CLIMATE ADAPTED PEOPLE SHELTERS (CAPS)

WHAT IS CAPS?

The CAPS project aimed to reimagine Sydney's bus shelters as Climate Adapted People Shelters through an open innovation design competition. The project involved transport users, local councils, planning and transport authorities, and the community at specific high-traffic locations in Western Sydney.

The CAPS competition was run by the University of Technology Sydney (UTS) in collaboration with local and state government, and sought designs to maximise thermal performance and user comfort, as well as building in technology to aid commuters.

Eight possible locations across Western Sydney were identified in high-traffic, high-heat areas. Teams were able to pick one or more of the sites to inspire the design of their climate adapted people shelter.

WHY LOOK AT BUS SHELTERS?

Over the past 100 years, heatwaves have caused more deaths in Australia than any other natural hazard. By 2030, Western Sydney is projected to experience up to 7 additional days above 35°C per year placing exposed communities at heightened risk, including Sydney's bus users. The elderly, the mobility, vision and hearing impaired, as well as the very young are often most heavily dependent on public transport and among the most vulnerable to the effects of urban heat.

The CAPS project addresses the complex challenges of public exposure to urban heat and the need for smarter public transport infrastructure to improve liveability of cities.

WHAT WAS THE PROCESS?

The competition was open to all and looked to encourage multi-disciplinary teams made up of designers, architects, landscape architects, engineers, urban planners, inventors, and students.

The project was a research project in "open innovation" and human-centred design, with teams sharing knowledge and ideas at two workshops.

The “User Insights” workshop in March 2016 was attended by over 70 people including technical experts, councils, designers, engineers, entrants, governments and industry. This was an opportunity for entrants to collaborate, and to share the broader user insights gathered from the initial discovery stage and what services and challenges there were at each of the eight locations for re-imagination.

The “User Testing” workshop held in April 2016 acknowledged that everyone who uses a bus shelter is an ‘expert’. This was an opportunity to tap into ‘open source’ information in the community and use it to support design teams. More than 40 people participated in the three-hour workshop to give the design team’s feedback and an opportunity to iterate before finalising designs for submission to the competition.

Nine team submissions were received incorporating 15 designs across six of the identified locations. Submissions were judged by a panel including representatives from Penrith City Council, the Greater Sydney Commission, Samsung, Stockland, and Macquarie University. The designs were of a first-class standard offering smart, innovative solutions that can turn bus stops into places of true shelter for our communities.

The winning team, MM Creative addressed challenges at a bus stop in Penrith. The stop is located across the road from Nepean Hospital and is frequented by frail, elderly and disabled people. “Commuters told us that the direct sunlight and lack of shade led people to wait inside the medical centre behind the bus shelter, which had air conditioning”, MM Project Manager Liam O’Brien said. “This often resulted in them missing the bus. The elderly in particular struggle to make the bus when it arrives.”

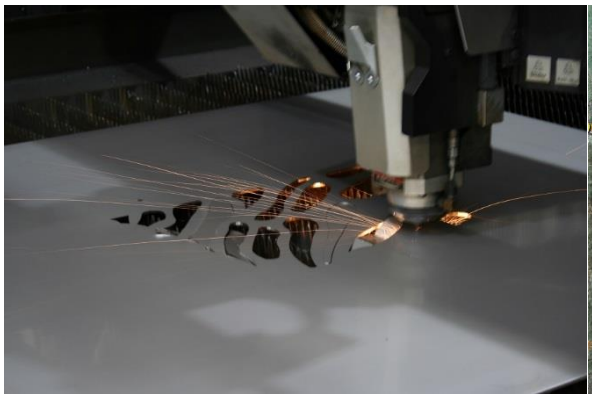
DESIGN FEATURES

The winner of the CAPS bus shelter design competition was MM Creative from Micron Manufacturing with their 'Modus' shelter. This shelter was built next to the existing shelter, allowing direct comparison of the design against a standard shelter installed by Penrith City Council.

The Modus shelter was designed based on prioritising protection from heat, which is prevalent in Western Sydney. Heat can have significant impacts on the health and wellbeing of the community, but in particular on vulnerable members including the very old, very young and people with existing medical conditions.

Key features of the design include a distinctive roof with the shape modelled on an endangered bird species that is native to Western Sydney – the Whistling Kite. The shelter provides a greater overhang based on solar modelling to provide more shade to shelter users at hot times of the day.

The shelter is designed to include cross flow ventilation to remove any heat that accumulates under the shelter roof, which is also insulated to minimise heat gain to the shelter.



The artwork within the rear screen includes images of the Whistling Kite to reinforce the design of the structure.

A solar PV system has been included on the roof to allow for LED lighting of the shelter, which is a new feature for Penrith bus shelters. Connecting to mains electricity presents an additional cost for council so allowing the shelter to be energy self-sufficient while also providing lighting for additional night time security and user comfort is a great benefit.

Anti-graffiti coating is included to minimise the impact of graffiti on the shelter and keep it looking good over time.

The shelter utilises smart manufacturing at the Micron Manufacturing factory in Western Sydney to minimise wastage and make the shelter very strong and durable. Modus has also been designed to be modular in nature – with changes easily incorporated depending on the individual site requirements.

EFFECTIVENESS

The team from Micron Manufacturing worked with Penrith City Council to refine, build and install the design as a prototype with installation taking place in November 2017.

Following its installation researchers from UTS's Institute for Sustainable Futures undertook on-site monitoring to directly compare the performance of the CAPS shelter with the existing

shelter which was retained. Users were also surveyed to obtain their feedback both with the performance of the shelter, but also with the design and 'feel' of the shelter.

The quantitative monitoring of the shelter demonstrated that it was possible through the incorporation of specific design elements to influence radiation, temperature, and user thermal comfort within the shelters.

The elements of the design most important to reducing temperature were the provision of additional shade from the larger roof, the insulated roof and placement of seating with respect to shade. Monitoring demonstrated that the CAPS shelter was up to 4°C cooler than the older style bus shelter. Similarly the older style shelter had higher roof temperatures for most of the day, with peak temperatures of up to 15°C higher than the CAPS shelter.

Feedback from shelter users was overwhelmingly positive, with users remarking on the improved visual amenity, the perception of cooler ambient temperatures and improved thermal comfort in the new shelter.

The results provide Councils with solid evidence to consider in the design of future bus shelters to maximise protection from heat. This will include incorporating key elements of the Modus design which influenced thermal comfort for users, particularly the larger roof and the insulation. An additional opportunity identified in the research includes investigating the use of heat reflective surface coatings around bus shelters to minimise heat gain from concrete surfaces for users.

This project was assisted by the New South Wales Government and supported by Local Government NSW through the Building Resilience to Climate Change program.

PENRITH CITY COUNCIL UTS:ISF INSTITUTE FOR SUSTAINABLE FUTURES LOCAL GOVERNMENT NSW NSW GOVERNMENT Office of Environment & Heritage NSW Environmental Trust