 10,000 square metres will have to be all-electric, given they are expected to handle thermal loads efficiently and economically. For buildings over 10,000 square metres, opportunities to use more electric plant and equipment to minimise the use of natural gas will need to be investigated and documented in their sustainability reports. A recent announcement from the Victorian Health Building Authority means that all new buildings, irrespective of size, will be required to be all-electric.[151]

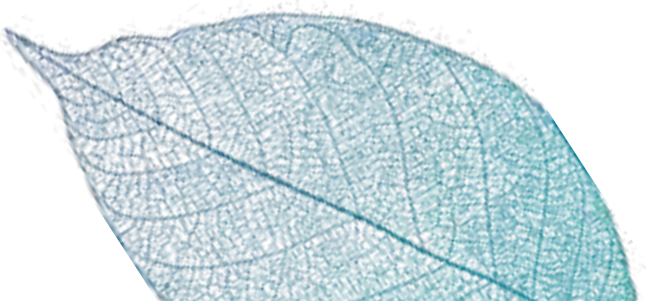
The impacts of the built and urban environment on human health and wellbeing, and initiatives to improve climate resilience, are discussed further in Chapter 6.

ACTION 4.9

Expanding use of NABERS ratings for health and aged care facilities

The Australian Government will consider:

- Expanding the use and public reporting of National Australian Built Environment Rating System for public hospitals and residential aged care
- Developing and implementing National Australian Built Environment Rating System tools for private hospitals and medical centres.



Case Study 9

Decarbonisation of health infrastructure in the ACT

Canberra Hospital's new Critical Services Building will be Australia's first all-electric major hospital building when it opens in 2024. The building's all-electric status will avoid 1.89 kt CO_2-e of emissions annually, which is equivalent to removing 760 cars from the roads. Key features include energy-efficient systems, with intelligent heating and cooling, and a high-performing double-glazed façade, which minimises the cooling required in summer and heating required in winter. This will work alongside new technology that automatically monitors and controls heating, ventilation, and cooling.

The new building includes locally sourced low carbon concrete. During demolition of the previous buildings that stood on the site, 96% of the materials were salvaged and repurposed for other projects. The ACT has also committed $1 billion to building a new all-electric northside hospital in Bruce.

©ACT Health

ACTION 4.10

Moving towards zero emissions buildings

The Australian Government and the Australian Building Codes Board will work together to consider possible changes to the commercial building energy efficiency requirements in the National Construction Code. The changes are intended to support the Government's energy and greenhouse gas policies, including the 2050 net zero target. If agreed by Building Ministers, the new requirements will apply to hospitals and other health and aged care facilities.

4.5.3 Travel and transport

Transport is a significant contributor to health system emissions. Emissions from vehicles owned or controlled by hospitals and the health system are accounted for in either scope 1 (for fuel use), or in scope 2 (for electricity use when electric vehicles are charged from the healthcare organisation's purchased energy). Emissions associated with vehicles not owned by the health system, such as employee commuting, and supply chain transportation, largely fall into scope 3. Finally, emissions associated with patient travel to and from health and aged facilities (excluding owned or leased vehicles, such as ambulances) are generally considered to fall outside of scopes 1, 2 and 3.[152] Travel and transport includes air as well as road transport. When it produced a 2015 baseline estimate of its scope 1 and scope 2 emissions, Ambulance Victoria estimated that air transport contributed 33% of greenhouse gas emissions, with road transport contributing 37% and emissions from buildings contributing 30%.[153]

While a detailed measurement of the contribution of patient travel to the Australian health system's emissions footprint is yet to be undertaken, it is important to consider, as a component of the functioning of the health system. For example, emissions footprinting data from NSW Health shows that patient, staff and visitor travel comprises 13% of the Central Coast Local Health District's total emissions and 24% of Nepean Hospital's total emissions.[154] Accounting for patient travel is also important in capturing the emissions reductions from increased clinically appropriate use of telehealth and hospital in the home services. First Nations people in remote locations will face different challenges compared to Australians living in urban locations. Targeted action is necessary to ensure challenges in remote locations are adequately addressed.

Road traffic contributes to harmful air pollution and noise pollution, causing health issues, especially for communities living near high-traffic areas.[155] Research from the University of Melbourne suggests that there are more than 11,000 premature deaths (adults), 12,000 cardiovascular hospitalisations and 66,000 cases of asthma (among 0-18 years olds) from motor vehicle air pollution in Australia each year.[156] Transitioning to vehicles with advanced emissions control systems and the use of cleaner liquid fuels can reduce harmful noxious emissions, reduce greenhouse gas emissions, and improve population health. Furthermore, greater promotion of active travel and public transport for patient and staff travel could result in increased physical activity, leading to improved physical and mental well-being.[157] Physical activity and active travel are discussed in further detail in Chapter 6.

Areas for action in the travel and transport space (summarised also in Figure 10) are:

- **Electrifying fleet vehicles:** Switching from internal combustion engines to electric vehicles will reduce greenhouse gas emissions from fossil fuel combustion as the electricity grid decarbonises. The Government has a Net Zero Australian Public Service by 2030 target, which includes 75% low emissions vehicles for Commonwealth fleet new passenger vehicle purchases and leases by 2025.[158] Many states and territories have set electric vehicle targets and taken action to support vehicle electrification. Net zero ambulance prototypes as well as mental health response vehicles have now been launched and piloted through the National Health Service in England.[159]
- **Delivering care closer to home where clinically appropriate:** Telehealth and Hospital in the Home can provide outpatient care for patients that is clinically appropriate, more accessible and more convenient for patients, while reducing patient travel emissions. In response to the COVID-19 pandemic, the Australian Government introduced temporary telehealth Medicare Benefits Schedule (MBS) items to ensure safe access to health care. Telehealth accounted for 14% of specialist consultations across Australia from March to September 2020. A review and survey conducted by the Royal Australasian College of Surgeons found patients felt telehealth services saved time and money and improved access to specialty care; 94% of patients said they were satisfied with the quality of their telehealth consultation.[160] The Virtual Clinical Care Centre is an effort by NSW Ambulance to manage the increased volume of emergency calls, especially during heightened demand such as the COVID-19 pandemic and the NSW North Coast floods. The Centre facilitates advance handling of low acuity cases, ensuring emergency resources are prioritised for critical situations, while providing care guidance to others.[161] The Medicare Benefits Schedule Review Advisory Committee has conducted a Post Implementation Review of Telehealth MBS items and considers it appropriate the Government continues supporting the better uptake of telehealth where quality and safety standards can be met.
- **Changing modes of delivery of medicines, medical supplies and community visits:** Not all courier services or community visits need to be undertaken in a motor vehicle. NHS trusts across England have been piloting alternative modes of travel and transport. For example, chemotherapy medicines are now delivered to hospital sites via cycle couriers in Oxford University Hospital NHS Foundation Trust and by drone from Queen Alexandra Hospital in Portsmouth to St Mary's Hospital on the Isle of Wight.[162]
- **Supporting active travel among staff and patients:** Interventions to support zero emissions staff travel include showering, changing and locker facilities, and salary sacrifice schemes for bicycles. Increased active travel is associated with improved staff physical and mental health and wellbeing and can also lower staff sickness and absenteeism.[163]
- **Working with local councils and state and territory governments to improve public transport options to health and aged care facilities:** Walking or cycling to health and aged care facilities may not be possible or practical, including because of disability and/or long distances from services. Furthermore, almost 700,000 households in Australia do not have a motor vehicle and therefore driving to health and aged care facilities may not be an option.[164] Improving public transport options to health services will improve access and reduce inequities. It can also reduce health system emissions from staff and patient travel as public transport becomes cheaper and more convenient.

The Australian Government launched the National Electric Vehicle Strategy in 2023.[165] This Strategy builds on existing state and territory electric vehicle targets and will support the efforts of state and territory health systems to electrify their vehicle fleets by introducing the national fuel efficiency standard, a key intention of which is to increase the availability of affordable electric vehicles in Australia.

FIGURE 10: DECARBONISING TRAVEL AND TRANSPORT

Case Study 10

Royal Melbourne Hospital telehealth program

The advent of telehealth, accelerated by the COVID-19 pandemic, has transformed healthcare. Telehealth is a promising avenue for curbing emissions linked to patient travel, while also fostering patient-centred care closer to home where clinically suitable. The telehealth team at Royal Melbourne Hospital facilitated over 83,000 outpatient telehealth appointments between January and November 2022, effectively circumventing the need for many patients to travel for in-person consultations. These appointments avoided 12 million km of patient travel, equal to 2.4 kt of CO_2-e emissions.

With patients and accompanying support persons required to wear N95 masks at RMH, during this time an estimated 100,000 N95 masks were saved, corresponding to emissions savings of 6.7 tonnes of CO_2-e and cost savings of $154,000. These savings also allowed redistribution of N95 masks during a time of acute shortage.

ACTION 4.11

Sharing best practice in reducing ambulance emissions

The Australian Government and the Council of Ambulance Authorities will work together to promote knowledge sharing and data collection among state and territory ambulance services and other patient transport providers, also drawing on international experience, to adopt best practices in reducing emissions from ambulance services and to measure and report on progress.

4.5.4 Medicines and gases

This section considers medicines and gases that generate greenhouse gases at the point of use – in particular, anaesthetic gases and pressurised metered dose inhalers (pMDIs) – which are significant contributors to health system emissions. Reducing emissions of all medicines is addressed in other sections, through the inclusion of emissions considerations in Health Technology Assessments, tackling overprescribing, and reducing emissions in the supply chain.

Anaesthetic gases delivered through inhalation (known as volatile anaesthetics) include hydrofluoroethers (sevoflurane and desflurane), chlorofluorocarbons (isoflurane) and nitrous oxide.[166] Pressurised metered dose inhalers (pMDIs) are prescribed to patients to treat respiratory illnesses, including asthma and chronic obstructive pulmonary disease, and use hydrofluorocarbon propellants.[167] Both nitrous oxide and fluorinated gases have a very high global warming potential compared to CO_2.

Fortunately, there are safe and effective environmentally sustainable alternative inhalers and anaesthetic gases that are clinically appropriate (and support high-quality care) for many patients. Emissions from pMDIs can first be supported by ensuring respiratory patients are receiving high-quality, evidence-based care, through correct diagnosis, use of preventive medication and avoiding risk factors. Then, where clinically appropriate, pMDIs can be switched to dry powder inhalers and soft mist inhalers, which have a significantly smaller emissions

footprint than pMDIs. The National Asthma Council Australia recommends pMDIs for young children and people with severely limited inspiratory capacity.[168] However, for most people, a switch to dry powder inhalers can assist in reducing emissions without compromising patient care. Consumer engagement on the health and environmental benefits of switching to a dry powder inhaler will be an important aspect of making this switch. This would reduce emissions given pMDIs constitute the bulk of the several million inhalers used annually in Australia.[169]

Desflurane is an inhalational anaesthetic with a 100-year global warming potential over 2500 times that of CO_2. It also has a global warming impact around 13 times greater than that of sevoflurane, another anaesthetic gas used for similar clinical indications, with no proven clinical benefit to using desflurane over sevoflurane or other agents.[170,171] Desflurane use has also been found to be significantly more expensive than alternatives. Although desflurane is (like other fluorinated anaesthetic gases) not reportable under the Paris Agreement and therefore not part of Australia's National Greenhouse Accounts, given it makes a significant contribution to health system emissions and clinically safe alternatives are available, its phase-out is an important priority in reducing Australia's health system emissions.

In 2021, Alfred Health in Melbourne became one of the first health services in Australia to stop using desflurane. They found that between 2012 and 2018, they purchased an average of 336 desflurane bottles per annum, meaning removing desflurane would save 290 tonnes CO_2-e per annum compared to use over these years and provided the hospital a cost saving of $22,491 in 2021 alone. In October 2023, WA Health became the first public health jurisdiction in Australia to remove desflurane from its state-wide medicines formulary (case study 11).[172]

Case Study 11

Removing desflurane from WA Health Medicines Formulary

In October 2023, WA Health became the first public health jurisdiction in Australia to remove desflurane from its Statewide Medicines Formulary. This outcome formalised a clinician led movement over several years which focussed on education, engagement, and advocacy to raise awareness of the environmental impact of desflurane and reduce its use at individual hospitals and health services. Regular monitoring of desflurane use over five years indicated there had been a widespread shift to lower carbon anaesthetic alternatives and, importantly, no adverse clinical outcomes.

As momentum grew, it became important to embed the change at a system level to safeguard it for the future and help demonstrate WA Health's commitment to low carbon and environmentally sustainable healthcare. A submission seeking the removal of desflurane from the Formulary – supported across multiple disciplines, including anaesthetists, theatre staff, Heads of Departments, pharmacists and sustainability officers – was presented to and accepted by the WA Therapeutic Advisory Group and the WA Drug Evaluation Panel. It is estimated that, annually, removal of desflurane from the state formulary saves $750,000 and reduces emissions by around 1,800 tonnes of CO_2-e.

©WA Department of Health

As presented in section 4.1.4 above, medical nitrous oxide use contributes 20% of the total Australian health system Scope 1 emissions, according to National Greenhouse Accounts data. Nitrous oxide is widely used in birthing suites, paediatric and adult operating theatres, and emergency departments, as well as dental, skin care, and veterinary clinics. A study of nitrous oxide use in Footscray Hospital found that there was a 77% discrepancy between the volume procured and the volume used due to leakage from piped manifold systems.[173] Similar discrepancies have also been found in the UK. The Queensland Government Statewide Anaesthesia and Perioperative Care Clinical Network has produced a series of recommendations on reducing nitrous oxide emissions, which include avoiding use of nitrous oxide where possible, avoiding installing new nitrous oxide piping and decommissioning existing piping.[174] Emissions reductions from nitrous oxide use are also possible by tackling 'venting', the practice of releasing unused nitrous oxide when cannisters are returned for refill.

ACTION 4.12

Reducing emissions from desflurane

The Australian Government will work with the Australian and New Zealand College of Anaesthetists, the Australian Society of Anaesthetists and states and territories to significantly reduce use of desflurane, including by agreeing a date by which its use will be phased out.

ACTION 4.13

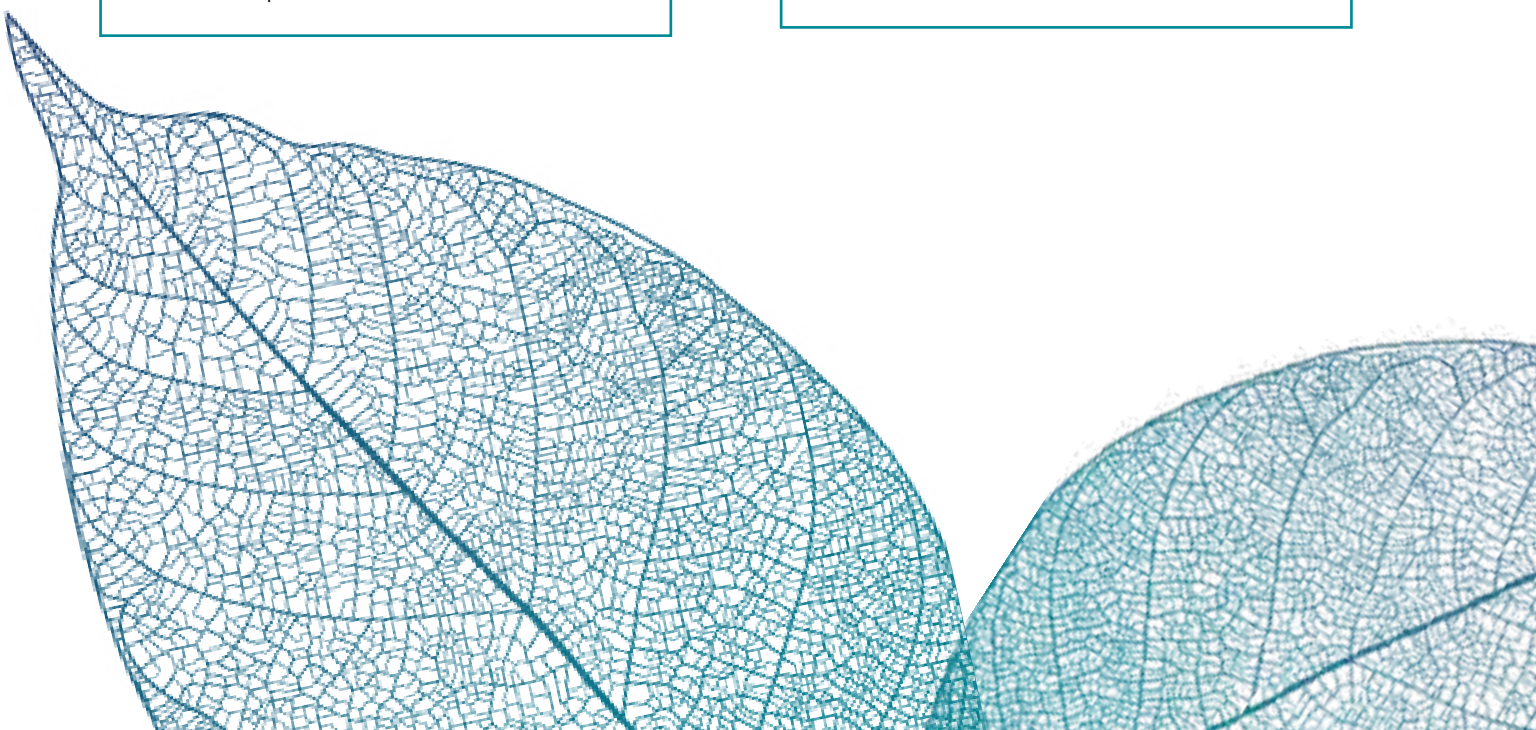
Reducing emissions from nitrous oxide

The Australian Government will work with the Australasian College for Emergency Medicine, the Australian and New Zealand College of Anaesthetists, the Australian Society of Anaesthetists, the Australian Nursing and Midwifery Federation, the Royal Australian and New Zealand College of Obstetricians and Gynaecologists, states, territories, industry and suppliers to improve patient care, protect health care staff and reduce greenhouse gas emissions from nitrous oxide gas, both by reducing wastage from leaks and venting and by educating on appropriate use.

ACTION 4.14

Reducing emissions from respiratory inhalers

The Australian Government will work with Asthma Australia, National Asthma Council of Australia, Lung Foundation of Australia, Thoracic Society of Australia and New Zealand, Royal Australian College of General Practitioners and industry to improve respiratory health outcomes and reduce greenhouse gas emissions from respiratory inhalers.



4.5.5 Food and catering

Food and catering are a substantial contributor to health and aged care emissions.[175] Reducing food- and catering-related emissions involves action in three broad areas: updating menus to include more nutritious low-carbon foods, eliminating food waste, and making sustainable food procurement decisions. Improved management of food refrigeration is an opportunity to reduce both scope 2 emissions from energy use and scope 1 emissions from refrigerants, as well as reduce food waste.

The Australian Dietary Guidelines are the key source of information for the types and amounts of food people need to eat for good health and wellbeing, reduce risk of chronic disease and prevent deficiency. The Australian Dietary Guidelines inform policy for food and beverage provision in health and aged care services. In section 6.5, we discuss action the Australian Government is taking to update these Guidelines to consider sustainability.

The second area of action is to reduce and effectively manage food waste. 7.6 million tonnes of food are wasted across in Australia each year and food waste is responsible for 3% of Australia's greenhouse gas emissions.[176] Food waste also causes unnecessary use of water and land to grow food that is never consumed. In the 2017 National Food Waste Strategy the government set a goal to halve the country's food waste by 2030.[177]

The final area of action is food procurement. Health and residential aged care services can reduce food and catering emissions by purchasing locally and sustainably produced food wherever possible, engaging with suppliers to reduce packaging, and encouraging sustainable practices in food cultivation, manufacture, distribution, and waste management.[178]

ACTION 4.15

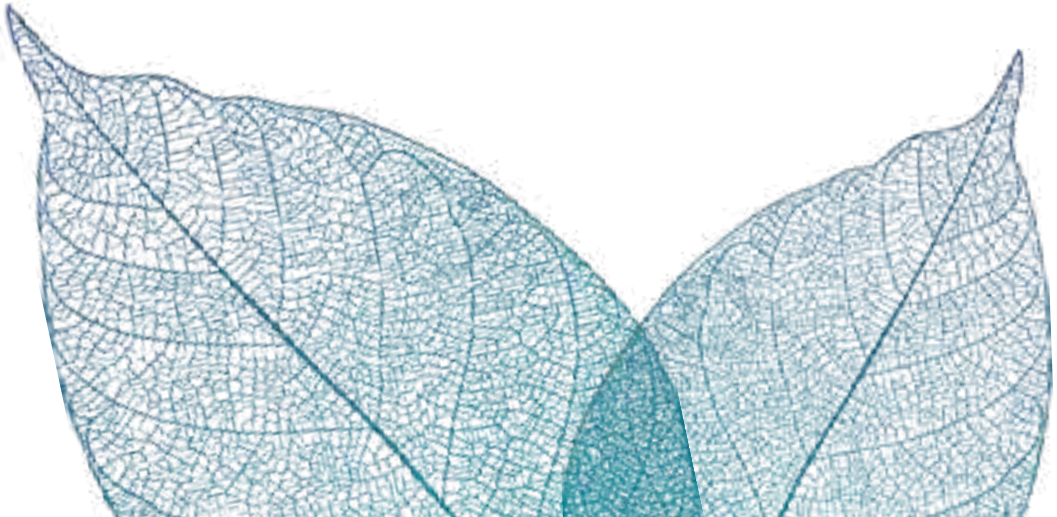
Review of nutrition standards in health care

The Australian Government will commission and publish a review of how sustainability is currently considered in state and territory policies on food access, availability and procurement in hospitals, and may consider relevant policies internationally. This review could inform guidance on food provision with the public hospital system.

4.5.6 Waste and resource use

The health system generates multiple waste streams, both non-hazardous (such as food, drink and used hand towels) and hazardous (including clinical waste – defined as waste contaminated with bodily fluids, chemicals or pharmaceuticals, such as discarded sharps, intravenous fluid and unused medicines – and anatomical waste). The emissions footprint of this waste depends on the type of waste and the method of disposal, which can include recycling, compost, landfill and incineration. For example, hazardous waste has a high emissions footprint as it requires extra processing, including high temperature incineration or chemical decontamination.[179]

As a result of the 2018 National Waste Policy and the 2019 National Waste Policy Action Plan, the Australian Government is working to reduce and manage waste Australia-wide.[180,181] This includes commitments to recover 80% of all waste by 2030, phase out problematic and unnecessary plastics by 2025, and halve the amount of organic waste sent to landfill by 2030.



Work is already underway to reduce health system waste in many Australian states, territories and health services. For example, NSW Health has developed a five-year sustainable waste management plan with the goal of diverting 80% of waste away from landfill.[182] Further efforts are underway in line with the waste hierarchy shown in Figure 11. These include:

- **Reduce** packaging and use of disposable items when they are not clinically indicated. A 'Gloves Off' project, to reduce use of non-sterile gloves when there is no benefit to patients or workers, is being trialled in John Hunter Hospital in NSW,[183] inspired by a similar project at Great Ormond Street Hospital in London which saved 21 tonnes of plastic and £90,000.[184]
- **Reuse** medical devices, such as surgical and anaesthetic instruments and personal protective equipment or PPE (including surgical and isolation gowns and face masks). A recent study found switching from single-use anaesthetic equipment to reusables across six operating rooms in Western Health in Victoria would result in annual savings of $32,000, along with an 84% reduction of CO_2-e emissions if accompanied by decarbonisation of the electricity grid in line with the current UK and EU power mix.[185] A different study found introducing reusable isolation gowns in the Intensive Care Unit in Western Health in Victoria could result in a 95% reduction in solid waste, a 41% reduction in CO_2-e, and a $1 saving per gown use.[186] This study was undertaken during COVID-19, when single use gowns were more expensive due to high demand and low supply. There remain cost challenges supporting the switch from disposable gowns to reusables (see case study 12), meaning more work is required to make reusable products more cost competitive.
- **Reprocess** medical equipment and devices. Reprocessing involves all the steps required to make a contaminated reusable or single-use device ready for patient use. The steps involved in reprocessing may include cleaning, functional testing, repackaging, relabelling, disinfection or sterilisation. The reprocessing of single-use devices involves strict requirements to avoid risk to patients and maintain high-quality care.
- **Refurbish** and reuse equipment. Walking aids given to patients for acute or short term use – for example, walking sticks, crutches and walking frames – can be returned, cleaned, refurbished and reused.
- **Recycle** equipment that cannot be reused. Imperial College Healthcare NHS Trust in London is working with PPE manufacturer Globus Group to recycle disposable face masks into new products, such as operating theatre clogs, plastic bed pans and disposable syringes.[187]
- **Replace** disposable plastic products with more biodegradable alternatives, which are then properly composted, rather than sent to landfill. For example, South West Healthcare in Victoria has replaced single use plastic items with compostable alternatives, such as compostable injection trays, kidney dishes, denture pots and lids and anaesthetic trays.
- **Waste segregation** to reduce the amount of waste requiring emissions-intensive specialised treatment, for instance incineration. Improving waste segregation is fundamental for the appropriate management and reduction of emissions from waste streams. The Victorian Department of Health provides a range of resources to support staff to manage their waste effectively, including waste audit guidelines, information on polyvinyl chloride (PVC) recycling, waste and recycling signage and guidance to clinical staff.[188]

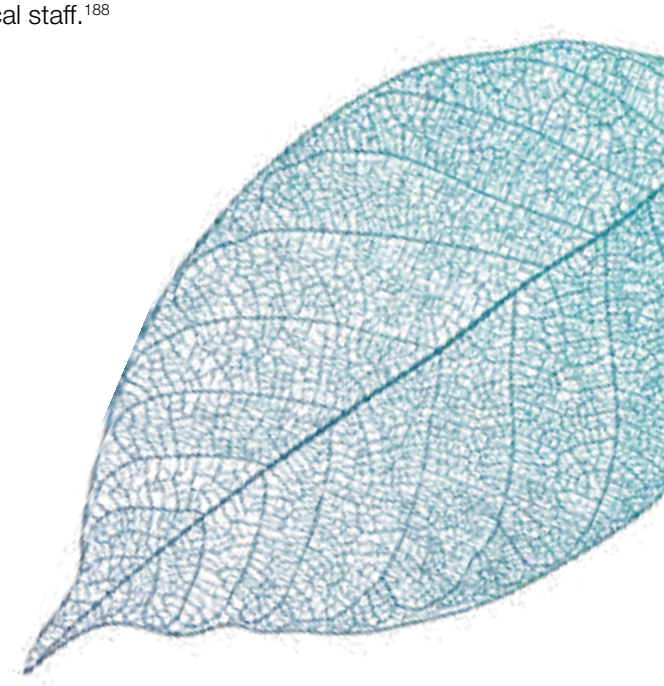
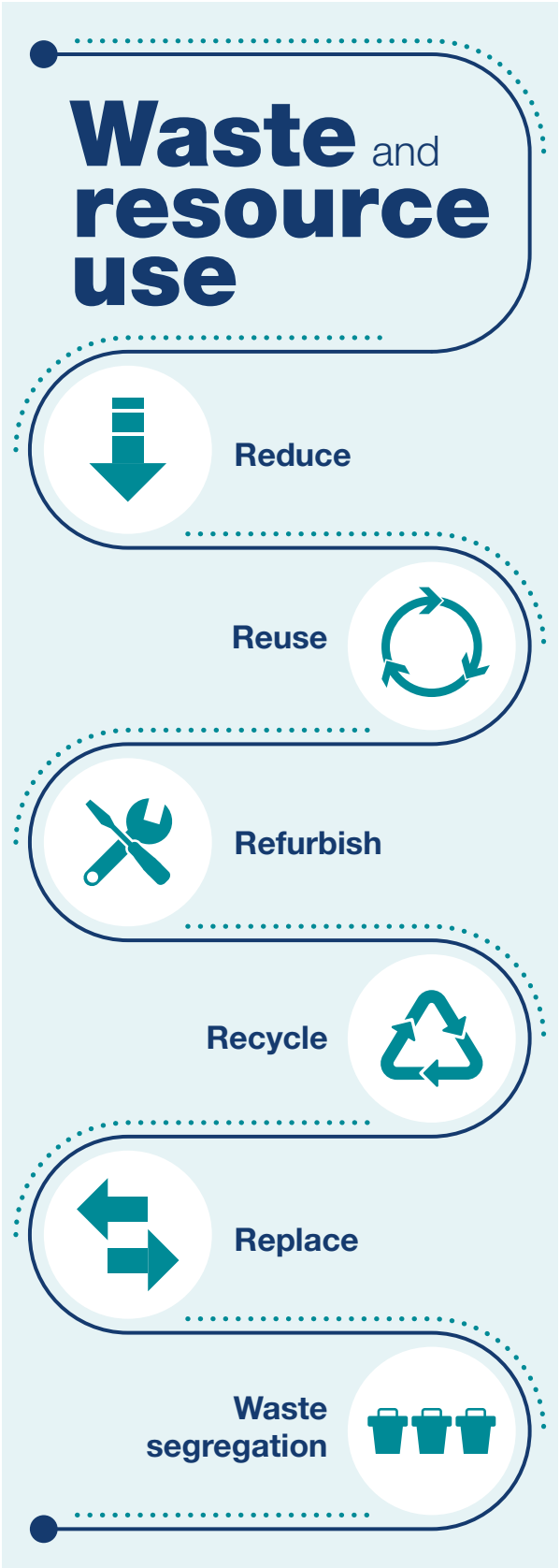


FIGURE 11: WASTE AND RESOURCE USE



Case Study 12

Reusable hospital gowns: spotlight on Barwon Health

While efforts are underway to reduce health sector emissions, health workers are advocating for procurement guidelines which maximise health outcomes while minimising both emissions and cost.[189] Barwon Health and Deakin University examined the potential environmental and economic benefits from changing from single-use to reusable isolation gowns (an item of personal protective equipment designed to protect healthcare workers and patients from transfer of body fluids and microorganisms).

A life cycle assessment was conducted to assess the greenhouse gas emissions and solid waste associated with both gown types. The emissions produced by each gown type were monetised using the World Bank 'social cost of carbon',[190] added to the financial cost of the gowns to give a total cost.

Reusable gowns were guaranteed for 100 wash cycles. Allowing for losses, one reusable gown was assumed to replace approximately 90 single use gowns. Reusable gowns were found to have substantial environmental benefits with 96% less solid waste and at least a 42% smaller emissions footprint over five years. The emissions savings from reusable gowns would be further increased by powering the laundries with renewable electricity (the study assumed the current Victorian energy mix in which brown coal predominates) or by using zero emission trucks to transport the gowns. This combination could lead to an 88% emissions reduction over five years.

The cost per use of reusable gowns was estimated to be more than that of single-use gowns, based on available quotes and costs for the study. Including monetised environmental damages did not significantly change the cost differential. A proportion of this price was estimated to be attributed to the transport costs moving gowns from the hospital to the laundry facility. A frequent review of costs of both gown types, bundling into a larger linen contract, and shorter travel distances between laundries and hospitals could see the reusable gowns being more cost competitive.

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Many medical products contain PVC and other halogenated materials that produce toxic and persistent organic pollutants (POPs) such as dioxins, furans and polychlorinated biphenyls in small quantities when burned.[191] Australia has committed to eliminate POPs under the Stockholm Convention. Medical waste incineration facilities can use best practice pollution elimination technologies to reduce these and other emissions such as those from black carbon (which also acts as a short-lived climate pollutant), and oxides of nitrogen.

In 2022, the Minister for the Environment and Water included Plastics in healthcare products in the 2022-23 Minister's (Product Stewardship) Priority List.[192] The Minister's priority list identifies the products and materials considered most in need of industry-led product stewardship action.

The carbon and environmental impact of waste can also be tackled through engagement with suppliers. Health and aged care procurers can engage in dialogue with manufacturers and ensure contracts and tendering processes incentivise circularity concepts, such as reuse, refurbishment and recycling. This is discussed further in the next section.

ACTION 4.16

Supporting the systematic implementation of waste reduction action

The Australian Government will commission and publish a review of the potential ways in which health and aged care waste can be reduced, reused, refurbished, recycled, replaced and segregated and how these changes can be implemented. This review will then feed into the green procurement and sustainable resource use guidelines and further resources for health and aged care facilities and staff.

4.5.7 Supply chain

Around 70% of the health system's global emissions footprint is derived from the supply chain, including but not limited to the production, transport and disposal of health-related goods such as medicines.[193] Health and aged care organisations are well placed to leverage their considerable purchasing power to influence manufacturers to improve and report on the environmental performance and the emissions footprint of the products they purchase.

A large proportion of items purchased in Australia's health system come from the same international suppliers (for example, pharmaceutical, medical imaging and other medical technology companies), who also supply to other international health systems. Aligning health system procurement requirements would represent a larger share of the market, which would strengthen the requirements of suppliers from each individual health system and reduce the reporting burden of companies as they develop and implement their own net zero plans.

Ensuring resilience of health system supply chains is discussed in section 3.4.3. International collaboration to decarbonise health system supply chains is discussed in section 5.1.

ACTION 4.17

Promoting green procurement and sustainable resource use

The Australian Government will develop guidelines on green procurement and sustainable resource use in consultation with states, territories, industry and suppliers.

05

Collaborating internationally to build sustainable, climate-resilient health systems and communities

OBJECTIVE 3

International collaboration

Collaborate internationally to build sustainable, climate-resilient health systems and communities. The Strategy will identify opportunities for knowledge sharing and the development of international standards as well as highlight the ways Australia can support its neighbours to protect and promote health in their climate change responses.

Climate change is a global problem. Addressing climate change effectively requires working with other nations. There are also limits to what Australia can achieve on its own. For example, Australia's small share of the global medicines and medical device markets limits its ability to impose new sustainability-driven requirements and standards on international manufacturers. However, by collaborating with other jurisdictions to align requirements and standards we can achieve more rapid change, while at the same time minimising the burden on manufacturers and suppliers.

The COVID-19 pandemic highlighted the significant interdependencies between nations in managing disease threats that cross national borders and maintaining critical health supply chains. Climate change is already increasing existing pressures in these areas, and mitigating the risks to health which may arise from these pressures will require close international cooperation and alignment. For example, communicable diseases could spill across borders into previously unaffected regions and nations due to the direct and indirect effects of climate change. Climate-related drought, heatwaves, wildfires and changing seasonal patterns, can affect food production in major regional and global food bowls, with flow-on effects on food security and nutrition around the world. To mitigate risks from these climate impacts, frequent, transparent and effective international knowledge sharing and collaboration will be required.

Initially formed to share information about work in COVID-19, an international collaboration between like-minded health technology assessment bodies was established in 2021. This international collaboration, which spans Australia, Canada, New Zealand and the United Kingdom, is exploring the feasibility of sharing the work to support decision making, identifying and preparing for the opportunities and challenges of the future.[194]

Two of the members of the international collaboration, the National Institute for Health and Care Excellence and the Canadian Agency for Drugs and Technologies in Health, are exploring how to incorporate environmental considerations in health technology assessment processes.[195,196] The inclusion of environmental considerations in these processes could be helpful in making decisions on medicines and medical technologies when other factors, such as clinical outcomes and cost-effectiveness, are equal.

ACTION 5.1

Considering the role for emissions footprinting of health technology products

The Australian Government will, in consultation with industry and other relevant stakeholders, review options for including public reporting and consideration of environmental impacts, starting with greenhouse gas emissions, of health technologies, in collaboration and alignment with international best practice in comparable jurisdictions.

5.1 International responses to health and climate change

Many of Australia's closest allies and partners around the world have well-advanced programs and policies to increase the sustainability and climate-resilience of their health systems. In

Canada, the HealthAdapt Program helps the health sector prepare for and respond to the impacts of climate change.[197] In New Zealand, climate change is now a priority in the Te Pae Tata Interim New Zealand Health Plan 2022, and work is underway to address three focus areas: health system decarbonisation, environment in all practices, and health system resilience and adaptation.[198]

Each of the National Health Services of England, Scotland and Wales have published health and climate change strategies.[199,200,201] The National Health Service in England has developed a supplier roadmap for its domestic and international suppliers and is also collaborating with the United States Department of Health and Human Services to align procurement requirements for suppliers (case study 13).

Case study 13

Decarbonisation of international supply chains

In 2020, the National Health Service (NHS) in England published its 'Delivering a Net Zero National Health Service' report, where it committed to reducing its greenhouse gas emissions to net zero by 2045. The supply chain, including medicines and medical equipment, accounts for over 60% of the NHS's total emissions.[202]

After consulting with suppliers, in 2021 NHS England published its supplier roadmap to help suppliers align with its net zero target. This roadmap presents requirements for all contracts over a certain value that increase through to 2030, including a minimum 10% net zero and social value weighting in procurement decisions; a requirement that suppliers publish a carbon reduction plan; public reporting of targets and emissions by suppliers; and, from 2027/28, emissions footprinting of individual products supplied to the NHS.[203]

In recognition that health supply chains are international in nature and that many suppliers provide goods and services to more than one national health system, NHS England and the United States Department of Health and Human Services have announced an intention to collaborate to align health system procurement requirements.[204]

ACTION 5.2

Collaborating to decarbonise international supply chains

In working to decarbonise health system supply chains, the Australian Government will work with the international collaboration between the English National Health Service and the United States Department of Health and Human Services to develop aligned procurement requirements to decarbonise health system supply chains.

There has also been increasing engagement on health and climate change in international fora. The Alliance for Transformative Action on Climate and Health (ATACH) was established as a platform for coordination and collaboration to support countries who have made climate resilient and sustainable health systems commitments, initially through the COP26 Health Programme in Glasgow.[205] ATACH, which has 76 nation states as members as of November 2023, monitors and shares knowledge and coordinates action in five key areas:

- Climate Resilient Health Systems
- Low Carbon Sustainable Health Systems
- Supply Chains
- Financing the Health Commitments on Climate Resilient and Low Carbon Health Systems
- Climate Action and Nutrition.

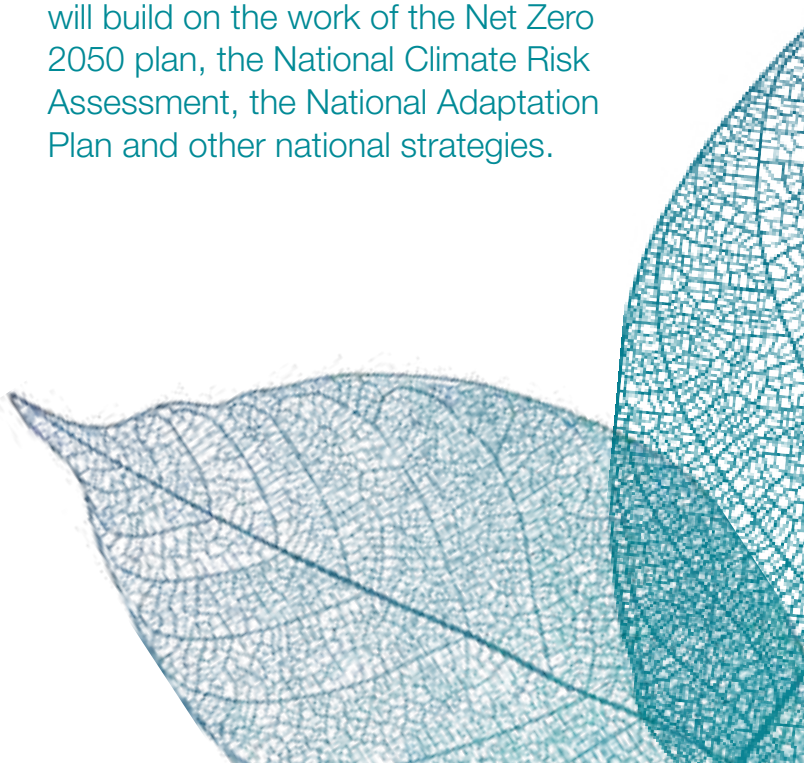
ACTION 5.3

Alliance for Transformative Action on Climate and Health

The Australian Government will join and actively participate in the Alliance for Transformational Action on Climate and Health.

5.2 International cooperation under the Paris Agreement

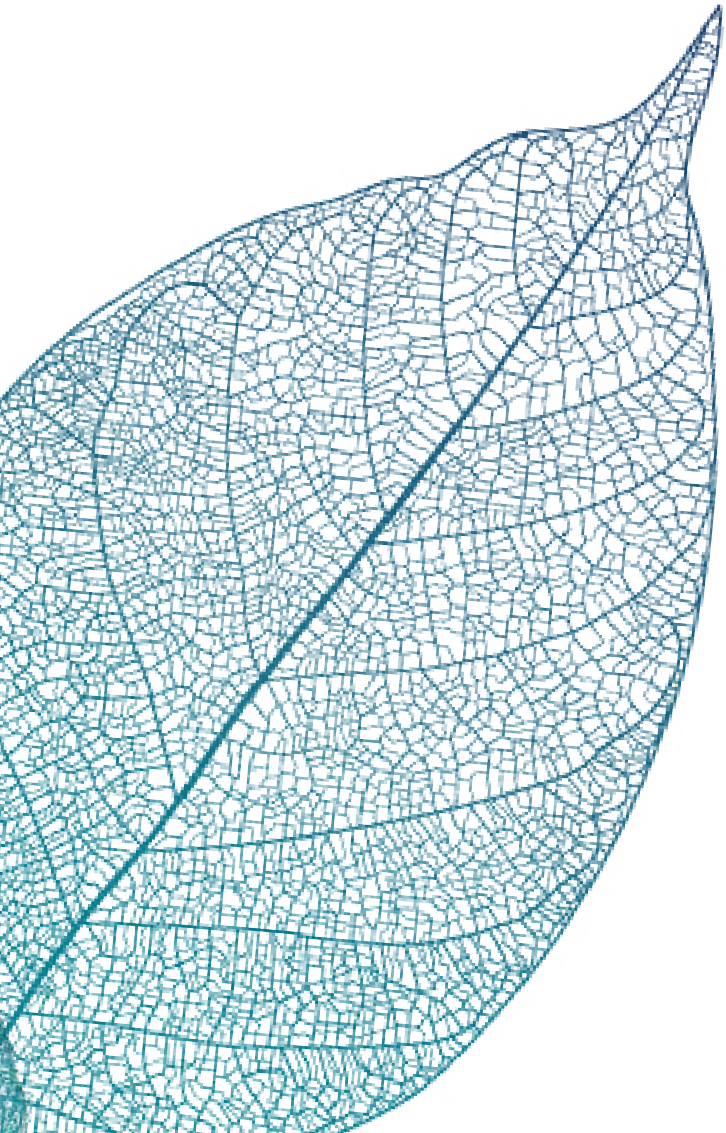
The Paris Agreement set the goal of limiting the global average temperature rise to well below 2°C above pre-industrial levels and pursuing efforts to limit temperature increase to 1.5°C. Parties, including Australia, must make submissions (known as Nationally Determined Contributions or NDCs) outlining how they will contribute to achieving this goal. NDCs communicate plans for emissions reduction and climate change adaptation and must be updated every five years with increasing ambition, based on each country's capabilities and capacities. Australia submitted its first NDC in 2015 and submitted an update in 2022. Australia's second NDC submission, due in 2025, will build on the work of the Net Zero 2050 plan, the National Climate Risk Assessment, the National Adaptation Plan and other national strategies.



ACTION 5.4

Incorporating health considerations into Australia's next Nationally Determined Contribution under the Paris Agreement

The Australian Government is considering options for how its next Nationally Determined Contribution under the United Nations Framework Convention on Climate Change, due for submission in 2025, could highlight its strong action to reduce emissions from the health system and improve resilience to climate impacts.



5.3 Australia's international development program

Climate action is at the heart of Australia's new International Development Policy 2023.[206] The Policy makes a commitment to working together with our partners in Australia and overseas to better address climate change. New climate targets will ensure Australian development assistance tackles climate impacts. All bilateral and regional Development Partnership Plans will consider climate risk and at least half of all new bilateral and regional investments will have a climate change objective from 2024-25, with a goal of reaching 80% in 2028–29.

Climate change is a cross-cutting theme for Australia's new five-year $620 million Partnerships for a Healthy Region Initiative, recognising the importance of the intersection between climate change and health. The initiative aims to enhance the capacity of partners to understand good practice and models to integrating climate change across public health investments, with all partnership initiatives addressing climate change.[207]

Engagement with our Pacific neighbours is particularly important to Australia's climate change collaboration. Australia endorsed the 2050 Strategy for the Blue Pacific Continent as a framework to take a strategic and long-term approach to Pacific regionalism.[208] As described below, Australia has partnership programs with several Pacific countries, including Nauru, Kiribati, Solomon Islands, Tonga, Papua New Guinea, as well as Southeast Asia neighbours, including Timor-Leste, Cambodia and Indonesia. At the Pacific Islands Forum 2023,

the Australian Government committed to increase financial aid to Pacific nations facing climate threats, including through contributions to funding for the Green Climate Fund and the new Pacific Resilience Facility. Australia will also contribute at least $350 million in climate infrastructure for the region via the Pacific Climate Infrastructure Financing Partnership, helping to build resilience in the face of a changing climate.[209]

5.3.1 Health systems

The Australian Government is providing support to priority countries to develop climate-resilient health systems which are efficient, responsive and protect population health in an unstable and changing climate. Key programs include:

- Our $266 million three-year contribution to the Global Fund to Fight AIDS, Tuberculosis and Malaria, through which Australia is supporting 50 of the countries most susceptible to climate change, addresses the impact of climate change on these diseases and builds low-carbon, climate-resilient health systems.[210] The work of the Global Fund includes activities such as assessing the impact of climate change on malaria transmission, assessing the threat of climate-related drug and insecticide resistance, championing environmentally sustainable sourcing and supply of medical commodities, and strengthening emergency response capacity.
- The Government's Australia-Pacific Climate Partnerships program, which is providing specialist technical assistance on climate and health to investment design teams for health programs in Nauru, Kiribati, Solomon Islands and Tonga. The program has also supported an analysis of the impact of climate change on mental health in the Pacific.[211]
- In Papua New Guinea, Australia is supporting an assessment of key climate risks and opportunities in the country's health sector to guide development of the Papua New Guinea Government's next Health Portfolio Plan.
- Australia also supported the Kiribati Ministry of Health and Medical Services to review the Draft Kiribati National Environmental Health and Climate Change and Health Action Plan 2020–2023.

5.3.2 Food security

While climate change is not the only force at play shaping food security and nutrition in the Indo-Pacific, it is exerting increasing pressure on already stressed food systems. Climate change affects food systems across all the dimensions of food and nutrition security. The potential result is increased food prices and the reduced availability of food.

The Australian Government provides support to help reduce the exposure of farmers to short-term climate risks, while also building resilience so they can cope with shocks and longer-term stresses. Adaptation is essential in both Asia and the Pacific, but particularly in the Pacific.[212] This involves finding and promoting climate-tolerant varieties of plants, improving soil condition and water efficiency and, more broadly, improving livelihoods and income opportunities within the food system.

Australian support also targets mitigation, aiming to reduce greenhouse gas emissions associated with agricultural production. This includes improved agricultural technologies and practices.

Key climate-resilient agricultural development initiatives include:

- **Pacific Food Security Initiative:** Australia has supported the Pacific Food Security Initiative with $9.5 million between 2020 and 2024, working in partnership with governments, regional organisations, the private sector, NGOs and other community partners to increase the availability and affordability of local, nutritious foods.[213] Such foods are vital for health and long-term wellbeing and can also generate significant local income and employment, boosting economic opportunities for rural communities and providing effective, sustainable pathways to build climate resilience.
- **Global Agricultural and Food Security Program:** Australia is a strong supporter of the Global Agriculture and Food Security Program,[214] providing $150 million between 2010 and 2024. The Program invests in sustainable and climate-resilient practices that reduce agriculture's climate footprint, strengthen farmers' resilience, and increase food production to meet current and future demand. Under the Program close

to USD1.7 billion has been invested since 2010 to assist some 153 million farmers in some of the world's poorest countries including Cambodia, Timor-Leste, Tuvalu, Kiribati and the Solomon Islands.

- **To'os ba Moris Di'ak/Farming for Prosperity (TOMAK):** The Australian Government has funded TOMAK with $50 million between 2016 and 2026. TOMAK is a 10-year (2016-2026) agriculture livelihoods program implemented in Timor-Leste, in partnership with Timor-Leste's Ministry of Agriculture, Livestock, Fisheries and Forestry and Ministry of Health, Secretary of State for Equality, municipal and local authorities, as well as NGOs and the private sector.[215] The program aims to increase the resilience of agriculture-based livelihoods, improve household food security and dietary diversity, and improve government policies, programs, and services. To achieve this, TOMAK examines food supply chains and the local food environment to support farming families, as well provide capacity development to its partners.

5.3.3 Water security

In some places, increasing droughts and extreme temperatures are leading to water scarcity and losses in agricultural production. In other places, unseasonal rainfall can lead to flooding that affects drinking water and threatens sanitation. Climate impacts are changing river courses, increasing snow melt and changing the distribution of rainfall, with serious impacts on communities and exacerbating existing inequalities. Climate change is adding to existing water insecurity across the globe.

Good hygiene practice in health care facilities is fundamental in providing quality care, especially for mothers, newborns and children. Globally, one half of health care facilities lack facilities to clean hands where care is provided or at toilets, one in five lack basic water services, and one in 10 have no sanitation services.

The Australian Government is investing in water resource management and water and sanitation programs to assist partner governments in the Indo-Pacific region build more resilient systems to support water security from the rapidly growing threat of climate change. This helps reduce the risk of water-borne diseases which are some of the most significant global health impacts of climate change.[216]

Key programs include:

Water for Women Fund

($159.9 million, 2018-2025)

Delivering 20 climate-resilient water, sanitation and hygiene projects across 16 countries in the Indo-Pacific region.[217]

Australian Water Partnership

($33 million, 2019-2024)

Mobilising Australian water sector expertise in support of Australia's development cooperation program. The Partnership is mainstreaming climate change across relevant activities[218] and supporting dedicated climate change initiatives, such as its Hindu Kush Himalaya Governance Program[219] and the Water Security and Climate Resilience in West Java project.[220]

Improving Climate Resilient Water, Sanitation, and Hygiene in East Asia and Pacific

($6 million, 2022-2025)

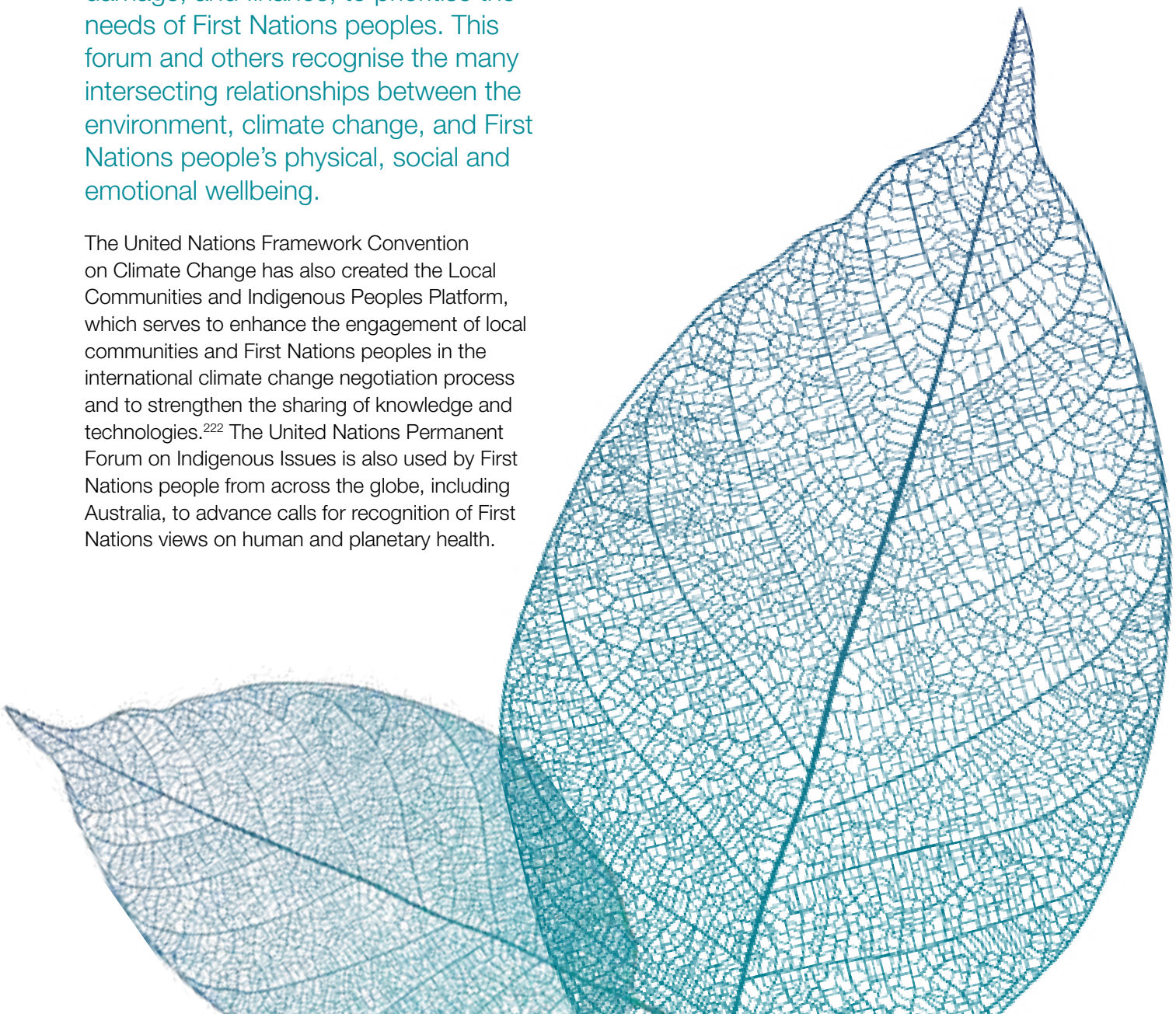
With UNICEF East Asia and Pacific Regional Office, supports climate resilient water, sanitation and hygiene in six countries: Cambodia, Indonesia, Timor-Leste, Papua New Guinea, Solomon Islands and Kiribati.

5.4 First Nations people and climate negotiations

At COP21 in Paris in 2015, First Nations representatives formed the International Indigenous Peoples' Forum on Climate Change,[221] to call for stronger international action on mitigation, adaptation, loss and damage, and finance, to prioritise the needs of First Nations peoples. This forum and others recognise the many intersecting relationships between the environment, climate change, and First Nations people's physical, social and emotional wellbeing.

The United Nations Framework Convention on Climate Change has also created the Local Communities and Indigenous Peoples Platform, which serves to enhance the engagement of local communities and First Nations peoples in the international climate change negotiation process and to strengthen the sharing of knowledge and technologies.[222] The United Nations Permanent Forum on Indigenous Issues is also used by First Nations people from across the globe, including Australia, to advance calls for recognition of First Nations views on human and planetary health.

First Nations representatives from Australia attend the annual United Nations climate conference. Delegations such as those supported by Australia's Indigenous Peoples Organisation have advanced the case for inclusion of First Nations people in climate decisions and solutions. They have also showcased local practices such as cultural burning as examples of First Nations knowledge contributing to climate change mitigation and adaptation.[223] Australia's First Nations leaders are also active in regional forums, such as the 2022 First People's Forum for Oceania, hosted by Girringun Aboriginal Corporation, which brought together First Nations leaders from across the Pacific to set First Nations climate priorities ahead of COP27.[224]



06

Supporting healthy, climate-resilient and sustainable communities through **whole-of-government action**

OBJECTIVE 4

Health in all policies

Support healthy, climate-resilient and sustainable communities through whole-of-government action which recognises the relationship between health and climate outcomes. The Strategy adopts a Health in All Policies approach, promoting the health co-benefits of emissions reductions across society and adaptation action beyond the health system to protect health and wellbeing from climate change.

The Australian Government is committed to protecting the health of people in Australia and the health of our environment. These commitments can be achieved synergistically, through an integrated, Health in All Policies approach that addresses the wider determinants, or 'building blocks', of both human and planetary health. Healthy, resilient, and sustainable food and agriculture, urban environments, buildings, and transport can help address the health impacts of climate change while also reducing emissions.

The Government is working to maximise the human and planetary health benefits of its wide-ranging climate mitigation and adaptation action. This aligns with the Health in All Policies approach that underpins this Strategy, which recognises that human health and health equity are shaped by factors beyond the scope of the health system.[225] This section outlines work across sectors and society to support healthier, more resilient and more sustainable communities in Australia's changing climate. Much of the action outlined in this section will have significant benefits in terms of both climate change mitigation, as well as in adapting to the health impacts of climate change.

Significant improvements in population health will be gained as a result of action to achieve Australia's commitment to net zero emissions by 2050. Positive health outcomes that arise from action to reduce greenhouse gas emissions are known as the 'health co-benefits' of climate change mitigation. These co-benefits tend to be experienced sooner than the benefits that will be experienced from slowing the pace of climate change, and they improve the health of people living and working in the places where the mitigation efforts have been made.[226] Evidence shows that co-benefits arise from mitigation interventions in sectors such electricity generation, household energy, land transport, and food and agriculture.[227] These correspond to key greenhouse gas emitting sectors, which have been identified to develop sectoral decarbonisation plans as part of the Government's Net Zero 2050 plan.[228]

6.1 Heat and heatwaves

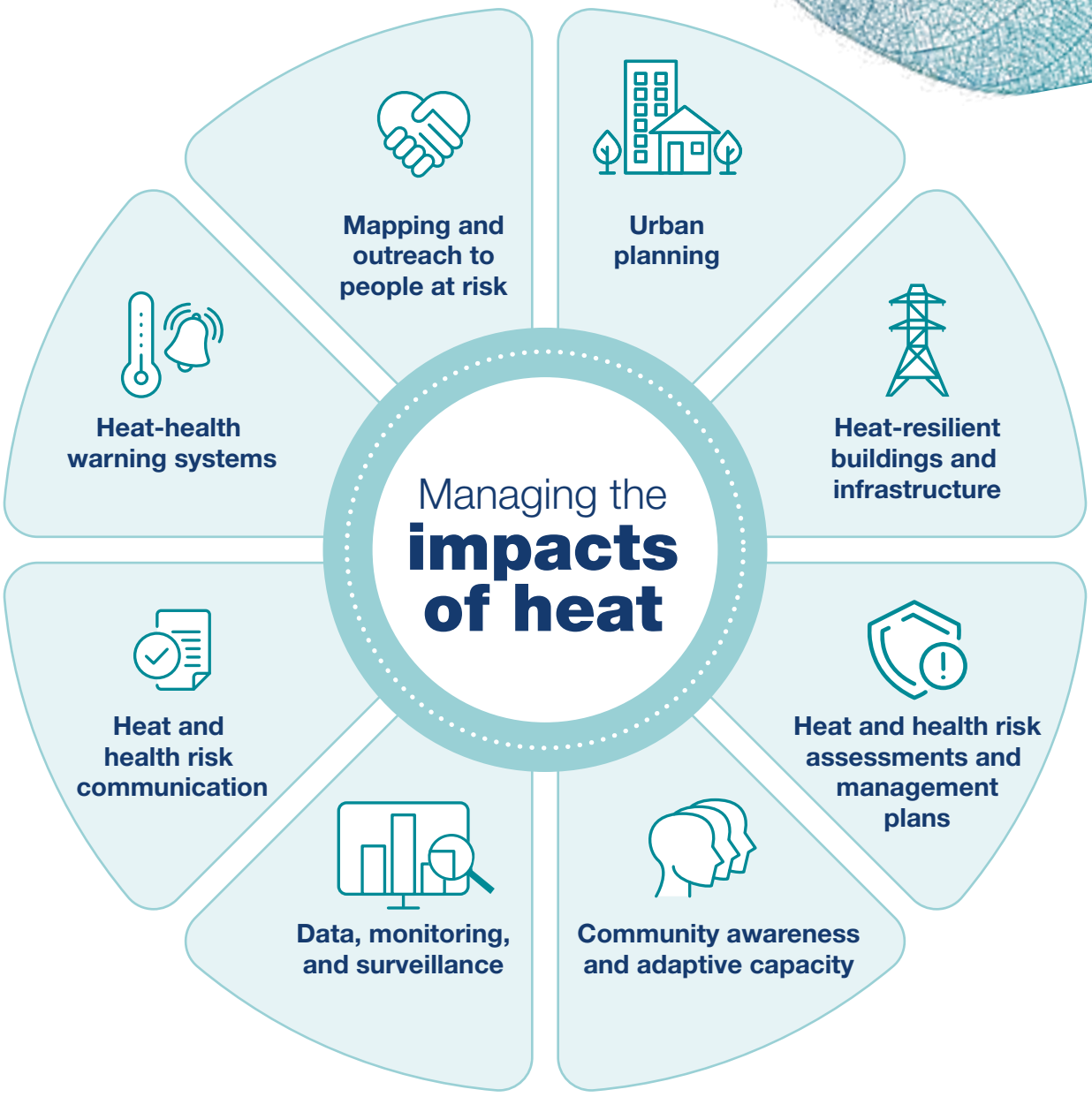
Heat is one of the most significant climate risks to health and wellbeing in Australia. Heatwaves already cause more deaths than any other natural hazard,[229,230] and the health risks associated with heat exposure will increase as temperatures rise, our population ages, and more people in Australia live and work in urban centres. Exposure to both extreme heat events, and to incremental increases in heat overall, are associated with increased morbidity and mortality – with flow on impacts on healthcare costs and productivity.

Adverse health outcomes from heat exposure include heatstroke, dehydration, increases in chronic disease, preterm births and still births, and mental ill-health.[231,232] Moreover, extreme heat can disrupt infrastructure, preventing people from safely accessing healthcare, medication, and other essential services. Groups at particular risk of experiencing heat-related illness include older people, outdoor workers, people with chronic conditions, pregnant women, children, people living in poorly insulated housing or remote communities, people with reduced mobility, culturally and linguistically diverse communities, refugees, and people experiencing energy poverty and/or social isolation.

Many of the adverse health impacts of heat can be minimised or prevented with well-designed adaptation interventions. Relevant interventions include heatwave warning systems, public education and risk communication campaigns, as well as targeted outreach programs for at-risk populations (such as providing heat refuges).[233] It is also important to act on the wider determinants of health, such as making changes to buildings,

urban environments, and land use that reduce heat retention and exposure,[234] such as increasing blue (aquatic) and green (vegetated) space, and improving building insulation, shading and ventilation. Where possible, interventions should be implemented in such a way as to promote health equity, and to avoid increasing greenhouse gas emissions and contributing further to climate change. Figure 12 outlines the array of measures that could be considered to reduce risks to health from heat. There is also an opportunity to learn from First Nations knowledges and cultures in managing the impacts of heat (see case study 15).

FIGURE 12: MEASURES TO MANAGE THE HEALTH IMPACTS OF HEAT



Heat and health action plans are widely used around the world as a framework for responding collaboratively and systematically to the various health impacts of heat to prevent morbidity and mortality arising from heatwaves and hot weather.[235] Many state, territory and local governments already have plans in place to address the risks to health from heat in their jurisdictions. A National Heat-Health Action Plan will complement and leverage these plans, as well as the recently published National Heatwave Warning Framework,[236] to support best-practice approaches to heat and health across Australia.

ACTION 6.1

Developing a National Heat-Health Action Plan

The Australian Government will work with states and territories to develop and publish a National Heat-Health Action Plan which promotes a nationally consistent approach to minimising the health impacts of heat. Key considerations in this plan will include:

- Strengthening the National Heatwave Warning Framework as approaches to heatwaves develop over time
- Providing guidance and support tools for health workers, community organisations, and other relevant sectors in preventing, identifying, and responding to heat-related illness
- Enhancing monitoring, surveillance, and data collection for heat vulnerability and health impacts
- Identifying and pursuing opportunities to reduce population exposure to heat (including urban heat islands)
- Supporting tailored and evidence-based public health messaging about the health impacts of heat and self-protective measures
- Minimising heat-health impacts amongst at-risk groups, including occupationally exposed workers, culturally and linguistically diverse communities, and people with disabilities or reduced mobility.

Case study 14

South Australian heat health warning system

The South Australia heat health warning system was developed after the extreme heatwave of January 2008-2009, which led to 374 deaths and over 2000 cases of illness or injury. The South Australian warning system incorporates public heat warnings, health advisories and targeted support for at-risk groups including the elderly, those with mental health conditions and the homeless.

The South Australian warning system supports the Telecross Redi program, a telephone support program conducted by the Red Cross and funded by the South Australian Department of Human Services. The program provides daily welfare check phone calls to at-risk or isolated clients. Individuals either self-register or are registered by family members, doctors, or support workers. When registered clients do not respond to a call, SA Police conduct a home welfare check. Research into warning systems across the globe demonstrates they can lead to reductions in adverse health outcomes and can be cost-effective public health interventions.[237]

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Case study 15

First Nations culture and adaptation to extreme heat

There is growing recognition that First Nations cultures can provide important insights into climate adaptation. Already one of the hottest places on earth, the Northern Territory is especially susceptible to the effects of climate change. A 2023 study published in *The Lancet Planetary Health* found the traditional cultural practices of Aboriginal people living in the Northern Territory enable them to withstand hot weather better than non-Indigenous Australians.[238] These practices, developed over many generations, are based on First Nations people's seasonal knowledge and harmonious understanding of culture and the environment. They involve avoiding physical activity during the hottest times in the day, for example by aligning social and cultural practices with cooler periods.

Warumungu elder and co-author of the study, Norman Frank Tjupurrula, reflected on the role of culture in supporting First Nations people's resilience to extreme weather as part of the study's findings:

> Our culture is as old as this country, it is very old. And how we live now, it's changing, but our culture comes from the old ways. In the old days, in the wintertime, people would walk out in the desert, collecting seeds and bush potato in the desert when it was cool. In summertime they would live in the river and creek country, near the water. In the very hot weather they'd be around the spring country where they could get water.
>
> Norman Frank Tjupurrula

Looking to First Nations people's cultural practices provides Australian society with an opportunity to rethink the way we work, live and play to build resilience to the health impacts of the climate change. Non-Indigenous Australians can also protect themselves from extreme heat by avoiding physical exertion during the hottest times of the day.

Jimmy Frank Jurpururrla and his daughter Jaydah wash off after a long day in the Victoria River near Kalkarindji, NT. ©Andrew Quilty 2023

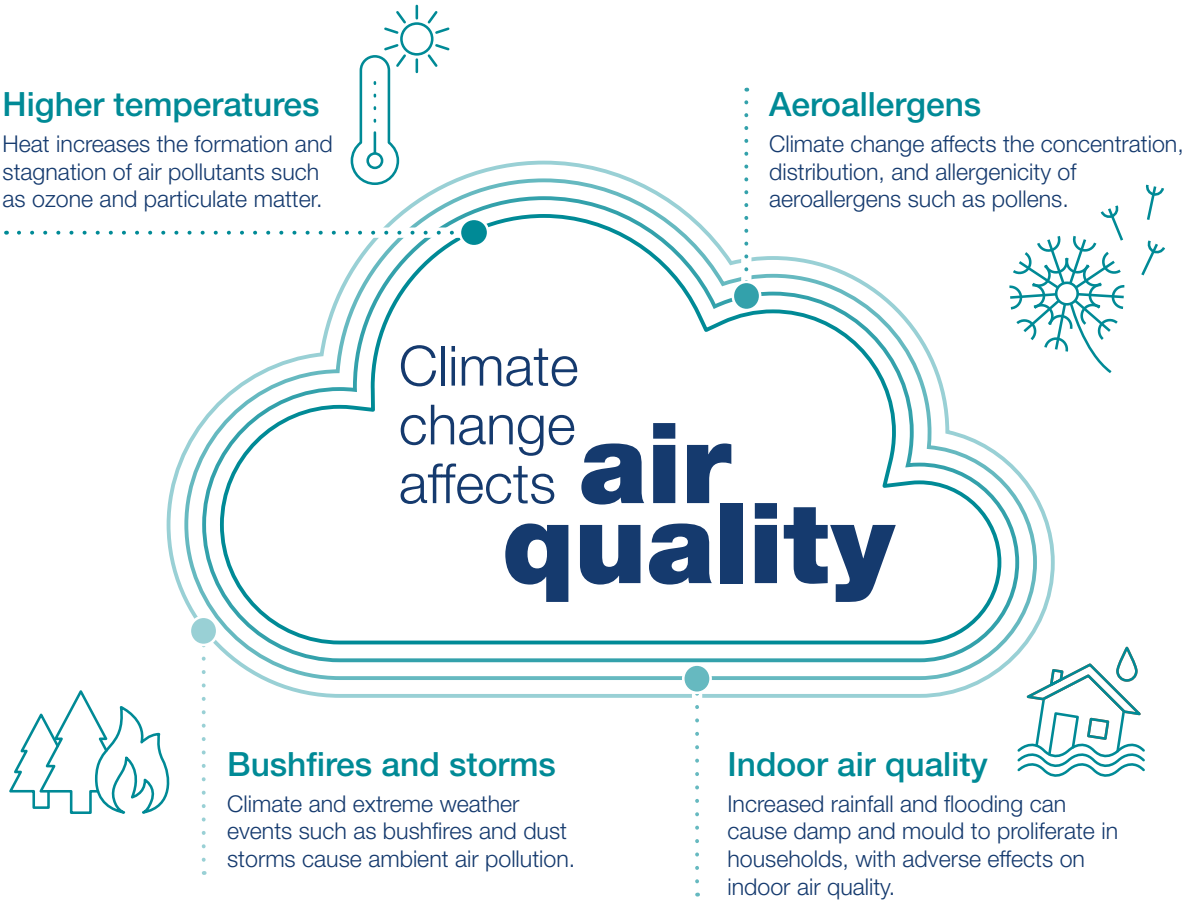
6.2 Air quality

Climate change adversely affects air quality via a number of intersecting pathways (see Figure 13). Air quality is a major environmental determinant of health and is recognised as a major global public health risk.[239] Air pollution – indoor and outdoor, from both biogenic (natural) and anthropogenic (human) sources – is associated with a wide range of adverse health effects, many of which are inequitably distributed.

According to the World Health Organization, "the burden of disease attributable to air pollution is now estimated to be on a par with other major global health risks such as unhealthy diet and tobacco smoking."[240] Moreover, air pollution from coal, oil and gas is responsible for 8.7 million deaths globally each year.[241] Alongside their contribution to greenhouse gas emissions, combustion-based electricity, transport, heating, resource extraction, industry, agricultural practices and waste disposal all produce noxious pollutants that are harmful to human health, such as particulate matter ($PM_{2.5}$) and nitrogen dioxide (NO_2).[242] The health system also contributes to local air pollution.[243]

Certain populations are particularly susceptible to the health impacts of poor air quality. These include children, pregnant women and older people, people living and/or working in low socio-economic status communities, people with seasonal allergies and hay fever, and those with chronic respiratory or cardiovascular conditions such as asthma or ischaemic heart disease. Research has found exposure to air pollution is associated with numerous adverse reproductive health outcomes, including decreased fertility, preterm births and birth defects.[244] In the coming decades, key demographic and epidemiological trends – including population growth and ageing, a growing burden of air pollution-sensitive chronic disease, and increasing urbanisation – are likely to increase population-level vulnerability to the health impacts of air pollution.

FIGURE 13: THE IMPACTS OF CLIMATE CHANGE ON AIR QUALITY



Several recent events have highlighted and increased awareness of the health impacts of poor air quality. Smoke from the 2019/2020 Black Summer bushfires affected an estimated 80% of the Australian population at some point and caused at least 417 premature deaths, more than 3000 hospital admissions, and more than 1000 asthma presentations at emergency departments.[245,246] Climate change affects the concentration of pollen in the air and consequently the frequency and severity of thunderstorm asthma epidemics.[247] In 2016, Melbourne was affected by the world's largest epidemic thunderstorm asthma event, which resulted in ten deaths and thousands of people experiencing breathing difficulties (see case study 1).[248] Climate change is likely to lead to more frequent and widespread episodes of bushfire smoke, ozone pollution, and thunderstorm asthma.[249] The Royal Commission into National Natural Disaster Arrangements and the Australian State of the Environment 2021 report recognise the growing need for better air quality action and information in Australia.[250,251]

By global standards, Australia has relatively good indoor and outdoor air quality.[252] However, there is increasing evidence to suggest adverse health effects occur even at very low air pollutant exposure levels.[253] By extension, health benefits are likely to arise from improvements to air quality beyond compliance with existing national and international standards. Evidence suggests that significant and rapid health co-benefits can be achieved by targeting climate mitigation policies to also achieve air quality outcomes.[254] A range of studies from the United States have quantified the air quality co-benefits of replacing fossil-fuel-generated electricity with renewable energy, finding the air quality co-benefits due to improved health outcomes exceed the cost of deployment.[255] The Intergovernmental Panel on Climate Change and the International Energy Agency recommend integrated policies to prioritise both air quality and climate goals from the outset to maximise co-benefits between climate change mitigation and noxious pollution control.[256]

A key dimension of addressing the health impacts of air pollution and climate change is identifying and implementing strategies to improve indoor air quality. Poor indoor air quality – which may be driven by a number of factors, including inadequate ventilation, or use of wood or gas heaters – is associated with a variety of adverse health outcomes.[257] As noted in Figure 13, climate change can worsen indoor air quality, for example by contributing to the proliferation of household mould as a result of flooding. Over the past few years, the COVID-19 pandemic has drawn particular attention to the need for further research on the effects of indoor air quality on human health, as well as potential measures to improve indoor air quality and protect human health.[258]

Improving ambient air quality is similarly crucial. In Australia, national outdoor air quality standards are set through the National Environment Protection Measure for Ambient Air Quality[259] and are reflected in state and territory legislation. State, territory, and local governments are responsible for monitoring and managing air quality in their jurisdictions via local environment protection agencies. The National Clean Air Agreement provides a cooperative framework for state and territory governments and the Commonwealth to work together on priority action to improve air quality and reduce the adverse effects of air pollution on human health.[260]

ACTION 6.2

Addressing the impacts of climate change on air quality

The Australian Government will work together with states and territories to address the risks and health impacts of reduced air quality driven by climate change, as part of wider work to increase knowledge, awareness, and capacity to respond to the risks and health impacts of air pollution. This will be achieved through relevant projects outlined in the National Clean Air Agreement work plan, and other complementary programs and initiatives.

6.3 Communicable disease

Climate change is expected to affect the emergence and transmission of numerous communicable diseases in Australia and worldwide.[261] Climate-sensitive communicable diseases include vector-borne diseases such as dengue; water-borne diseases such as cholera; zoonotic diseases such as leptospirosis and Hendra virus; food-borne diseases such as salmonella; and soil-borne diseases such as melioidosis. Changes in climate are expected to make certain regions more susceptible to disease transmission. Other factors increasing the risk of disease transmission include population growth, migration, and urban densification; altered land use patterns; and contamination of water and food supplies and damage to sewerage systems as a result of extreme weather events.[262]

Transmission of vector-borne diseases is significantly affected by climate change, which can affect the distribution, abundance, and seasonality of disease vectors such as mosquitoes and ticks. Climate-related increases in temperature and precipitation are likely to create widespread changes in conditions which may be favourable for mosquito breeding.[263] These changes can alter the mosquito season, either on an ongoing basis or in association with extreme weather events. They can also drive invasions of mosquitoes into areas where human populations were previously unexposed to mosquito-borne disease. There are several climate-sensitive vector-borne diseases of concern for Australia. These

include dengue, Japanese encephalitis, and Ross River virus (see Figure 14). There are also a number of serious mosquito-borne diseases which are not known to be in Australia but which have the potential to become established. Effective management of vector-borne diseases requires the control of vector breeding sites, surveillance and the control of vector populations (including at Australia's border and at foreign airports serving Australian routes), vaccination against relevant diseases where available or appropriate, early warning systems and public education on risk reduction measures.

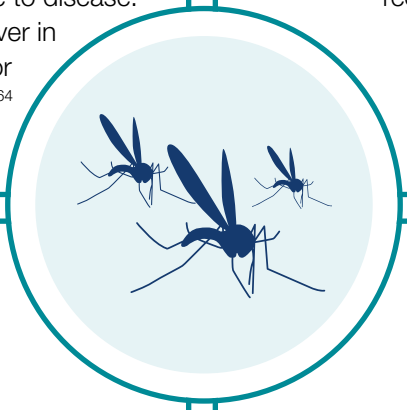
FIGURE 14: KEY CLIMATE-SENSITIVE VECTOR-BORNE DISEASES OF RELEVANCE FOR AUSTRALIA

Dengue

Dengue Virus is transmitted to humans by infected *Aedes* mosquitoes and can cause severe and occasionally lethal infections. Currently in Australia, these mosquitoes are only found in northern Queensland and the Torres Strait, where there are occasional dengue outbreaks stemming from overseas-acquired cases. Climate change may indirectly allow *Aedes* mosquitoes to become more widespread, exposing more people to disease. A vaccine for dengue exists, however in Australia it is only recommended for use in very limited circumstances.[264]

Malaria

Malaria is an infection caused by parasites transmitted to humans by infected *Anopheles* mosquitoes. The severity of disease varies, but it can be life-threatening. Endemic malaria has been eradicated from Australia since the 1960s. There is a risk that climate change could enable exotic malaria vectors to establish in Australia and cause disease outbreaks. Malaria vaccines are not currently recommended for use in Australia.[265]



Japanese encephalitis

Japanese Encephalitis Virus (JEV) is spread from animals to humans via *Culex* mosquitoes. Although most infections are asymptomatic, symptomatic cases have a high rate of mortality and permanent morbidity. Disease is preventable with two safe and effective vaccines currently recommended for high-risk groups in Australia.[266] Climate change may increase JEV outbreaks in the future.

Murray Valley encephalitis and Ross River virus

Murray Valley Encephalitis Virus and *Ross River Virus* are both transmitted to humans by infected mosquitoes. The disease caused by both viruses is generally mild, but can be severe. Both viruses are currently endemic in Australia, with most cases occurring in northern Australia. There is no specific treatment or vaccine. Climate change could potentially result in increased transmission and disease in Australia.

Case study 16

Wolbachia release in North Queensland communities

Certain tropical diseases, including dengue, yellow fever and Zika, are primarily spread by the *Aedes aegypti* mosquito. Traditional vector control has largely failed to control *Aedes aegypti* due to widespread insecticide resistance and resource constraints, with multiple dengue cases reported annually in Queensland. Climate change is leading to an expansion of mosquito habitat and prolongation of the active mosquito season, increasing the risk of human exposure to vector-borne disease.

In Cairns in 2011, the World Mosquito Program released a few dozen *Aedes aegypti* mosquitos carrying a safe and naturally occurring bacteria called *Wolbachia*. When *Aedes aegypti* carry *Wolbachia*, their capacity to spread viruses like dengue, yellow fever and zika is reduced. The technique of sterilising dengue carrying *Aedes aegypti* offspring with *Wolbachia* is regarded as a long term, self-sustaining public health intervention, and has been implemented in 11 countries. The Cairns release followed decades of research investigating the potential for *Wolbachia*-carrying *Aedes aegypti* mosquitoes to reduce the capacity of mosquitoes to spread disease.

The World Mosquito Program has partnered with local councils and health services in Queensland to implement various programs, including the Dengue Safe Project Ingham. Further research in Australia has demonstrated the potential for *Wolbachia* to reduce instances of dengue transmission in Queensland. In the summer of 2018, multiple research organisations participated in a trial release of *Aedes aegypti* mosquitoes sterilised with *Wolbachia* across three regions in Northern Queensland. Over 80% of the mosquito population were suppressed over the course of the trial period, and two out of the three sites saw substantially suppressed mosquito populations the following season. With fewer mosquitoes carrying dengue each season, the number of infections in humans may also decrease. To ensure effectiveness, levels of Wolbachia must remain high in the mosquito population, which requires close monitoring to detect changes.

Climate change will also affect the emergence and transmission of a variety of other communicable diseases, in addition to those spread by vectors. The ecosystem stress, change, and destruction associated with climate change, combined with human population factors and changing land use, increase the risk of zoonotic disease transmission (transmission from animals to humans). Increased temperatures, extreme weather events, and other climate factors are also likely to cause altered transmission of food-, water-, and soil-borne diseases, and infectious skin diseases.[267] Furthermore, climate change is also accelerating the emergence and spread of antimicrobial resistance.[268]

A priority for the Australian Centre for Disease Control (CDC) is expected to be to support the enhancement of Australia's capacity to identify, monitor and respond to the full spectrum of emerging communicable disease threats driven by climate change, in line with One Health principles. Enhanced and up-to-date communicable disease surveillance will facilitate the management of associated risks to health and wellbeing in Australia. The Australian CDC will play an important role in supporting the improved coordination of communicable disease surveillance and response, including enhanced collaboration and data sharing between jurisdictions. The Australian CDC will also work to ensure One Health principles are embedded across portfolios and jurisdictions, in recognition of the need for proactive multisectoral collaboration to strengthen disease surveillance and pandemic prevention and preparedness at the human-animal-ecosystem interface. This work will complement and supplement work on other aspects of climate change and health data, monitoring, and surveillance outlined at section 3.4.1.

ACTION 6.3

Addressing climate change impacts on communicable disease

It is anticipated that the Australian Centre for Disease Control will work with jurisdictional stakeholders to enhance Australia's communicable disease surveillance, prevention, and response capabilities, reflecting the impacts of climate change on communicable disease emergence and transmission. Key considerations will include:

- Increasing data sharing, linkages, and analysis across departments and jurisdictions, with improved consistency and integration of human and animal disease and relevant ecosystem data
- Enhancing surveillance and risk analysis of disease vectors, zoonotic disease, and antimicrobial resistance
- Establishing governance and operational structures to coordinate, promote, support, and assess the adoption of One Health principles across all levels of Australian government.

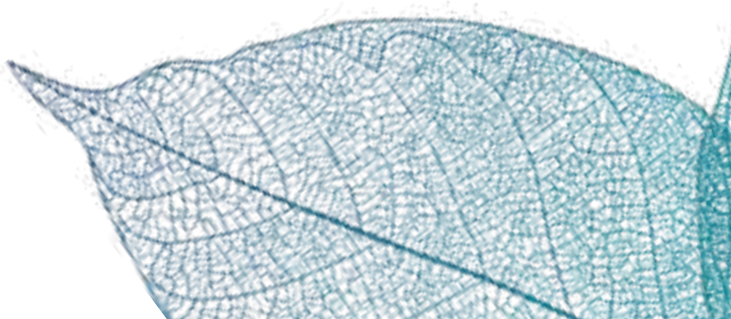
6.4 Mental health

The impacts of climate change on mental health and wellbeing are serious and wide-reaching.[269] People in Australia are already experiencing psychological distress, exacerbations of existing mental health conditions, and other adverse mental health outcomes as a result of the impacts of climate change and extreme events.[270,271] Even without first-hand exposure, the mere awareness of the unfolding threat of climate change can have mental health impacts.[272] In one study, more than half (51%) of Australians surveyed were "very (25%) or fairly (26%) worried" about climate change and extreme weather events in Australia.[273] 'Climate distress' can lead to mental disorders, especially if individuals and communities do not receive adequate support.[274]

Climate change magnifies the already inequitable distribution of mental ill-health in Australia,[275] and this is projected to get worse.[276] Populations at greatest risk of negative mental health impacts of climate change include young people; people living with existing mental illness and disabilities; First Nations people and culturally and linguistically diverse groups; and people experiencing or at risk of family, domestic and sexual violence.[277] Other at-risk groups include those who live in rural and remote communities, live in low socio-economic areas, or are vocationally exposed to climate change.[278,279,280] The Australian Government recognises the need to further support these priority populations, and ensure that mental health support is provided in a way that is proactive, accessible, and appropriate to their circumstances.

One of the ways in which climate change affects mental health and wellbeing is through the impacts of climate-related disasters and extreme weather events. The National Disaster Mental Health and Wellbeing Framework affirms a national commitment between Commonwealth, state and territory governments to consistently and sustainably support the delivery of mental health services and improve the wellbeing of affected individuals before, during and after disaster events and recommends all Australian governments adopt a five-year planning timeframe for mental health recovery.[281] The Australian Government's mental health investment in response to climate-related disasters has historically been through time-limited, ad hoc supports for individuals and communities as an immediate response to specific disaster events. However, evidence shows that disaster-affected individuals are likely to continue experiencing mental ill-health up to ten years after a disaster event.[282]

To ensure people are adequately supported to deal with the mental health impacts of climate change – which include, but are not limited to, the impacts of climate disasters – requires action from all levels of government, health care professionals, service providers, and the wider community. Ensuring continuity of access to primary care is important, as is including primary care providers such as General Practitioners in mental health prevention and care planning and training for climate change. However, action to protect mental health from the impacts of climate change must extend beyond the health system. There is also a need to promote mental health and wellbeing and community psychological resilience in preparation for the ongoing climate crisis, such as by building skills for people to support each other in community settings to manage climate distress, and by increasing social connectedness.[283,284,285,286]



ACTION 6.4

Increasing social community connectedness

The Australian Government will work to improve and promote mental health initiatives aimed at increasing social community connectedness to help build longer-term resilience in communities before, and after, climate-related disasters and extreme weather events. This will help to address a wide range of mental health impacts of climate change, as well as support and complement the implementation of the National Disaster Mental Health and Wellbeing Framework.

ACTION 6.5

Building workforce awareness, education, and capacity-building

The Australian Government will work with relevant stakeholders to build workforce capacity to prevent, identify, and respond to the mental health and wellbeing impacts of climate change, including by exploring options for training in climate change and mental health.

6.5 Food, nutrition, agriculture, and land management

Climate change threatens safe and reliable access to sufficient, nutritious and culturally appropriate food.[287,288] Changes in temperature and rainfall, increases in extreme weather events, and shifts in the distribution of pests and invasive species all pose risks to Australia's food security, with consequences for dietary habits and, in turn, human health.[289,290]

The Australian Government is working with the agricultural sector to build climate resilience through a range of national programs and initiatives, including:

- **Driving climate-smart agricultural practices** by working with state and territory governments and industry to ensure Australia continues to sustainably increase agricultural productivity, improve adaptation and resilience to a changing climate, and drive a low-emissions agriculture sector, in particular through the National Statement on Climate Change and Agriculture[291] and the $302 million Climate-smart Agriculture Program.
- **Improving drought management, resilience and preparedness** by developing a new National Drought Agreement with states and territories. The Government will also develop a new Australian Government Drought Plan and drought decision-making framework and implement a drought early warning system. A new Drought Resilience Funding Plan and associated Investment Strategy will guide investment of the $400 million available from the Future Drought Fund over the period 2024-2028.

- **Strengthening Australia's future biosecurity system** through the National Biosecurity Strategy 2022-2032, which addresses changing and increasing biosecurity risks driven in part by climate change.

Ensuring that Australia's agriculture and food systems are healthy, resilient and sustainable is critical to reducing emissions and improving population health. At present, agriculture contributes 16.8% of Australia's greenhouse gas emissions.[292] Food-related agricultural emissions can be reduced in varying degrees through technological progress, reducing food waste, and dietary changes, which collectively have the potential to yield health benefits.[293] The evidence suggests diets high in fruits, vegetables, legumes, nuts and wholegrains, and low in red and processed meat, reduce risk of coronary heart disease, stroke, type 2 diabetes and colorectal cancer.[294] Australian Bureau of Statistics data suggest only 6.1% of adults in Australia eat the amount of fruit and vegetables recommended by the Australian Dietary Guidelines,[295] and it is estimated 16,400 deaths in 2019 were attributable to high consumption of red and processed meat and dairy.[296] Research has demonstrated that if population-level changes to diets were made to include no processed meat, small amounts of red meat, moderate amounts of other animal-sourced foods (poultry, fish, and dairy), and generous amounts of fruits, vegetables, legumes, and nuts, premature mortality could decrease by 19% in 2030, and also contribute to reducing food-related greenhouse gas emissions.[297] This would require significant shifts in current eating patterns and guidelines. Discretionary foods, described by the Australian Dietary Guidelines as "foods and drinks not necessary to provide the nutrients the body needs", are also estimated to contribute to a third of diet-related greenhouse gas emissions in Australia.[298]

In preparing for the review of the Australian Dietary Guidelines announced in 2020, stakeholders identified sustainability (including economic, social and environmental impacts) and dietary patterns as a key topic to be prioritised in evidence reviews that will underpin updated Guidelines. Expanding the dietary guidelines to further consider sustainable food systems will be key to supporting future policy action and consumer decisions to reduce food-related health system emissions across the supply chain while also supporting health and wellbeing. Widespread adoption of the Australian Dietary Guidelines is also important – evidence suggests that a shift from existing average Australian diets to a diet consistent with the existing Australian Dietary Guidelines will greatly reduce the environmental impact of diets.[299]

Case study 17

Healthy and sustainable food system action across Tasmania

The Tasmanian Department of Health funds several projects through the Healthy Tasmania Strategic Plan 2022-2026, aligned to the priority areas of Eating Well and Climate Change and Health. Eat Well Tasmania act as a connector across the Tasmanian food system to champion healthy eating and promote opportunities to enjoy healthy, seasonal, local food every day.

The What's in Season campaign understands eating seasonally is a tasty, affordable and nutritious way to enjoy Tasmanian produce at home whilst building a culture of healthy eating. Promoting fruit and vegetable availability across the four seasons through storytelling and social media demonstrates the links between food consumption, individual, community and planetary health in a way consumers relate to and understand.

Too Good to Waste is a consumer behaviour change campaign crafted by Eat Well Tasmania to motivate Tasmanians to reduce their food waste and eat well. The campaign raises awareness about the links between

food, health and climate change by showcasing inspirational stories about food waste champions and providing tips on food preparation, storage advice, and eating produce past its prime. The campaign includes a food waste tool kit featuring waste-free fridge and pantry guides, food waste 'first aid' guides, recipe generator and seasonal produce storage guides to complement the What's in Season guides.

The Sustainable Institutional Food Procurement Tasmania project involves scoping current procurement and food service systems to identify points for improving the health and sustainability of meals. The Sustainable Table project focuses on co-benefits of reducing emissions and improving the nutrition quality of ingredients. For example, mapping regional seasonality of vegetables helps adapt healthy menus and shorten supply chains. In countries like Australia, transporting vegetables produces twice as many emissions as their production. Relocalisation of procurement can reduce emissions from transport and supply fresher, more nutrient dense vegetables for institutional meals.

ACTION 6.6

Taking account of sustainability considerations in the Australian Dietary Guidelines

The National Health and Medical Research Council will engage with the Australian Government to consider economic, social, and environmental sustainability in the updated Australian Dietary Guidelines, including Australia's commitment to the Sustainable Development Goals, the Paris Agreement and net zero emissions by 2050. The updated Australian Dietary Guidelines are expected to be published by 2026.

For First Nations people living in remote regions, climate change impacts on food security in several ways. Challenges to food security in rural regions include long and complex supply chains, harsh climates, high operational costs, seasonal isolation and fragile transport infrastructure. Food security is therefore a longstanding issue which faces compounding impacts from produce shortages and supply chain interruptions caused by climate change. For example, extreme weather affects food availability and cost, such as when the 2022 floods in the Northern Australia prevented food transport trucks from reaching community stores for extended periods.

Climate change impacts, including destruction of land and waterways, extreme weather, extinctions, biodiversity loss and changing animal and plant distribution, make it harder to practice traditional and other local methods of food production.[300] Restricted access to traditional foods and barriers to varieties of affordable, available nutritious food in remote stores has resulted in many First Nations people consuming an energy-dense, nutrient poor diet.

ACTION 6.7

Addressing the impacts of climate change on First Nations health and food security

In partnership with First Nations communities, the Australian Government will work to address the impacts of climate change on First Nations food security and the health of First Nations people, including through the National Strategy for Food Security in Remote First Nations Communities.

Benefits of First Nations people's land and sea management include healthy and diverse environments, and better access to culturally appropriate, nutritious food. Caring for Country is also associated with positive outcomes for First Nations people's physical, emotional and social wellbeing, whilst also having economic co-benefits.

6.6 Built environment and housing

The built environment has a profound impact on our health. As the Australian Institute of Health and Welfare notes, it influences our "activity levels, access to nutritious food, the houses we live in… affect[ing] the air we breathe … the water we drink, and shelter[ing] us from the weather."[301] Optimising the built environment can have significant benefits for population health, while improving the resilience and sustainability of the environments in which humans live. In the coming years, the Australian Government will deliver a new comprehensive National Urban Policy. The National Urban Policy will address urgent challenges facing our major cities – from equitable access to jobs, homes and services, to climate impacts and decarbonisation. It will bring together a vision for sustainable growth in our cities.

Many of the major climate impacts on population health are mediated – and potentially exacerbated – by the quality and climate resilience of the built environment in which people live, work, and play. As such, ensuring that cities, infrastructure, and housing are climate-resilient and health-promoting is vitally important to protecting health in a changing climate. Key factors in the resilience and adaptive capacity of cities to the pressures arising from climate change include the thermal mass of the urban form (surfaces such as bricks, concrete and asphalt roads absorb and radiate heat, causing the 'heat island' effect);[302] the extent and quality of vegetated areas;[303] the extent of impervious surfaces and the attention paid to flood mitigation;[304] and social dimensions, such as how public spaces facilitate civic engagement and interaction.

Integrating more green and blue spaces into urban areas improves adaptive capacity while delivering benefits for human general and mental health through recreational amenity.[305] These spaces can mitigate both excess heat and flooding risk and should also be designed in such a way as to limit mosquito breeding sites to prevent the spread of mosquito-borne disease. Plants provide shade and release water vapour during transpiration, generating a natural evaporative cooling process that helps to mitigate the urban heat island effect.[306] Lakes and other water features provide similar benefits owing to evaporation, while modifying stormwater infrastructure to create riparian zones through 'water sensitive urban design' can reduce flooding risks by slowing down water flow and increasing the 'sponginess' of the ground.[307] Trees also provide shade which improves pedestrian wellbeing on hot days and reduces heat absorption by urban

surfaces. Well designed and maintained green spaces can also reduce air pollutants. Parks, street trees and riparian zones are important tools to reduce climate risks in urban areas.

In addition to improving urban environments, it is important that buildings themselves are designed to be sustainable, health-promoting and climate resilient. Many principles of sustainable building design and construction not only save energy but also ameliorate the health effects of climate change. For example, minimising combustion processes can reduce climate impact while improving indoor air quality. Pollution from wood heaters, unflued gas heaters and inadequately ventilated gas cooktops, along with vehicle fumes from attached garages can trigger asthma onset and flareups.[308] Energy-efficient alternatives, such as reverse-cycle air conditioners and induction cooktops, reduce emissions while protecting health. In addition, improving thermal performance and energy efficiency – through increased insulation, improved ventilation, attention to the size and position of windows, and shade structures – is critical both for reducing greenhouse gas emissions and protecting health in a warming climate.[309,310]

Good-quality and climate-resilient buildings are necessary for protecting communities from environmental hazards and the health impacts of climate change. It is important that buildings being constructed today are resilient to and suitable for a changing climate, which will feature increasingly frequent and severe climate hazards. The National Construction Code (NCC) sets out minimum requirements for the design, construction and performance of new buildings. Recent updates to the NCC have addressed the increased prevalence of extreme weather. For example, new wind assessment standards in 2021 account for possible changes in extreme winds driven by climate change over a building's design life,[311] and new condensation provisions ameliorate mould growth. Further, NCC provisions for energy efficiency and thermal performance in residential buildings were introduced in 2022 requiring new homes to improve minimum performance from 6 stars to 7 stars out of a possible 10,[312] meaning new houses will use significantly less energy.

ACTION 6.8

Considering climate resilience in updates to the National Construction Code

The Australian Government will work with states, territories, and the Australian Building Codes Board to progress opportunities to embed sustainability and climate resilience principles in the National Construction Code, and in doing so will consider the health impacts of climate change.

Access to appropriate, affordable and secure housing provides physical and emotional safety, promotes better health outcomes, and improves quality of life. As average temperatures increase, there will be more frequent and severe extreme weather events, as well as gradual changes (for example, coastline changes from increased saltwater intrusion and erosion associated with sea level rise). These weather and environmental changes will place increased pressure on the capacity of buildings to protect inhabitants. Many homes across Australia are not built to perform well during extreme weather events.[313,314]

A lack of effective insulation, ventilation and climate control can make inhabitants more susceptible to heat stress and heat-related illness.[315] Problems with water infiltration and water vapour build-up can cause further complications such as mould growth, particularly affecting people with compromised immune systems, allergies or chronic lung conditions.[316]

Households are a major contributor to greenhouse gas emissions, accounting for around 22% of Australia's total.[317] These emissions largely come from gas use for heating and cooking, as well as electricity. Most Australian homes were built before minimum efficiency regulations were introduced; as a result, the average home has an energy efficiency rating of only 1.7 stars.[318] Measures to reduce emissions by improving energy efficiency, such as home retrofits, and switching from gas to electricity, can reduce humidity and damp, and improve

thermal comfort and indoor air quality. This can improve mental health and reduce the risk of heart disease, lung disease, stroke and cancer.[319,320,321]

The $1.7 billion Energy Savings Package announced in the 2023-24 Budget will help households, local councils, and businesses to access energy upgrades. This package includes the $1.3 billion Household Energy Upgrades Fund, which provides $1 billion to the Clean Energy Finance Corporation to provide low-cost finance for home upgrades that save energy, and $300 million to support upgrades to social housing, co-funded and designed in partnership with the states and territories; and $100 million to support local governments to improve energy performance of local government facilities. The Government is developing the National Energy Performance Strategy which establishes a framework for long-term co-ordinated action to deliver the Government's vision for Australians to enjoy the economic, climate and health benefits of improved energy performance. The Household Energy Upgrades Fund is a downpayment on the National Energy Performance Strategy, helping households make better choices to improve the energy performance of their homes, including through improved thermal efficiency, especially those experiencing hardship who are more at risk to adverse health impacts from poorly insulated homes.

Case study 18

Victorian Healthy Homes Program

Cold winters in Victoria, combined with thermally inefficient housing, can pose serious health risks to some populations. Cold indoor temperatures are associated with negative health impacts for elderly people, children and people with disability or chronic illness. High indoor humidity can also exacerbate asthma and allergies.

The Victorian Healthy Homes Program was a randomised controlled trial measuring the impact of home upgrades to improve energy efficiency and thermal comfort on temperature, energy use, health and wellbeing. Run by Sustainability Victoria, the program delivered home upgrades to 1000 vulnerable households in the state. It found a small upgrade (average cost $2,809) increased indoor temperatures and improved health outcomes during the winter period, including reduced breathlessness and improved mental health and quality of life for participants. Other benefits included lower energy bills and reduced emissions, due to significantly lower gas use.

Improved health outcomes translated into savings to the health system of $887 per person over the three month winter period. Cost-benefit analysis also demonstrated the upgrade would be cost saving within three years, yielding a net saving of $4,783 per household over ten years due to energy savings and health gains.

©Sustainability Victoria

Climate change is increasing housing insecurity in Australia. Floods in Queensland and NSW in 2022 affected an estimated 20,000 homes,[322] with 3,800 homes deemed unliveable in NSW.[323] The 2019-20 bushfires in south-eastern Australia triggered around 65,000 displacements and destroyed more than 3,100 homes.[324] Climate-related disasters can strain transitional and short-term housing services and providers as well as the broader housing sector.[325] Many people experience mental trauma from the experience of emergency evacuation and losing homes. Homelessness can have significant impacts on a person's mental and physical health, their ability to access healthcare, and their security and safety. In addition, people already experiencing homelessness prior to a climate-related disaster will often have less access to public safety information and services, increasing danger during events and creating barriers to recovery.[326]

ACTION 6.9

Considering climate resilience in developing the National Housing and Homelessness Plan

The Australian Government, in collaboration with states and territories, will deliver a National Housing and Homelessness Plan that will outline a shared vision to inform future housing and homelessness policy in Australia. In developing this plan, the Government will consider the health benefits of climate-resilient housing.

One in three First Nations people currently live in houses with major structural defects,[327] and are therefore more likely to be affected by increased heat and other changes to climate. In remote First Nations communities, energy poverty and poorly designed, low-quality housing – as well as poor access to housing and essential services – interact with high levels of chronic disease to produce poor health outcomes. For example, many First Nations communities rely on prepaid electricity meters. Frequent disconnection is an ongoing issue, leaving some First Nations people unable to run vital medical equipment such as oxygen concentrators and home dialysis machines.

There is a large body of evidence showing a relationship between First Nations health and access to 'health hardware',[328] a term which encompasses physical home appliances necessary for healthy living, such as refrigerators, air conditioners and stovetops, as well as the overall design and maintenance of housing and access to essential services. First Nations people dependent on medications like insulin (which must be stored below 30°C) struggle to store their medications at the right temperature if they lack a functioning refrigerator or live in energy poverty.[329] These pre-existing inequities in access to quality housing and health hardware mean First Nations people are particularly susceptible to suffering poor health outcomes as a result of climate change.

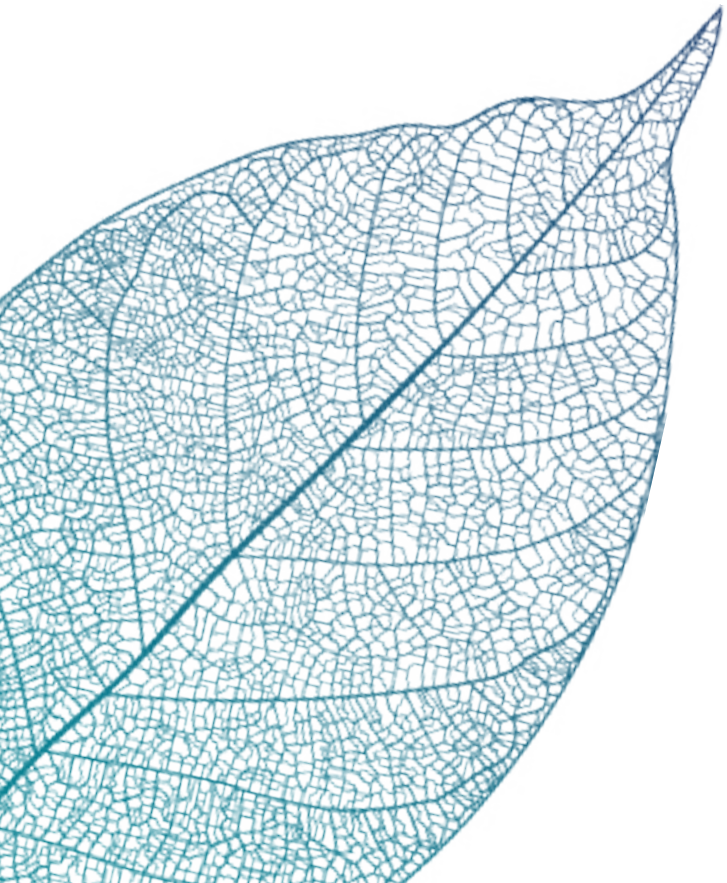
In 2022, the Joint Council on Closing the Gap agreed an Aboriginal and Torres Strait Islander Housing Sector Strengthening Plan under Priority Reform 2 of the Closing the Gap Agreement.[330] Additionally, the Joint Council agreed to establish a Housing Policy Partnership, to be co-chaired by the National Aboriginal and Torres Strait Islander Housing Association and the Department of Social Services. $9.2 million of government funding has been allocated to the Housing Policy Partnership over three years from 2022-23, which will provide a forum for First Nations voices to lead and shape the development of housing and homelessness solutions. In addition to these initiatives, the First Nations Clean Energy Strategy, and the National Energy Performance Strategy are expected to address energy poverty and climate resilience in First Nations communities. The National Housing and Homelessness Plan is also expected to consider First Nations housing issues, including the impacts of a changing climate.

ACTION 6.10

Promoting the health benefits of improved First Nations housing and energy security

The Australian Government will:

- Work in partnership with the National Aboriginal and Torres Strait Islander Housing Association, who are co-chairing the newly established Housing Policy Partnership, to promote the importance of high-quality, climate-resilient housing in reducing the negative health impacts of climate change on First Nations communities.
- Work in partnership with First Nations communities to include a health perspective in the First Nations Clean Energy Strategy, including by exploring opportunities to improve access to affordable and reliable power through renewable energy (e.g. rooftop solar, community microgrids and battery storage) for First Nations housing and health infrastructure.



6.7 Physical activity and active travel

Australian guidelines for physical activity and exercise recommend that adults aged 18-64 engage in between 2.5 and 5 hours of moderate intensity physical activity, or between 1.25 and 2.5 hours of vigorous intensity physical activity per week.[331] Physical activity can improve mental wellbeing and help prevent and manage chronic conditions such as cardiovascular disease and type 2 diabetes.[332] In 2022, it was estimated 39% of women and 32% of men aged 18-64 in Australia do not do the recommended amount of physical activity.[333]

Active travel – walking or cycling to get to a destination – provides an opportunity to achieve recommended levels of physical activity, while delivering benefits for planetary health, and improving health outcomes.[334,335] Redesigning cities to prioritise walking, cycling and public transportation usually also involves a more compact city form less centred around car travel. Adequate housing density, well-connected streets, mixed land use to create nearby destinations, high-quality pedestrian infrastructure and proximate public transport are key determinants of walkability.[336] Large areas of Australian cities currently have poor walkability and access to public transport, especially in outer suburban areas.[337] Australia also has low levels of cycling, estimated at 1.8% of all trips.[338] This compares to 11.5% in Japan and 26.8% in the Netherlands.

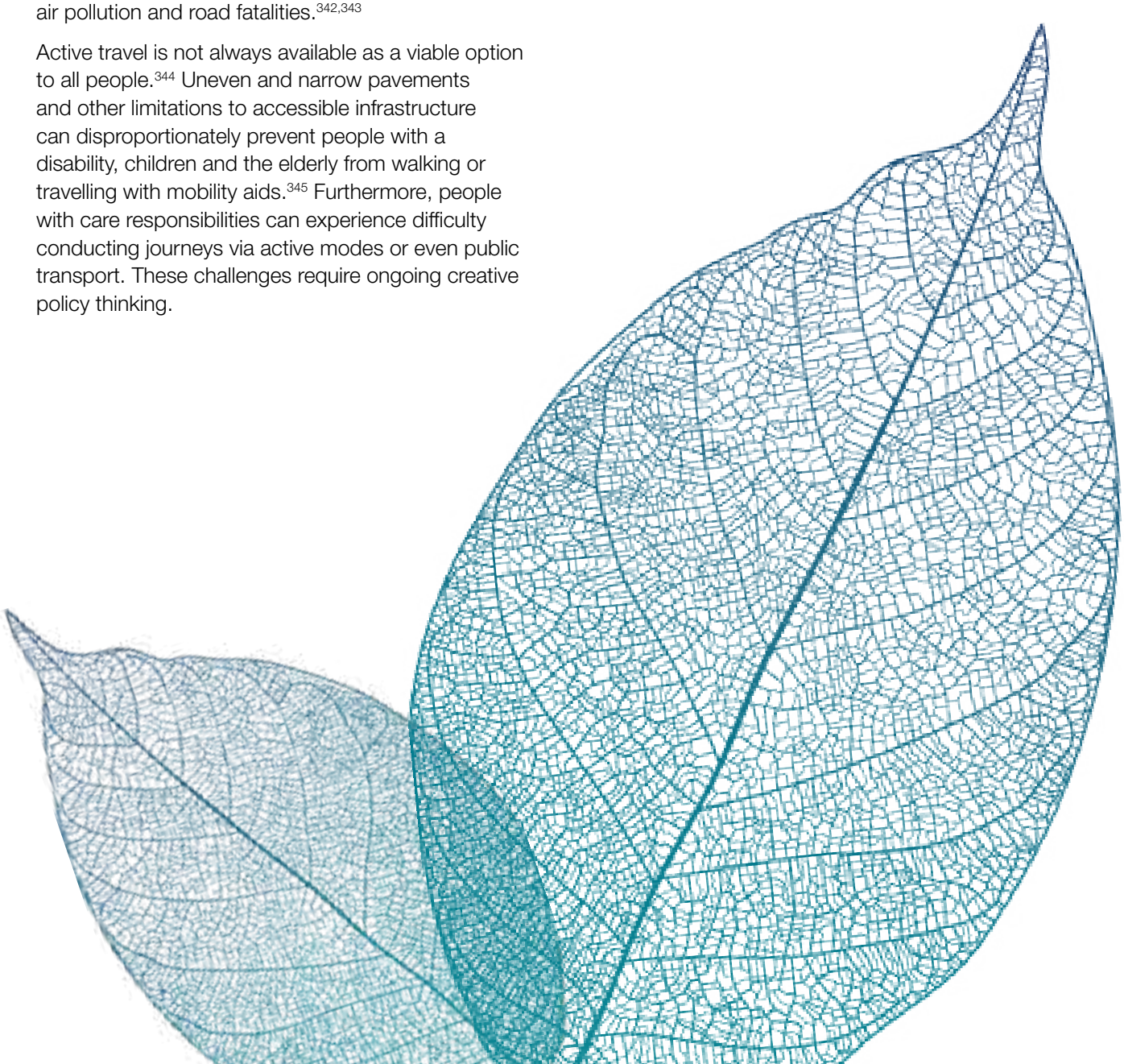
Improving transport options with an emphasis on public and active transport will tend to boost average fitness levels, while reducing air and noise pollution and overall rates of motor vehicle accidents, with considerable population health benefits especially in reducing rates of chronic disease.[339] A study across nine countries found increasing cycling and walking could result in over 2 million deaths avoided per year by 2040.[340] An Adelaide study modelling a shift of 40% of vehicle kilometres to active transport found that 508 deaths per year could be prevented due to increased physical activity.[341] Resources such as the World Health Organization's Health Economic Assessment Tool for walking and cycling can support decision making for transport interventions by modelling the effects of different policy options on physical activity, air pollution and road fatalities.[342,343]

Active travel is not always available as a viable option to all people.[344] Uneven and narrow pavements and other limitations to accessible infrastructure can disproportionately prevent people with a disability, children and the elderly from walking or travelling with mobility aids.[345] Furthermore, people with care responsibilities can experience difficulty conducting journeys via active modes or even public transport. These challenges require ongoing creative policy thinking.

ACTION 6.11

Promoting active travel

The Australian Government will seek to engage relevant agencies across all levels of government to promote active travel. This will support and complement implementation of the National Preventive Health Strategy 2021-2030.



07

Enablers of action on climate and health

7.1 Workforce, leadership and training

Workforce mobilisation is a key precondition in building a sustainable and climate-resilient health system. The World Health Organization has found the implementation of climate change and health strategies is limited by the capacity of the health workforce.[346]

As part of the consultation process to develop this Strategy, a wide range of health professional representative groups made submissions overwhelmingly supportive of improving sustainability and climate resilience in health workplaces. This response is consistent with evidence showing health workers are concerned about the health effects of climate change and the environmental impact of health systems, understand healthy people are dependent on a healthy environment, and are motivated to be part of the transition to a net zero and climate-resilient health system. A Sunshine Coast Hospital & Health Service survey showed 90% of staff 'strongly agree' or 'agree' climate change is a serious problem requiring immediate action; and 87% of staff 'strongly agree' or 'agree' health services should lead the way on climate action.[347] Similarly, a 2023 Royal Australasian College of Surgeons survey found 79% of surgeons make personal choices outside work to reduce their emissions footprint and 82% and 90% would use reusable gowns and drapes and surgical instruments respectively, if given supporting evidence and guidelines.[348] These findings are congruent with international health workforce studies.[349]

The Australian Government recognises much of the progress to date in building a sustainable and climate-resilient health system has been achieved by passionate workers driving reform and innovation around the country. A key aim of this Strategy is to support, upskill and mobilise the health and aged care workforce to raise public awareness and understanding of the health impacts of climate change; take action to address these impacts; strengthen the climate resilience of health services; provide care to affected populations; and lead innovation in reducing health system emissions. The Australian Government is supporting the health system to attract and retain staff into the future, acknowledging the existing and expected future pressures faced by the health workforce – including stresses related to the COVID-19 pandemic, recent climate-related emergencies such as bushfires and floods, the burden of chronic conditions and ongoing workforce shortages. Future public health workforce planning is vital, as is increasing its capacity and capability to effectively deal with the impacts of public health emergencies, communicable and non-communicable diseases, and the impacts of climate change.

Building a sustainable and climate-resilient health system requires a workforce with new knowledge, skills and capacities. This requires, as one essential component, inclusion of climate change and sustainable health in relevant health and aged care professions' curricula and training.[350] This will ensure that at entry to the health workplace new health and aged care professionals have the basic knowledge and skills required. Several health professions have already begun to introduce these components into accreditation standards and curricula. The Government is committed to supporting the expansion of these and other relevant education and training initiatives in the years ahead. Upskilling the existing workforce and encouraging change can occur through a variety of strategies, including by embedding sustainability training into Continuing Professional Development; creating local health net zero leads; short courses; and the uptake of sustainability focused quality improvement processes. In the future, a fit for purpose health and aged care workforce will need to be furnished with the capacities to meet emerging health challenges which will require strategic capacity building.

ACTION 7.1

Mobilising the health workforce to lead action on climate and health

The Australian Government will engage with states, territories and relevant stakeholders to support and mobilise the health workforce to build a sustainable and climate-resilient health system. Key considerations will include:

- Incorporating sustainable healthcare and climate resilience principles in health professional training curricula and accreditation processes, including through quality improvement processes
- Exploring options for developing and providing Continuing Professional Development and other training opportunities in sustainable and resilient healthcare for the health workforce.

Case study 19

Royal Melbourne Hospital environmental sustainability competition

In 2022, Royal Melbourne Hospital launched an environmental sustainability competition aimed at its entire staff, including both clinical and non-clinical personnel. This competition sought out innovative ideas to reduce emissions, waste, and resource usage, while also increasing awareness of the environmental impact of healthcare practices and promoting sustainable work methods.

The competition garnered participation from all corners of the hospital, resulting in 13 entries. These submissions spanned a range of categories, including clinical changes, facility improvements, waste reduction strategies, ward-specific innovations, and emissions reduction projects.

The collective impact of these initiatives was substantial. The initiatives led to a reduction of 2.5 kt CO_2-e of emissions and cost savings of $500,000. The efforts also had a tangible effect on waste reduction, diverting 250,000 items away from landfill. Royal Melbourne Hospital continued the competition in 2023, providing enhanced support for participants, including specialised resources offering practical guidance to individuals and teams working on environmental sustainability projects.

©The Royal Melbourne Hospital

Case study 20

NSW Health Net Zero Clinical Programs

The New South Wales Net Zero Leads Program is a pilot program funded by the Ministry of Health to support clinicians to develop and implement scalable, low-carbon models of care in their workplace. The program is interdisciplinary, involving senior clinicians from allied health, anaesthetics, emergency, intensive care, medical imaging, nursing, pharmacy and surgery who work across known carbon hotspots. A diverse range of regional and metropolitan local health districts are represented.[351] Each Clinical Lead is supported to take one day per week to lead on a net zero project in their service or specialty. The program also provides opportunities for upskilling and professional development. Clinical Lead projects include:

- **Emergency:** optimising pathology investigations and reducing unnecessary testing.[352]
- **Allied Health:** improving hand hygiene and reducing unnecessary use of non-sterile gloves.[353]
- **Intensive Care:** reducing use of single-use barrier gowns while maintaining compliance with infection prevention guidelines.
- **Anaesthetics:** investigating and measuring use of volatile anaesthetics (including desflurane) and introducing a behavioural change intervention to reduce use.[354]
- **Medical Imaging:** measuring current clinical demand patterns for computerised tomography scanners and implementing a pilot intervention to turn off scanners not in clinical use out of hours.[355]

These projects will result in the production of guidelines that other hospitals, local health districts and health jurisdictions can utilise to improve patient outcomes and experience while reducing costs and greenhouse gas emissions.

Dr Brian O'Connell is one of 10 clinical leads helping to accelerate the transition to Net Zero. ©NSW Ministry of Health

7.2 Research and innovation

Investing in and supporting coordinated climate and health research will improve the evidence base for responses to:

- Better understand current and emerging climate risks and systemic vulnerabilities
- Strengthen the resilience and sustainability of the health system
- Improve health and wellbeing by ameliorating the negative health effects of climate change
- Evaluate adaptation and mitigation interventions and identify barriers and enablers for their effective implementation and scaling up, as well as the wider health benefits of climate action
- Reduce health system greenhouse gas emissions.

Investing in and supporting First Nations researchers to participate in health and climate research is particularly important to improve the evidence base. There is a need to 'weave together' First Nations knowledge and Western science in mitigation and adaptation solutions through the development of respectful and culturally safe partnerships.[356]

To date, the vast bulk of climate change and health research has been focused on identifying the health impacts of climate change. The 2022 report of the Lancet Countdown found 80% of English language peer reviewed articles were on the health impacts of climate change, with 8.4% of articles focused on adaptation and 11.6% focused on mitigation. To date, the evidence around climate-related health adaptation is limited and there is a need for more work to evaluate the success of efforts to adapt to climate change.[357] The National Health and Medical Research Council funded a Special Initiative in Human Health and Environmental Change in 2021, which led to the establishment of the Healthy Environments and Lives (HEAL) National Research Network aiming to address this need.[358] In addition, Natural Hazards Research Australia has been established as Australia's national centre for natural hazard resilience and disaster risk reduction research. It aims to deliver usable research and knowledge that creates safer and more resilient communities and addresses the major challenges arising from natural hazards, including bushfires, floods, cyclones, heatwaves, storms and other hazards.[359]

Most existing studies exploring health and mitigation focus on the health co-benefits of mitigation – few studies have directly studied how to reduce emissions. There is a growing body of research of life cycle assessments, comparing equipment and procedures, however, there is limited research on the carbon hotspots of entire clinical pathways.

ACTION 7.2

Scan of Australian health and climate research

The Australian Government will commission and publish a report which undertakes a scan of current research activities in Australia pertaining to health and climate change. The report will identify gaps in the literature, with a view to informing the prioritisation of future research funding.

ACTION 7.3

National Health and Medical Research Council Targeted Call for Research

The National Health and Medical Research Council is developing a Targeted Call for Research focusing on strengthening the evidence base for Australian climate-related health impacts and effective interventions to improve health outcomes. The Call is planned for 2024 with an indicative funding allocation of $5 million over 5 years from the Medical Research Endowment Account.

7.3 Communication and engagement

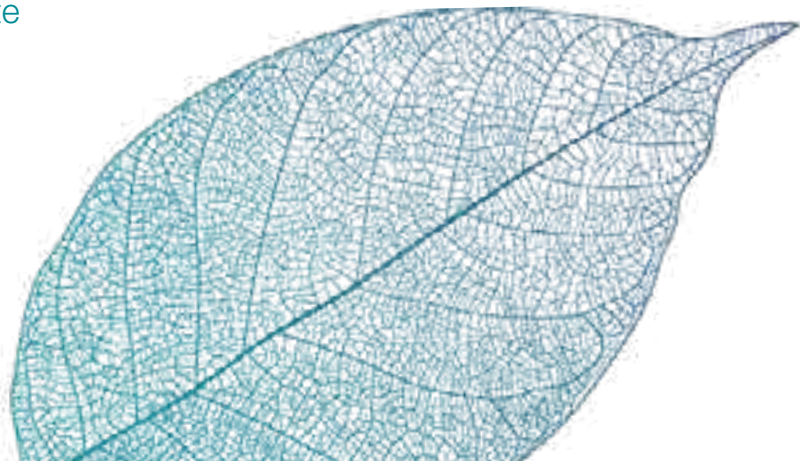
Communication and engagement will be crucial to mobilising effective, collaborative action on climate change and health across Australia. Effectively communicating and engaging with a wide range of stakeholders and the general public will ensure action to address the health and health system impacts of climate change are widely understood, providing a strong foundation for behavioural change across the health system. To empower individuals to play an active role in enhancing the sustainability and resilience of the health system, they must be equipped with tools, knowledge and information to make informed decisions about their health and healthcare. For example, it will be increasingly important that individuals understand the likely impacts of climate-related hazards such as heat and bushfire smoke on their health, and that they are enabled to take appropriate steps to reduce these risks. Likewise, where appropriate, patients who wish to do so should be empowered and supported to make clinically appropriate decisions about their healthcare that help to reduce its emissions footprint.

There is a particular need for engagement with communities that will be hit hardest by climate change, such as First Nations people and young generations. Engagement and communication should also be targeted to culturally and linguistically diverse communities, and to those who may have limited access to electronic media, such as older people and those living in remote communities. Effective engagement and communication with the public, patients, and consumers will be key to successful, equitable implementation of the Strategy. Improving and refining how agencies communicate and engage with a wide range of stakeholders and the general public will ensure action to address the health impacts of climate change and decarbonise the health system is widely understood and endorsed. As part of implementation of the National Preventive Health Strategy, a National Consumer Engagement Strategy for Health and Wellbeing (NCESHW) is being developed to strengthen partnerships between health policy makers and the community.[360] The NCESHW will facilitate consumer participation and engagement at all levels of the health system.

ACTION 7.4

Developing health and climate education materials

The Australian Government will design and deliver public-facing guidance on ways to reduce the emissions footprint of health and aged care, and opportunities to improve resilience to the health impacts of climate change (including action that patients and healthcare workers can take directly).



7.4 Collaboration and governance

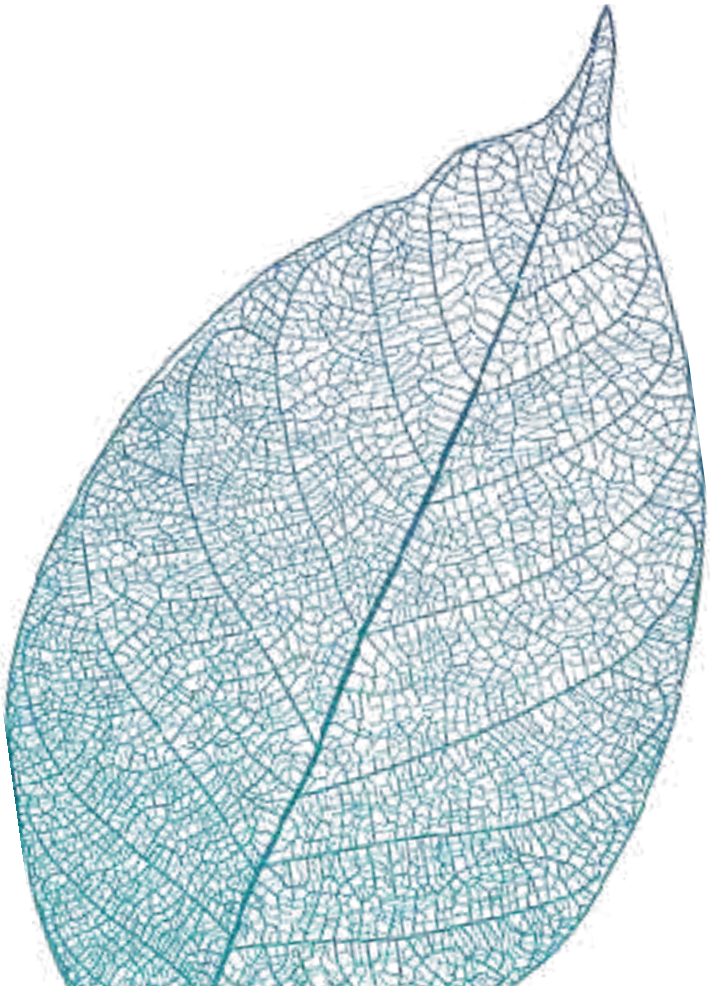
Tackling the health impacts of climate change and reducing health system emissions requires collaboration across all levels of society. The work must be informed by the perspectives of patients and consumers, as well as multi-sectoral collaboration across academia, industry, and relevant professional groups. The integrated translation of policy into practice requires new ways of collaborating, redefining shared authority and facilitating effective shared decision making.

Ensuring appropriate governance structures are in place – both cross-jurisdictional and beyond government – to facilitate regular collaboration with all stakeholders (and in particular First Nations people) will build ownership and facilitate working partnerships where required to plan and deliver shared commitments to reduce emissions and strengthen climate resilience. These governance structures are also needed to measure and track progress in delivering the Strategy, to inform future decisions, drive action, and hold stakeholders accountable.

ACTION 7.5

Reviewing health and climate governance

The Australian Government will review climate and health governance structures in consultation with states and territories and consider how to enhance cross-jurisdictional collaboration, as well as collaboration across the wider climate and health stakeholder community.



Appendix: List of actions

Chapter 3 actions

ACTION 3.1: Undertaking a National Health Vulnerability, Capacity and Adaptation Assessment

The Australian Government will undertake a National Health Vulnerability, Capacity and Adaptation Assessment, starting with an analysis of the *Health and Social Support System* within the *National Climate Risk Assessment*. The National Health Vulnerability, Capacity and Adaptation Assessment will holistically assess the health and wellbeing impacts of climate change across society, with impacts on health system functioning forming one area of focus.

ACTION 3.2: Developing a National Health Adaptation Plan

The Australian Government will develop a National Health Adaptation Plan as part of the National Adaptation Plan, expected to be published by the end of 2024.

ACTION 3.3: Developing guidance on risk assessment and adaptation planning

The Australian Government will develop guidance and implementation support tools in partnership with states, territories, Aboriginal Community-Controlled Health Services and other relevant stakeholders to enable state and territory health systems, local health systems, Aboriginal Community-Controlled Health Services and hospitals to undertake climate risk assessment and develop adaptation plans in a nationally consistent way.

ACTION 3.4: Building the capacity of Aboriginal community-controlled health services

In partnership with the Aboriginal community-controlled health sector, the Australian Government will work to identify options to support the capacity of Aboriginal Community Controlled Health Services to participate in place-based climate risk assessment and adaptation planning and emergency preparedness, response and recovery for climate-related disasters.

ACTION 3.5: Considering climate impacts in implementing the National Preventive Health Strategy

The Australian Government will consider the impact of climate change in implementing the *National Preventive Health Strategy 2021-2030*, recognising the role of preventive health in:

- Reducing demand on carbon-intensive health services and therefore reducing greenhouse gas emissions from the health system
- Building population and health system resilience to the health impacts of climate change and extreme weather events.

ACTION 3.6: Supporting leadership of First Nations communities on health and climate change

The Australian Government will work in partnership with First Nations organisations to support First Nations leadership on action and investment in climate change adaptation, including through its collaboration with Aboriginal Community Controlled Health Services to implement the following priorities under Objective 7 of the National Aboriginal and Torres Strait Islander Health Plan 2021–2031:

- Growing the First Nations environmental health workforce
- Housing and infrastructure solutions
- Food security
- Disaster planning, preparedness and recovery.

ACTION 3.7: Developing options for climate and health monitoring, data and indicators

The Australian Government will work with relevant stakeholders to explore options for developing a framework for routine data collection, monitoring, and reporting on the impacts of climate change on population health and health system functioning. This will be based on World Health Organization guidance and will include indicators of (a) relevant determinants of health; (b) the association between climate-related exposures and climate-sensitive health outcomes; and (c) health system resilience. The Government will work with stakeholders to improve the availability, collection and reporting of data to support this work.

ACTION 3.8: Developing a National Health Emergency Response Plan

The Australian Government will work with states and territories to develop an 'all hazards' National Health Emergency Response Plan, which will consider health emergencies for climate-related disasters and extreme weather events. This plan will update and consolidate existing health emergency response plans to provide a single source document to guide Australia's response to, and recovery from, emergency incidents of national significance.

ACTION 3.9: Strengthening the role of primary care in emergency response

The Australian Government will work with relevant stakeholders to strengthen the resilience and availability of primary care during and after climate-related disasters and extreme events by strengthening the role of Primary Health Networks in emergency preparedness and response. This will involve:

- Supporting Primary Health Networks to consider climate risks in the health needs assessment process and in planning and commissioning of local health services.
- Supporting Primary Health Networks to strengthen their functions in emergency preparedness, response and recovery. These functions encompass both:
  - Coordinating existing primary care services – for example, providing guidance and practical coordination and support to ensure continuity of access to relevant clinical care and preventive activities (including mental health support) during climate-related emergencies, particularly to communities in vulnerable situations
  - Commissioning new services to support additional community needs before, during, and after climate-related emergencies.
- Seeking to define clear roles for primary care and Primary Health Networks in emergency preparedness, response, and recovery activities – including by securing a role for Primary Health Networks in local incident response/ command governance structures for climate-related emergencies.

ACTION 3.10: Improving aged care emergency preparedness and response capability

The Australian Government will take the following action to improve aged care emergency preparedness and response capability:

- Continue to provide guidance through effective communication to support aged care providers in emergency preparedness and response, with the expectation of increased frequency and severity of extreme weather events impacting on older people. This will be in conjunction with the Aged Care Quality and Safety Commission who has existing resourcing for direct engagement with aged care providers.
- Surveillance, monitoring and reporting of extreme weather events, with early identification of potential risks to quality of care to aged care residents, and timely information sharing when risks escalate, in collaboration with the Aged Care Quality and Safety Commission.

ACTION 3.11: Strengthening aged care quality standards

From July 2024, the new Aged Care Act will give effect to a strengthened set of Aged Care Quality Standards, which will include requirements for providers for (a) emergency and disaster management, and (b) managing environmental risks relevant to care and services for older people. The Australian Government and the Aged Care Quality and Safety Commission will work together to develop accompanying guidance and implementation support tools, including to reduce climate-related risks to older peoples' health.

ACTION 3.12: Introducing aged care design principles and guidelines

From 2024, the Australian Government will introduce the National Aged Care Design Principles and Guidelines, which will include considering environmental sustainability and options for climate resilience when designing aged care homes.

Chapter 4 actions

ACTION 4.1: Reporting of estimates of health system greenhouse gas emissions

The Australian Government will publish baseline emissions estimates for the health system (inclusive of health and aged care) in 2024 and will seek to publish regular emissions estimates thereafter to track progress in emissions mitigation efforts. To the greatest extent possible, emission estimates will be drawn from Australia's National Greenhouse Accounts or based on methods and factors consistent with those Accounts. Where practicable, estimates will be disaggregated by source, scope, state or territory and whether the emissions occurred within or outside Australia.

ACTION 4.2: Alignment of approaches to reporting health system greenhouse gas emissions

The Australian Government will work together with state and territory health departments to align emissions estimation approaches by state and territory health systems, leveraging, to the extent possible, National Greenhouse Accounts methods and frameworks and data already reported by states and territories through their own reporting mechanisms.

ACTION 4.3: Establishing a national health system emissions reduction trajectory

The Australian Government will seek to negotiate a national emissions reduction trajectory for the Australian health system. The trajectory will encompass all levels of the health system (inclusive of aged care) and will encompass scope 1, scope 2 and scope 3 emissions and build on existing state and territory trajectories.

ACTION 4.4: Developing a health system decarbonisation roadmap

By 2025, the Australian Government will develop a health system decarbonisation roadmap encompassing all levels of the health system (inclusive of aged care). The roadmap will encompass scope 1, 2 and 3 emissions as well as patient travel, and will be developed in alignment with the Australia-wide Net Zero 2050 plan and state and territory strategies and plans. The Government will seek to develop the roadmap in partnership with stakeholders in state and territory health systems, and invite participation by private providers, industry and suppliers.

ACTION 4.5: New sustainability and climate resilience standards for health service organisations

In 2024, the Australian Commission on Safety and Quality in Health Care will, with input from the Australian Government and states and territories, pilot the Environmental Sustainability and Climate Resilience Healthcare Module – a framework of action focused on environmental sustainability and building climate resilience. Implementation of the Module will inform action in future national safety and quality standards developed by the Commission.

ACTION 4.6: Tackling unwarranted variations in clinical governance

The Australian Commission on Safety and Quality in Health Care will develop guidance for health service organisations' governing bodies and leadership teams on the delivery of appropriate, high value care, focusing on reducing unwarranted healthcare variation and low value care by prescribing:

- Model roles, responsibilities and accountabilities of members of governing bodies and leadership teams for delivering appropriate care
- Approaches to identify, measure and address unwarranted healthcare variation in line with an organisation's risk management framework
- A framework to invest, disinvest and reinvest resources to improve outcomes and shift resources from lower value to higher value activity
- Strategies to support monitoring and evaluation of local approaches to reducing low value care.

ACTION 4.7: Tackling unwarranted variations with health service organisations

The Australian Commission on Safety and Quality in Health Care and the Australian Government will work together to identify opportunities to support health service organisations reduce unwarranted healthcare variation and low value care by:

- Identifying clinical priority areas where there is evidence of low value care or unwarranted healthcare variation and take action to align care with evidence-based practice
- Developing measures to review the appropriateness of healthcare delivery with patient-reported outcome measures and patient-reported experience measures
- Describing stewardship programs for the quality use of medicines to reduce overuse and inappropriate prescribing
- Developing a framework and tools to monitor and evaluate systems for providing and improving the appropriateness of care.

ACTION 4.8: Developing a framework for reducing emissions by optimising models of care

The Australian Government will work with professional bodies to develop and pilot a framework for mapping emissions hotspots across patient care pathways of clinical specialties and the National Health Priority Areas to identify opportunities to reduce emissions while optimising patient care. This will build on the framework planned for development by the National Health Service in England.

ACTION 4.9: Expanding use of NABERS ratings for health and aged care facilities

The Australian Government will consider:

- Expanding the use and public reporting of National Australian Built Environment Rating System for public hospitals and residential aged care
- Developing and implementing National Australian Built Environment Rating System tools for private hospitals and medical centres.

ACTION 4.10: Moving towards zero emissions buildings

The Australian Government and the Australian Building Codes Board will work together to consider possible changes to the commercial building energy efficiency requirements in the National Construction Code. The changes are intended to support the Government's energy and greenhouse gas policies, including the 2050 net zero target. If agreed by Building Ministers, the new requirements will apply to hospitals and other health and aged care facilities.

ACTION 4.11: Sharing best practice in reducing ambulance emissions

The Australian Government and the Council of Ambulance Authorities will work together to promote knowledge sharing and data collection among state and territory ambulance services and other patient transport providers, also drawing on international experience, to adopt best practices in reducing emissions from ambulance services and to measure and report on progress.

ACTION 4.12: Reducing emissions from desflurane

The Australian Government will work with the Australian and New Zealand College of Anaesthetists, the Australian Society of Anaesthetists and states and territories to significantly reduce use of desflurane, including by agreeing a date by which its use will be phased out.

ACTION 4.13: Reducing emissions from nitrous oxide

The Australian Government will work with the Australasian College for Emergency Medicine, the Australian and New Zealand College of Anaesthetists, the Australian Society of Anaesthetists, the Australian Nursing and Midwifery Federation, the Royal Australian and New Zealand College of Obstetricians and Gynaecologists, states, territories, industry and suppliers to improve patient care, protect health care staff and reduce greenhouse gas emissions from nitrous oxide gas, both by reducing wastage from leaks and venting and by educating on appropriate use.

ACTION 4.14: Reducing emissions from respiratory inhalers

The Australian Government will work with Asthma Australia, National Asthma Council of Australia, Lung Foundation of Australia, Thoracic Society of Australia and New Zealand, Royal Australian College of General Practitioners and industry to improve respiratory health outcomes and reduce greenhouse gas emissions from respiratory inhalers.

ACTION 4.15: Review of nutrition standards in health care

The Australian Government will commission and publish a review of how sustainability is currently considered in state and territory policies on food access, availability and procurement in hospitals, and may consider relevant policies internationally. This review could inform guidance on food provision with the public hospital system.

ACTION 4.16: Supporting the systematic implementation of waste reduction action

The Australian Government will commission and publish a review of the potential ways in which health and aged care waste can be reduced, reused, refurbished, recycled, replaced and segregated and how these changes can be implemented. This review will then feed into the green procurement and sustainable resource use guidelines and further resources for health and aged care facilities and staff.

ACTION 4.17: Promoting green procurement and sustainable resource use

The Australian Government will develop guidelines on green procurement and sustainable resource use in consultation with states, territories, industry and suppliers.

Chapter 5 actions

ACTION 5.1: Considering the role for emissions footprinting of health technology products

The Australian Government will, in consultation with industry and other relevant stakeholders, review options for including public reporting and consideration of environmental impacts, starting with greenhouse gas emissions, of health technologies, in collaboration and alignment with international best practice in comparable jurisdictions.

ACTION 5.2: Collaborating to decarbonise international supply chains

In working to decarbonise health system supply chains, the Australian Government will work with the international collaboration between the English National Health Service and the United States Department of Health and Human Services to develop aligned procurement requirements to decarbonise health system supply chains.

ACTION 5.3: Alliance for Transformative Action on Climate and Health

The Australian Government will join and actively participate in the Alliance for Transformational Action on Climate and Health.

ACTION 5.4: Incorporating health consideration into Australia's next Nationally Determined Contribution under the Paris Agreement

The Australian Government is considering options for how its next Nationally Determined Contribution under the United Nations Framework Convention on Climate Change, due for submission in 2025, could highlight its strong action to reduce emissions from the health system and improve resilience to climate impacts.

Chapter 6 actions

ACTION 6.1: Developing a National Heat-Health Action Plan

The Australian Government will work with states and territories to develop and publish a National Heat-Health Action Plan which promotes a nationally consistent approach to minimising the health impacts of heat. Key considerations in this plan will include:

- Strengthening the National Heatwave Warning Framework as approaches to heatwaves develop over time
- Providing guidance and support tools for health workers, community organisations, and other relevant sectors in preventing, identifying, and responding to heat-related illness
- Enhancing monitoring, surveillance, and data collection for heat vulnerability and health impacts
- Identifying and pursuing opportunities to reduce population exposure to heat (including urban heat islands)
- Supporting tailored and evidence-based public health messaging about the health impacts of heat and self-protective measures
- Minimising heat-health impacts amongst at-risk groups, including occupationally exposed workers, culturally and linguistically diverse communities, and people with disabilities or reduced mobility.

ACTION 6.2: Addressing the impacts of climate change on air quality

The Australian Government will work together with states and territories to address the risks and health impacts of reduced air quality driven by climate change, as part of wider work to increase knowledge, awareness, and capacity to respond to the risks and health impacts of air pollution. This will be achieved through relevant projects outlined in the National Clean Air Agreement work plan, and other complementary programs and initiatives.

ACTION 6.3: Addressing climate change impacts on communicable disease

It is anticipated that the Australian Centre for Disease Control will work with jurisdictional stakeholders to enhance Australia's communicable disease surveillance, prevention, and response capabilities, reflecting the impacts of climate change on communicable disease emergence and transmission. Key considerations will include:

- Increasing data sharing, linkages, and analysis across departments and jurisdictions, with improved consistency and integration of human and animal disease and relevant ecosystem data
- Enhancing surveillance and risk analysis of disease vectors, zoonotic disease, and antimicrobial resistance
- Establishing governance and operational structures to coordinate, promote, support, and assess the adoption of One Health principles across all levels of Australian government.

ACTION 6.4: Increasing social community connectedness

The Australian Government will work to improve and promote mental health initiatives aimed at increasing social community connectedness to help build longer-term resilience in communities before, and after, climate-related disasters and extreme weather events. This will help to address a wide range of mental health impacts of climate change, as well as support and complement the implementation of the National Disaster Mental Health and Wellbeing Framework.

ACTION 6.5: Building workforce awareness, education, and capacity-building

The Australian Government will work with relevant stakeholders to build workforce capacity to prevent, identify, and respond to the mental health and wellbeing impacts of climate change, including by exploring options for training in climate change and mental health.

ACTION 6.6: Taking account of sustainability considerations in the Australian Dietary Guidelines

The National Health and Medical Research Council will engage with the Australian Government to consider economic, social, and environmental sustainability in the updated Australian Dietary Guidelines, including Australia's commitment to the Sustainable Development Goals, the Paris Agreement and net zero emissions by 2050. The updated Australian Dietary Guidelines are expected to be published by 2026.

ACTION 6.7: Addressing the impacts of climate change on First Nations health and food security

In partnership with First Nations communities, the Australian Government will work to address the impacts of climate change on First Nations food security and the health of First Nations people, including through the *National Strategy for Food Security in Remote First Nations Communities*.

ACTION 6.8: Considering climate resilience in updates to the National Construction Code

The Australian Government will work with states, territories, and the Australian Building Codes Board to progress opportunities to embed sustainability and climate resilience principles in the National Construction Code, and in doing so will consider the health impacts of climate change.

ACTION 6.9: Considering climate resilience in developing the National Housing and Homelessness Plan

The Australian Government, in collaboration with states and territories, will deliver a National Housing and Homelessness Plan that will outline a shared vision to inform future housing and homelessness policy in Australia. In developing this plan, the Government will consider the health benefits of climate-resilient housing.

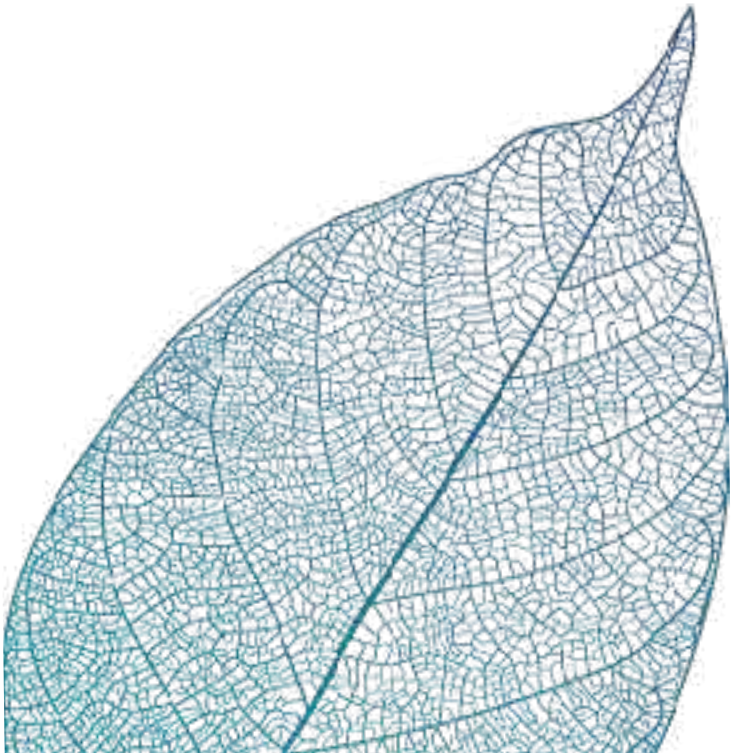
ACTION 6.10: Promoting the health benefits of improved First Nations housing and energy security

The Australian Government will:

- Work in partnership with the National Aboriginal and Torres Strait Islander Housing Association, who are co-chairing the newly established Housing Policy Partnership, to promote the importance of high-quality, climate-resilient housing in reducing the negative health impacts of climate change on First Nations communities.
- Work in partnership with First Nations communities to include a health perspective in the First Nations Clean Energy Strategy, including by exploring opportunities to improve access to affordable and reliable power through renewable energy (e.g. rooftop solar, community microgrids and battery storage) for First Nations housing and health infrastructure.

ACTION 6.11: Promoting active travel

The Australian Government will seek to engage relevant agencies across all levels of government to promote active travel. This will support and complement implementation of the National Preventive Health Strategy 2021-2030.



Chapter 7 actions

ACTION 7.1: Mobilising the health workforce to lead action on climate and health

The Australian Government will engage with states, territories and relevant stakeholders to support and mobilise the health workforce to build a sustainable and climate-resilient health system. Key considerations will include:

- Incorporating sustainable healthcare and climate resilience principles in health professional training curricula and accreditation processes, including through quality improvement processes
- Exploring options for developing and providing Continuing Professional Development and other training opportunities in sustainable and resilient healthcare for the health workforce.

ACTION 7.2: Scan of Australian health and climate research

The Australian Government will commission and publish a report which undertakes a scan of current research activities in Australia pertaining to health and climate change. The report will identify gaps in the literature, with a view to informing the prioritisation of future research funding.

ACTION 7.3: National Health and Medical Research Council Targeted Call for Research

The National Health and Medical Research Council is developing a Targeted Call for Research focusing on strengthening the evidence base for Australian climate-related health impacts and effective interventions to improve health outcomes. The Call is planned for 2024 with an indicative funding allocation of $5 million over 5 years from the Medical Research Endowment Account.

ACTION 7.4: Developing health and climate education materials

The Australian Government will design and deliver public-facing guidance on ways to reduce the emissions footprint of health and aged care, and opportunities to improve resilience to the health impacts of climate change (including action that patients and healthcare workers can take directly).

ACTION 7.5: Reviewing health and climate governance

The Australian Government will review climate and health governance structures in consultation with states and territories and consider how to enhance cross-jurisdictional collaboration, as well as collaboration across the wider climate and health stakeholder community.

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Australian Government

Department of Health and Aged Care

National Health, Sustainability and Climate Unit

NHSC.Unit@Health.gov.au