Melbourne's changing climate: science, impacts and response

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Out of the Box Executive

Whitehorse Community Arts Centre, Box Hill

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Acknowledgment of Country

I would like to acknowledge the Wurundjeri Woiwurrung people of the Kulin Nation as the Traditional Owners of the land on which we meet today. I pay my respects to their Elders past, present and emerging. I also welcome any Aboriginal and Torres Strait Islander people present today.

Key messages

- Climate Change is increasing the frequency and intensity of several weather and climate extremes and is emerging as <u>the</u> globe's most serious risk
- Melbourne will very likely continue to warm with risks from heatwaves, droughts, bushfires and more intense rainfall events expected to increase
- Return periods of extremes are expected to shorten and the likelihood of compounding events increase
- Commitments to reduce global carbon emissions are well short of those needed to avoid the worst impacts from climate change
- Deeper carbon emissions reductions are urgently needed

Rapidly rising greenhouse gas concentrations from burning of fossil fuels



BoM & CSIRO (2022)

The Paris Agreement: Central aim

"… to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degC above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius"



United Nations Framework Convention on Climate Change (2015)

Global and regional tipping points



Potsdam Institute for Climate Impact Research (2023) based on Armstrong McKay et all (2022)

A few tenths of a degree matters



What are the World Economic Forum's greatest risks for the world?

Risk categories

- Economic
- Environmental
- Geopolitical
- Societal
- Technological

2 years

- 1stMisinformation and disinformation2ndExtreme weather events3rdSocietal polarization4thCyber insecurity5thInterstate armed conflict6thLack of economic opportunity7thInflation
- 8th Involuntary migration
- 9th Economic downturn
- 10th Pollution

10 years

1 st	Extreme weather events
2 nd	Critical change to Earth systems
3 rd	Biodiversity loss and ecosystem collapse
4 th	Natural resource shortages
5^{th}	Misinformation and disinformation
6 th	Adverse outcomes of AI technologies
7 th	Involuntary migration
8 th	Cyber insecurity
9 th	Societal polarization
10 th	Pollution



Source: The World Economic Forum (2024)





Insurers' payments to policyholders impacted by extreme weather averaged over last 30, 20, 10, 5 years

9

Insurance Council of Australia (2024)

Physical climate risks rapidly increasing

Victoria's climate has changed If global emissions continue to increase, in the 2050s Victoria may experience...



Under high emissions, compared to 1986-2005. Updated from Victoria's Climate Science Report 2019

Greater Melbourne Climate Projections

Heavy rainfall events



Hot days



Victoria Government & CSIRO (2019)

Risks from extreme heat

- Causes catastrophic risks to human health
- Often leads to poor air quality
- Impacts on the body have flow on effects for wellbeing, workplace productivity and the economy
- Heat impacts vulnerable populations disproportionately

- Impacts the built environment, causing the buckling of roads and footpaths, damage to train tracks, the expansion and cracking of building materials and reduced efficiency of transmission lines and generators
- Increased energy demand for cooling puts further strain on power supplies potentially causing blackouts

Adapted from ARC Centre of Excellence for Climate Extremes (2024)

Land Surface Temperature difference from a non-urban (vegetated) baseline





Sun et al. (2019)

Greater Melbourne Climate Projections: More dangerous fire weather and rising sea levels

High confidence that the number of fire days where the Forest Fire Danger Index is extreme (for 1986-2005) is projected to increase at Melbourne by a median value of 7.7 days per year by the 2050s under high emissions - a 42% increase

"Sea levels are expected to continue rising through the 21st century (very high confidence). For example, at Williamstown by the 2050s under high emissions, sea level is expected to rise by a median value of 24 cm (4 mm/yr) compared to the 1990s"

Victoria Government & CSIRO (2019)



Compound events

"In coming decades, Australia is projected to experience ... An increase in the risk of natural disasters from extreme weather, including 'compound extremes', where multiple extreme events occur together or in sequence, thus compounding their impacts." (BoM & CSIRO State of the Climate 2022)

- Estuarine flooding from extreme rainfall coinciding with higher sea-levels
- Bushfire risk from drought coinciding with more intense heatwaves
- People's welfare, health and well-being declining because of increasing inequality coinciding with increasing weather extremes

Victoria's Climate Change Strategy

- Transition to a clean energy future will create jobs, cut costs for households and businesses and strengthen our energy system
- Invest in innovative technologies, such as zero emissions vehicles and hydrogen, and partner with businesses and communities to set Victoria up for their adoption
- Recognise and safeguard the role of our natural environment in reducing emissions, and ensure our farmers are well placed to embrace new technologies and practices that reduce emissions
- Support Victorian businesses and communities to cut emissions and thrive in a net-zero emissions future

Victoria Government (2022)

...Victorian Government emissions reductions targets

- To cut the state's emissions on the path to net zero emissions by 2045 by
 - 25% by 2020 (achieved)
 - ▶ 40% by 2025
 - ▶ 65% by 2030
 - ▶ 95% by 2035
- The Australian Government's emissions reduction targets are 43% by 2030 and net zero by 2050

WHITEHORSE CLIMATE RESPONSE PLAN 2023-2026

The Whitehorse Climate Response Plan 2023-2026 supports the first three years' implementation of Council's Climate Response Strategy 2023-2030 and its targets. This target alignment is represented in the icons to the right.

In this Plan, actions highlighted in grey are identified as opportunities, where additional new staff resources, and ongoing or once-off operational costs are required. These will be considered as part of Council's annual budget process.



Maintain carbon neutral status for corporate emissions.



electricity for Council operations by 2025.

Acronyms

ALGA	Australian Local Government Association
BV	Business Victoria
CASBE	Council Alliance for a Sustainable Built Environment
DEECA	Department of Energy Environment and Climate Action
DFFH	Department of Fairness, Families and Housing
DoH	Department of Health
DTP	Department of Transport and Planning
EAGA	Eastern Alliance for Greenhouse Action
EASL	Eastern Alliance for Sustainable Learning
ERG	Eastern Region Group
MAV	Municipal Association of Victoria
NELA	North East Link Authority
RV	Recycling Victoria
SRLA	Suburban Rail Loop Authority
SV	Sustainability Victoria
VGA	Victorian Greenhouse Alliances
WBG	Whitehorse Business Group
YVW	Yarra Valley Water



Achieve net zero corporate emissions by 2032.



Aspire for net zero community emissions by 2040.

Whitehorse City Council (2023)

Relationship between urban climate change emissions reduction and adaptation

Emissions reduction Adaptation Climate change emissions reduction means Climate change adaptation means reducing or avoiding greenhouse gas taking steps to prepare for and respond to the effects of the emissions to minimise the rate and magnitude of climate change. changing climate. **Emissions reduction Adaptation actions:** actions: Enhanced hazard risk Increased use of reduction planning Greener renewable energy Climate-wise buildings & adaptive Increased use of zero Expand urban forest building & emissions vehicles and green infrastructure infrastructure Technology to reduce design Reducing heat absorption manufacturing on streets, pavements and Water emissions other surfaces conservation (embodied carbon) Community awareness • Reducing waste Urban and education to landfill greening Urban planning and Circular economy, infrastructure design to Greater energy including greening accommodate projected sea efficiency the supply chain level rise, increased bushfires, and improved heatwaves, drought, intense resource recovery rainfall and flooding and recycling Enhanced support services

Victoria Government (2022)

Some actions can help adapt and reduce emissions.

Relationship between urban climate change emissions reduction and adaptation



Victoria Government (2022)

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Victoria Government (2022)

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