Emissions scenarios

Victoria's climate projections use Representative Concentration Pathways (RCPs) as emissions scenarios for the future.

What are emissions scenarios?

The future climate depends on: (1) the emissions pathway the world follows, (2) the response of the climate system to those emissions and (3) natural variability in the climate system.

Because we can't predict the social, economic and technological pathways the world will take in the future, we need to make assumptions about emissions pathways in order to project longer-term future climate.

The climate research community does this by using Representative Concentration Pathways (RCPs), which describe different possible futures based on the concentration of greenhouse gases in the atmosphere.

RCPs have replaced the previous scenarios (e.g. A1FI, A2, B1) that were used in older assessments.

What are the RCPs?

There are four RCPs (Table 1) ranging from ambitious mitigation (RCP2.6) through to ongoing high emissions (RCP8.5).

Table 1. Relationship between Representative Concentration Pathways (RCPs) and other scenarios, and their temperature outcomes at 2100.

Representative Concentration Pathway (RCP)	Special Report on Emissions Scenarios (SRES) rough equivalent	Concentration of CO_2 in 2100 (ppm)	Likely 2080-2100 global average temperature (°C above pre-industrial levels)
2.6	None	421	0.9 to 2.3
4.5	B1	538	1.7 to 3.2
6.0	B2	673	2.0 to 3.6
8.5	A1F1	936	3.2 to 5.4

How realistic are they?

Since the 2005 baseline where the RCPs start, there was evidence that we were tracking the highest or worst-case scenario RCP8.5, but a very recent slowdown in emissions growth suggests maybe we could be starting to track below this, although this is not clear and fully established yet. Regardless of which RCP we are tracking now, a range of scenarios should be considered when examining the future, rather than guessing a single scenario and using only that one.

The approach for VCP19

Following consultation with stakeholders, the Victorian Climate Projections 2019 (VCP19) uses RCP8.5 and RCP4.5. All relevant model outputs, as well as new high-resolution downscaling, report on changes under these two RCPs. This information can be used to inform long-term strategic climate risk management and adaptation planning under ongoing climate change.

RCP6.0 was also of interest to stakeholders but was not included due to low data availability; and the response is fairly similar to RCP4.5 for many broad questions. For comparative purposes, pre-existing data for changes in RCP2.6 and RCP6.0 are used where relevant.

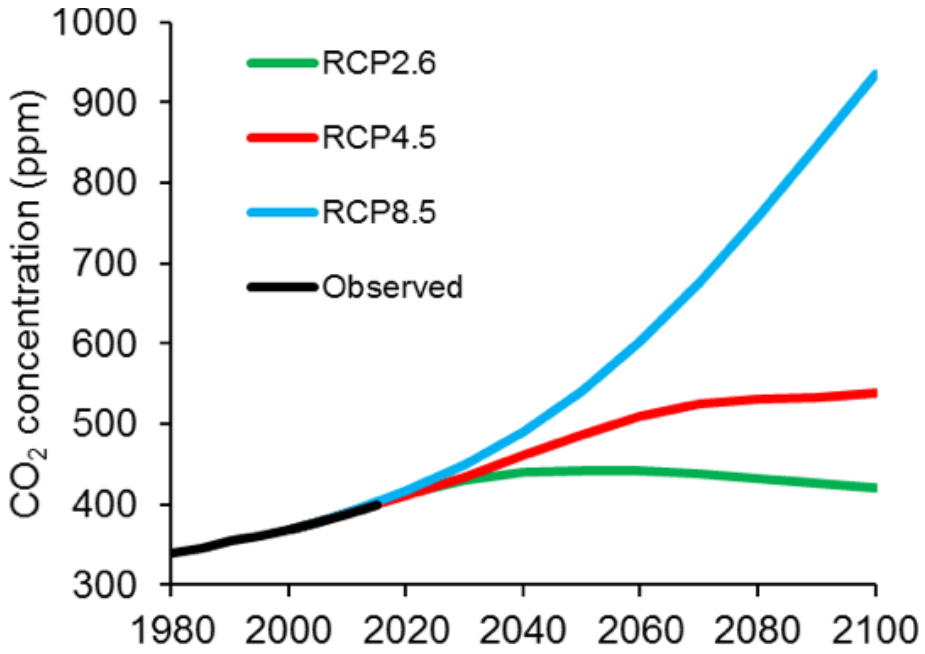

Figure 1. Carbon dioxide concentrations associated with the Representative Concentration Pathways.

What about the Paris agreement?

An alternative to looking at emissions or concentrations scenarios is looking specifically at change under the Paris agreement targets: "keeping global temperature rise well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 °C." Understanding Victorian climate change under these global targets requires more than the GCM and downscaling simulations for the RCPs. Note that pre-industrial in this context is not precisely defined but can generally be taken to relate to the climate of the latter half of the 19th century.

VCP19 provides some explanation of the potential impacts on Victoria of a 2 °C rise in global average temperature. Information about regional climate change under the Paris agreement targets using existing sources can be used as a 'minimum case' for adaptation planning, and to illustrate the benefit of emissions mitigation.

More information

www.climatechange.vic.gov.au/vcp19

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