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| Frequently Asked Questions |
| Victoria’s Climate Science Report 2019 |

## **Q**. What is in the Climate Science Report?

**A.** Victoria’s Climate Science Report 2019 provides a synthesis of the best available climate change science and its implications for Victoria. The report summarises the knowledge gained from the Victorian Government’s ongoing investment in climate science, such as the Victorian Climate Projections 2019 and the Victorian Water and Climate Initiative, as well as research from our leading academic institutions.

The report tells us that Victoria’s climate has already changed – becoming hotter and drier in recent decades. It also shows how these trends are projected to continue in the future, along with more frequent high fire danger days and rising sea levels.

The report intends to help you understand the likely impacts of climate change and convey the importance of using robust science to adapt to these changes to build a more resilient Victoria in the future.

## **Q**. How is Victoria’s climate changing?

**A.** Victoria’s climate is getting hotter and drier. Long-term observed records show that Victoria’s climate is changing through both natural variability and global warming. The average temperature across the state has warmed by just over 1.0°C since official records began in 1910. Over the past 30 years, Victoria’s cool season rainfall has declined compared to last century.

Mean sea level for Melbourne (recorded at Williamstown), has risen by approximately 2mm per year since 1966. There has been an increase in dangerous fire weather and in the length of the fire season across Southern Australia since the 1950s.

## **Q**. How will Victoria’s climate continue to change in the future?

**A.** Projections suggest that Victoria’s climate will continue to get hotter and drier. However, natural year-to-year and decade-to-decade variability mean that relatively cooler periods and very wet years will still occur.

Annual rainfall is projected to decrease across the state, due to declines across autumn, winter and spring. When extreme rainfall events do occur, they are likely to be more intense. Areas of the Victorian Alps are projected to see a greater reduction in rainfall than the surrounding areas. Victorian alpine areas are also projected to continue to experience declining snowfall (35-75 per cent by the 2050s under high emissions).

Comparison of observations and projections in Victoria suggest that temperature has been tracking towards the upper limit of projections while winter rainfall has been tracking towards the drier end of projections.

By the 2050s, if the current rate of global warming continues, Victorian towns could experience around double the number of very hot days each year compared to the 1986-2005 average.

By the 2090s, Victoria is projected to warm on average by 2.8 to 4.3°C under a high emissions scenario compared to 1986-2005. This would see Victoria frequently experiencing currently unprecedented high temperatures.

Victoria is likely to have a much longer fire season with the number of very high fire danger days likely to continue to increase. Sea levels along the Victorian coast are also likely to continue to rise.

For more specific information on how climate change may affect where you live, local climate projections have been developed and then analysed for ten regions across Victoria. Find the Victorian Climate Projections 2019 report for your region at www.climatechange.vic.gov.au

## **Q**. How will climate change impact me?

## **A**. Climate change affects us all and will have local impacts. For example, a hotter and drier Victoria could mean increased fire danger risk and longer fire seasons. For more specific information on how climate change may affect where you live, local climate projections have been developed and then analysed for ten regions across Victoria. Find the Victorian Climate Projections 2019 report for your region at www.climatechange.vic.gov.au

## **Q**. What is the difference between weather and the climate?

## **A.** “Climate is what you expect, and weather is what you get” (Mark Twain). Weather is what we get each day, while climate is the long-term average of the weather patterns we experience over decades.

## **Q**. What is the difference between climate variability and climate change?

## **A.** Climate variability looks at changes that occur within smaller timeframes, such as a month, a season or a year. Climate change considers changes that occur over a longer period - decades or longer. The long-term trends show an increase in temperature and decreases in cool season rainfall over recent decades.

## **Q**. Can we say an extreme weather event was caused by human-induced global warming?

**A.** Attribution studies allow us to understand the links between climate change and individual extreme events by working out if the likelihood or severity of an event happening now is different to what it would be in a world that was not warming in response to human activities.

While attribution can indicate if an event was more likely due to climate change, it does not allow us to say that climate change ‘caused’ a particular event. Also, where attribution science finds that climate change is making a given type of extreme weather more likely, natural variability means that there will still be ups and downs in the strength and frequency of extreme events from year to year.

Researchers from the national Earth Systems and Climate Change Hub have been conducting attribution studies on Australian extreme events, as well as supporting the development of a real-time attribution service. For more information see http://nespclimate.com.au/science-update-understanding-the-role-of-climate-change-in-climate-extremes/

## **Q**. Have recent widespread and extended droughts been caused by human-induced global warming?

**A**. Drought is complex, and broad definitive statements are difficult to make. Particularly in Australia, where we have a long history of extended droughts, it is difficult to discern the contribution of climate change, from normal variations in weather and climate. So, while we can’t say human-induced global warming caused the drought, it may have contributed to some degree.

## **Q**. Why is there more uncertainty in rainfall projections compared to temperature?

**A.** There are large uncertainties when it comes to rainfall projections – firstly because rain varies more in time and space than temperature. And secondly, because it’s tricky to reliably simulate influences like atmospheric circulation and weather systems in models. This applies even in local-scale modelling and warrants a greater focus on research. Therefore, it’s important to assess the overall confidence in rainfall projection by considering the influence of both large-scale and regional changes.

## **Q**. What action is the Victorian Government taking on climate change?

## **A**. The Victorian Climate Change Act 2017 is the centrepiece of Victoria’s commitment to take real and urgent action on climate change. We are leading our economy to net zero emissions by 2050 and supporting Victoria’s resilience in response to the impacts of climate change.

The actions that the Victorian Government is already taking mean that we are well on track to meet our target to reduce greenhouse gas emissions by 15 to 20 per cent below 2005 levels by 2020. Victoria’s 2020 emissions are projected to be 18 per cent below 2005 levels. Victoria’s Climate Change Act 2017 requires development of five yearly sector pledges which describe the actions government will take to reduce Victoria’s emissions. The first pledges for the period to 2025 must be finalised by 1 August 2020.

Climate change affects our economy and the way our state operates - it impacts business and jobs. Extreme heat events already [cost the Victorian economy](file:///C:\Users\cw0j\AppData\Local\Microsoft\:w:\r\sites\ecm_544\_layouts\15\Doc.aspx%3fsourcedoc=%7b4F088C7A-A65F-4A9A-B192-EFC35A4E183D%7d&file=FAQs_VicClimateScienceReport2019.docx&action=default&mobileredirect=true) on average $87 million a year, and this cost is projected to rise as heatwave events become more frequent We are delivering local-scale climate projections across the state to assist the community, businesses and government to prepare for and adapt to the future climate.

We are developing Adaptation Action Plans for industries or services most vulnerable to climate change or essential to successful climate adaptation. These systems are: health and human services, primary production, water, the natural environment, the built environment, education and transport. The government is also supporting regional and local climate change adaptation through a $1 million grant program. The grant program will help Victorian communities adapt to climate change impacts in their region.

More information on the action being taken by the Victorian Government on climate change can be found at [www.climatechange.vic.gov.au](http://www.climatechange.vic.gov.au)

## **Q**. Where can I find information on climate change in Victoria?

## **A**. Victoria’s government climate change website [www.climatechange.vic.gov.au](http://www.climatechange.vic.gov.au) has plenty of information and resources available on Victoria’s climate, the action we are taking to reduce the scope of the changes being experienced and also on how to best adapt to those changes. The website also hosts the Victorian Climate Projections 2019 reports.

To use the Victorian Climate Projections 2019 datasets, head to [www.climatechangeinaustralia.gov.au/vcp19](http://www.climatechangeinaustralia.gov.au/vcp19)

## **Q**. What are the Victorian Climate Projections 2019 (VCP19)?

**A**.: The Victorian Climate Projections 2019 (VCP19) is a Victorian Government research program to help Victorian communities prepare for climate change by providing authoritative and up-to-date information. CSIRO’s Climate Science Centre developed local-scale climate projections data for Victoria at a 5km by 5km scale. The projections cover average and extreme temperature and rainfall, relative humidity and evaporation to 2090 for moderate and high greenhouse gas emissions scenarios.

The project produced regional summaries, a technical report, publicly available datasets and guidance on how to use the information. The new research supports what we know from previous projections, as well as giving some new insights at a local scale into the hottest hot-day temperatures, and rainfall around mountain ranges. The new information complements the existing climate change information for Victoria.

## **Q:** What new information can we learn from the Victorian Climate Projections 2019 (VCP19)?

## A: VCP19 is new local-scale climate projection modelling for Victoria. The results from the new modelling are given in the context of existing climate projections for Victoria. This highlights where the projections reinforce what we knew from existing work and where VCP19 has produced new information.

## Some new findings from VCP19 include:

* The hottest hot days are likely to be even hotter than previously projected
* The western slopes of the Victorian Alps are likely to have a greater decline in rainfall than surrounding regions.

## VCP19 also includes new projections of Victoria’s climate in a world where climate change is limited to 2°C global mean temperature increase, as committed to under the Paris Agreement.

The Paris Agreement was signed in 2016 by most nations in the world which met in Paris and agreed to take steps to mitigate global warming.

The Information and data available from the 2019 climate projections fact sheet has more information about the project outputs and how they may be useful.

## **Q:** What will the future climate be in my region?

**A**: Regional overviews of future climate projections can be downloaded below:

[Barwon Climate Projections 2019 (PDF, 1.3 MB)](https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0037/429868/Barwon-Climate-Projections-2019.pdf)

[Central Highlands Climate Projections 2019 (PDF, 1.7 MB)](https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0030/429870/Central-Highlands-Climate-Projections-2019.pdf)

[Gippsland Climate Projections 2019 (PDF, 2.4 MB)](https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0035/429875/Gippsland-Climate-Projections-2019.pdf)

[Goulburn Climate Projections 2019 (PDF, 1.6 MB)](https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0036/429876/Goulburn-Climate-Projections-2019.pdf)

[Great South Coast Climate Projections 2019 (PDF, 3.0 MB)](https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0037/429877/Great-South-Coast-Climate-Projections-2019.pdf)

[Greater Melbourne Climate Projections 2019 (PDF, 1.5 MB)](https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0038/429878/Greater-Melbourne-Climate-Projections-2019.pdf)

[Loddon Campaspe Climate Projections 2019 (PDF, 2.4 MB)](https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0039/429879/Loddon-Campaspe-Climate-Projections-2019.pdf)

Mallee Climate Projections 2019

Ovens Murray Climate Projections 2019

Wimmera Southern Mallee Climate Projections 2019

## **Q**. Why has the Victorian Government done its own climate projections?

**A**: Global climate models typically use a grid cell size of 100-200km - projecting the same climate for any place within a 200km area. For Victoria, a state with unique and diverse geography, global models build projections that may reflect a single climate for both Mt Buller and Bendigo. As these two Victorian locations demonstrate, complex topography such as urban areas, coasts and mountains can have a significant influence on the regional climate.

To better represent regional climate, the Victorian Government has partnered with CSIRO to help us to understand the possible future climate down to a 5 km grid size to better prepare for local impacts and plan to adapt at a local-scale.

## **Q**. What action can I take on climate change?

**A**: Learn about how climate change may impact your community and share your knowledge with others.

Take steps to build the resilience of your business, environment and community to the impacts of climate change by considering the known risks when making decisions.

To contribute to global efforts to reduce greenhouse gas emissions, and moderate the scale of the climate change we can expect, join the Victorian Government’s [TAKE2 program](https://www.sustainability.vic.gov.au/campaigns/take2).

For ideas on how to adapt to the local impacts of climate change, refer to Victoria’s climate change website [www.climatechange.vic.gov.au](http://www.climatechange.vic.gov.au)

To understand how to stay healthy in a changing climate, visit the Better Health Channel online for simple actions you can take to protect yourself and your family from the impacts of climate change [www.betterhealth.vic.gov.au](http://www.betterhealth.vic.gov.au)