Media Release

How does the climate react to net zero?

How will Australia achieve net zero, and what comes next? Meet the climate experts leading the way.

Australia is on the path to net zero, but what does this really mean? What will the climate look like once we achieve net zero? Will it be sufficient to curb climate risks, or must we aim for net negative emissions? And what happens if we fall short?

Experts from the ARC Centre of Excellence for Climate Extremes examine these questions and shed light on the realities of net zero and its implications for our climate in a new briefing note.

Understanding net zero

Net zero is achieved when human-induced greenhouse gas emissions are balanced by their removal from the atmosphere. Once net zero is reached, the concentration of greenhouse gases in the atmosphere starts to decrease and the pace of climate change begins to slow down. But many might not realise that while temperatures over land are expected to begin cooling, parts of the ocean may continue to warm.

Liam Cassidy, a co-author of the briefing note, is studying for his PhD with the ARC Centre of Excellence for Climate Extremes at the University of Melbourne. Liam's work focuses on the global and regional temperature changes in our climate system after net zero, which he says is an important emerging area of research.

Cassidy recently published research on heat extremes after net zero, finding that the frequency of heat extremes over most land areas may decrease after net zero. These changes are likely regionally dependent, with some regions projected to experience up to a 40 per cent reduction while others may see minimal changes.

"It is very exciting to work at the forefront of climate science focused on net zero because I believe discovering and communicating our early findings and challenges might help guide future research directions around what reaching net zero might mean for the health and safety of communities around the world," he says.

"The future of net zero research is also very exciting as the greatest research impacts might require collaboration between scientists across many disciplines, including STEM and social sciences."

The urgency of reaching net zero

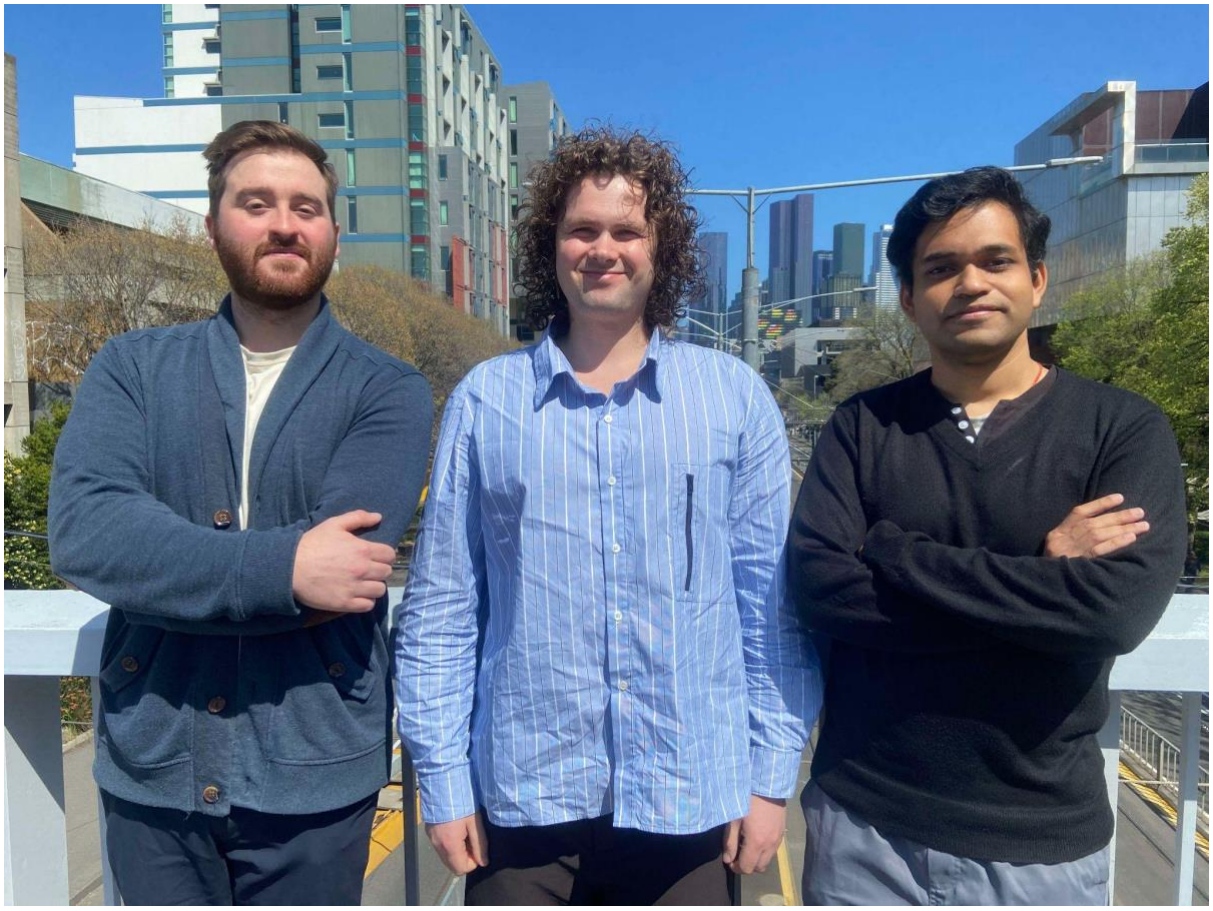
Every fraction of a degree of warming amplifies climate risks and human suffering. Limiting the impacts of climate change requires reaching net zero emissions as soon as possible. But even this may not be enough. Net negative emissions—where more greenhouse gases are removed than emitted—could cool the planet further and mitigate the most severe impacts of climate change.

As a signatory of the Paris Agreement, Australia has committed to limiting global temperature increases to well below 2°C and striving for 1.5°C. Yet, current global efforts are on track to exceed these targets. If they do, scientists have predicted this will have catastrophic impacts on the environment and, by extension, affect every human on the planet.

Reaching net zero by 2050, as many countries have pledged, is likely inadequate to meet the Paris Agreement goals, and more immediate action is needed. The most reliable path to achieving net zero is through significant reductions in greenhouse gas emissions as soon as possible.

Australia's net zero future leaders

The ARC Centre of Excellence for Climate Extremes has been at the forefront of research into how net zero will shape our climate future. These researchers are not only studying Australia's future climate, they are helping to shape it.



Liam Cassidy, Alexander Borowiak and Aditya Sengupta, PhD candidates at the University of Melbourne and co-authors of this briefing note on net zero (left to right). Image: Supplied.

Cassidy's co-author, Alexander Borowiak, PhD student at the University of Melbourne, uses climate models to explore how the climate may evolve post-net zero, focusing on regional temperature changes over the next century.

"Achieving net zero is crucial for preventing further climate change and stabilising global temperatures, in line with the Paris Agreement," says Borowiak.

"I joined climate science to hopefully help contribute to a solution to climate change by employing my maths and science skills in an important area of research. I am passionate about

working in net zero science as I believe understanding how we get there and what getting there means is crucial.

“Getting to net zero is important for keeping our climate safe, but the pathway we take there can also have an important influence on the future of our climate.”

Their third co-author, Aditya Sengupta, is also a PhD student at the ARC Centre of Excellence of Climate Extremes, based at the University of Melbourne. He is studying the impacts of climate change on the El Niño Southern Oscillation (ENSO), particularly how ENSO will change after we reach net-zero emissions.

“Working in this area is very interesting since it enables us to analyse and look for potential reversal or irreversibility of changes that we have already made to our earth system,” explains Sengupta.

“The findings will have implications for policymakers and governments alike for planning and preparing for regional climate change and for achieving the zero emission target quickly within this century.”

Borowiak adds: “Contributing to research that is filling in an important gap in our understanding of climate change is very worthwhile, and hopefully will help with efforts to understand and reduce future impacts of climate change.”

For further information on Australia’s path to net zero, please refer to the ARC Centre of Excellence for Climate Extremes’ latest briefing note on net zero. For interviews with the authors, please contact the ARC Centre of Excellence for Climate Extremes media team at v.ticha@unsw.edu.au or l.poncet@unsw.edu.au.

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