

Adapting bus shelters to climate change

COUNCIL NAME

Penrith City Council

WEB ADDRESS

penrithcity.nsw.gov.au

SIZE

405 square kilometres

POPULATION

205,043

FUNDING PROGRAM

[Building Resilience to
Climate Change](#)

Overview

Buses are one of the most popular types of transport for members of Sydney's most vulnerable populations: children and older people, those who are socially disadvantaged or have a disability. There can be limited opportunities to use other forms of travel on extremely hot days, exposing people to unpleasant, uncomfortable and potentially health compromising conditions.

Climate Adapted People Shelters, or CAPS, was a design competition, initiated by councils in Western Sydney in association with multidisciplinary research teams, to respond to the challenges of increasing urban heat and bus shelter design.

This project resulted in the construction of a prototype shelter with significant potential for widespread rollout. Based on its appearance and performance, the winning design has community approval and temperatures inside up to 4°C cooler than in existing shelters.

Background

Over the past century heatwaves have caused more deaths in Australia than any other natural hazard. By 2030, Western Sydney is projected to experience up to seven additional days above 35°C per year, placing vulnerable communities at heightened risk. Inadequate or poorly designed bus shelters present a significant barrier to public transport use that falls unequally on disadvantaged groups in the community (Hine and Mitchell 2001).

Public bus shelters in Sydney are seldom designed with 'shelter' in mind. Their location and construction is predicated on a business model that focuses on visibility for the placement of advertising, safety concerns and the operational needs of bus services rather than passenger comfort. Users of shelters are increasingly exposed to a range of environmental hazards including urban heat (Jacobs and Delaney 2015) and poor air quality.

Implementation

Initial workshops with participating councils identified eight, high traffic locations - each with site specific issues - on which entrants could base their design.

To explore what was wanted from climate adapted public infrastructure, further workshops were held with transport users and agencies, planners, project partners and the local community to inform a design brief that met the diverse needs of the community, especially vulnerable people.

The open innovation design competition required user research, the development of design documentation, a model, and two video pitches; one for the online CAPS People's Choice Award and another outlining key features such as thermal performance, materials choice, cost estimates and desirability.

Thirty teams ranging from architectural and engineering professionals to university and high school students entered. Ten designs were selected for final judging, all in the running for the

REFERENCES

uts.edu.au/research-and-teaching/our-research/institute-sustainable-futures/our-research/climate-change/climate-adapted-people-shelters

Hine J and Mitchell M (2001) *The role of transport in social exclusion in urban Scotland*, Scottish Executive Central Research Unit

Jacobs B and Delaney C (2015) "Adapting to Urban Heat: Penrith City Council." Prepared for Penrith City Council by the Institute for Sustainable Futures, University of Technology Sydney.

chance to be recognised for design expertise in developing climate adapted solutions and an opportunity to see their solution built.

CAPS was a collaboration between the Institute for Sustainable Futures, U.lab and Centre for Management & Organisation Studies at the University of Technology Sydney, NSW Climate Adaptation Research Hub, Institute for Culture and Society at Western Sydney University, [the then] Ashfield Municipal and Canterbury City Councils, and Parramatta City and Penrith City Councils.



Completed shelter with morning sun shade profile



Outcomes

Winners MM Creative demonstrated innovative features such as adaptability, modularity, shade and temperature control using modern materials and fabrication techniques.

They also best met the design brief by including:

- a roof profile inspired by the wings of a bird, native to the local environment
- rotatable seating to improve ventilation and visibility
- adjustable shade and ventilation panels to enhance user protection
- insulated roof panels
- self-adjusting LED lighting
- compliance with disability and safety standards
- optional hub with screens, WiFi, solar charging, surveillance camera and smart card reader
- possible low maintenance green wall or planter boxes to use rainwater.

Following construction of the winning design at Derby Street in Kingswood, monitoring found it up to 4°C cooler than the existing shelter which also had higher roof temperatures for most of the day, peaking at 15°C above those of the new shelter.

Qualitative user feedback was overwhelmingly positive, with people remarking on the improved visual amenity, perception of cooler ambient temperatures and improved thermal comfort.

Key learnings

While CAPS initially focussed on improved performance in urban heat, the project demonstrated considerations about small scale transport infrastructure and the need to include design solutions that are unique, aesthetically appealing, technically savvy, environmentally responsive and place based, rather than having a one size fits all, utilitarian approach.

The fabrication and installation of the winning design revealed barriers to innovation adoption.

These barriers were largely based on existing governance and practices and included inflexible procurement processes, challenges coordinating services ranging from utility supply to traffic

management, working with non-standard designs and slightly unorthodox construction methods, and delays in gaining final technical design and engineering approvals.

Council is currently considering incorporating either the entire design or elements of it for new bus shelters across the region.

Contact

Name: Andrew Hewson

Position: Sustainability Education Officer

Phone: 02 4732 7983

Email: andrew.hewson@penrith.city



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