

Future maps: We have the blueprint for livable, low-carbon cities

August 30 2019, by Deo Prasad



Credit: AI-generated image ([disclaimer](#))

Over the past seven years more than 100 research projects at the [Co-operative Research center for Low Carbon Living](#), in collaboration with industry across Australia, have pondered a very big question: How do we build future cities that are sustainable, livable and affordable?

This is exactly what Australians want, as the recent Greater Sydney Commission report, [The Pulse of Greater Sydney](#), revealed. People want cities in which they live close to jobs and have reasonable commuting times. They want access to parks and green space, and relief from ever-increasing urban heat.

The good news is we already know what it will take to deliver on much of this wish list. Since 2012, I have headed the A\$100 million Low Carbon Living CRC, which has brought together Australian businesses, industries, communities and many of our brightest researchers to work out how to steer change.

Our [Cooling Sydney Strategy](#), for instance, is the result of years of research into how to combat urban heatwaves. The burden of this heat is unevenly spread across our cities.

For example, residents of Sydney's western suburbs are [exposed to many more days hotter than 35 degrees](#) than Sydneysiders living in the CBD and the city's north. Last summer that meant over a month's worth of intense heat in the suburb of Penrith, including [nine days in a row above 35°C](#).

While the recent winter sun might feel welcome, the negative impacts of increasingly hot cities on our health, lifestyle and energy use greatly outweigh any winter comfort.

So what are the solutions?

Our researchers have already found how we can offset increasing heat. The [strategies](#) includes cool and permeable pavements, [water features](#) and [evaporative cooling](#), shade structures, vertical gardens, street trees and other plants—even special heat refuge stations.

Keeping cool inside, without huge power bills, is possible too. During last summer's heatwave, our [pilot 10-star energy-efficient house in Perth](#) remained a comfortable 24°C inside, without air conditioning, when it was over 40°C outside. The exceptional thermal performance of the house was down to its evidence-based design.

This work is just one part of our wider remit. Our UNSW-based center is on track to deliver independently verified cuts of [10 megatons of carbon emissions generated by Australia's built environment by 2020](#). By integrating renewable energy systems, smart technologies, low-carbon materials and people-centered design into buildings and urban precincts, we have developed a sustainable, livable and affordable urban blueprint for Australia. A PwC study (yet to be released) estimated cumulative economic benefits totaling A\$684 million by 2027.

To put this another way, we have identified and verified evidence-based pathways to cut emissions equivalent to taking some 2.1 million cars off the road.

Some of the progress to date is not immediately obvious to the casual observer. Take an otherwise unremarkable stretch of road along the back way to Sydney Airport. Recently, a [30-meter section of concrete was installed](#), which looks more like an ad hoc road repair than an important scientific pilot study.

But 15 meters is paved with a new geopolymers concrete that slashes greenhouse gas emissions by 50%. The other 15 meters is conventional concrete, the [most widely used man-made material on the planet](#). Concrete production, using cement as its binder, accounts for about [8% of all global emissions](#).

The geopolymers concrete developed through our research center is a similarly high-performance product but its binder safely incorporates

otherwise noxious industrial waste streams, such as fly ash from coal-fired power stations and slag from blast furnaces. Australia has stockpiled about [400 million tonnes of waste](#) from coal-fired power generation and steelmaking.

In Alexandria, in collaboration with the City of Sydney, we are testing this [low-carbon concrete](#) as a road surface that could help clean up industrial waste while slashing emissions. [Working with NSW Ports](#), we've also shaped it into low-carbon bollards to form a breakwater to protect the coastline at Port Kembla from extreme weather.

We now have the know-how to do better

There are many such success stories, but with 150 CRC Low Carbon Living projects the list is too long to detail. What's more important, as our funding period comes to an end and Australia loses its only innovation hub committed to lowering carbon in the built environment, is to note how we got to where we are today.

The federal government's Co-operative Research center program fosters co-operation and collaboration on a grand scale. Industries, businesses, government organizations and communities with a stake in solving big, complex challenges partner with researchers from a wide range of academic fields. This structure brings together sectors and people whose paths might otherwise rarely cross.

The cross-fertilization of ideas, expertise and skills delivers innovative solutions. [Research worldwide](#) has consistently shown that collaboration drives innovation, and that innovation drives economic growth. Our experience confirms that as we partnered with organizations such as Multiplex, AECOM, BlueScope Steel, Sydney Water, ISCA, CSIRO and the United Nations Environment Program.

Cities are complex, exciting beasts, but we have the knowledge and expertise to live better, more comfortable urban lives in Australia while reducing demand for energy, water and materials. That is, we have the blueprint for low-carbon urban living. We must now choose to use it.

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