BUSH TECH #43

Cooler living in arid areas

Centre for Appropriate Technology

OVERVIEW

There are simple things that can be done in and around existing houses to make them cooler in hot arid areas using limited resources and local skills. The actions outlined below will help to significantly improve summer comfort and lessen reliance on air conditioners.

Central Australia is an example of a hot arid area. It has very hot summers with hot dry winds, and cold dry winters. There can be a large difference between day and night temperatures, and the rainfall is low and unpredictable.

Because the hot season is much longer than the cold one (8-9 months of warm or hot weather) it is very important that new houses are well orientated, designed with properly insulated roof and walls and shaded to stay cool inside.

There are several ways to improve existing houses that are uncomfortable in the summer months.

The two main strategies are:

- keep the heat out of the house
- get rid of the heat that made its way in.

HOW DO HOUSES GET HOT?

Heat comes from the sun as radiation, with as much intensity as if there was a 1.3kW bar heater for every 1 square meter area. This radiation heats up everything it reaches.

The angle of the sun changes from season to season. In the summer the sun rises earlier and climbs high in the sky. Summer heat enters through the roof, the walls and windows of the house. West and south-west facing walls are the worst in terms of heat gain, and windows can make it even worse, so it is particularly important to shade these sides of the house.

Some materials, such as single layer concrete block walls, have high thermal mass; they hold onto more heat and for longer than other materials, releasing it over time. Exposing these materials to the direct sun will transfer heat into the house, making rooms very hot in summer, both during day and into the night.

As dark colours soak up more of the sun's heat than light colours do, dark coloured roofs and wall surfaces will also transfer more heat into the house.

The air outside in the summer gets uncomfortably warm. Hot winds blowing into the house through open windows and doors will heat up the house as well. Gaps underneath doors and broken windows all let more hot air into the house during the day.

Concrete pavement in the yard close to the house absorbs and releases heat into the surrounding space, further heating the air that can flow into the house.

WHAT YOU CAN DO TO KEEP YOUR HOUSE COOL

It is important to reduce the summer heat entering the house, particularly through exposed west and south-west walls and windows. Once the house has heated up it is harder to cool it down. Some houses don't have air conditioners, and if they do, it can be very expensive to run them.

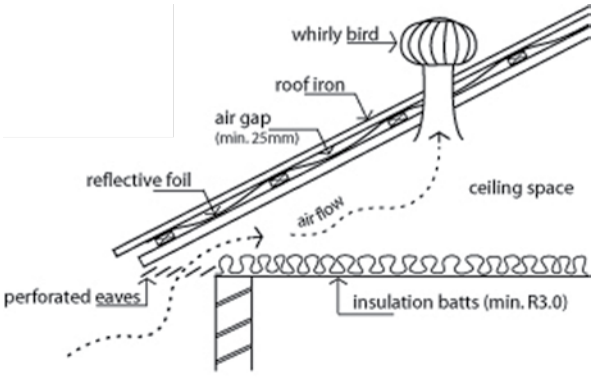
The less heat gain during the hot summer months (and the less heat loss in winter), the less you need to spend on air conditioning or heating. Here are some suggestions to help, some of which are simple to implement; others require more skills.

Start with asking the following questions:

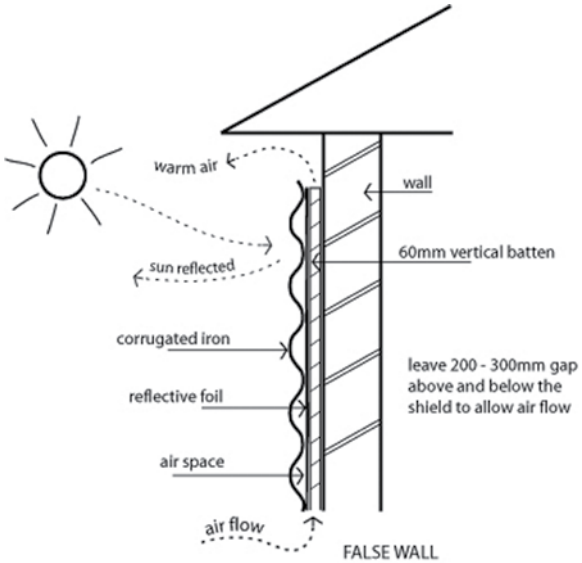
- Are the walls protected from the sun on the west, east and north facing sides of the house?
- Are the windows protected from the sun on the west, east and north facing sides of the house (shaded on the outside or curtains/blinds on the inside)?
- Are the walls and the roof light coloured?
- Is there any insulation in the roof space? (You will see reflective foil and/or insulation batts if there is)
- Is the roof space ventilated? (See if there are ridge vents or whirly birds on the rooftop, or louvres at the gable ends)
- Are there security and fly screens on the windows and doors so they can be left open at night?
- Is there good shade around the house?

If you answered NO to any of these, think about what can be done to improve the situation. Go though the chart on the next page to find which solutions are most appropriate to make your house cooler.

False wall



ROOF INSULATION WITH WHIRLY BIRD



FALSE WALL

	STOPPING THE HEAT GETTING IN	GETTING THE HEAT OUT	HELP FROM THE YARD
BY THE RESIDENTS	• Stop hot air entering the house by closing all doors and windows during the hottest time of the day; • Close inside doors to keep some rooms cool; • Use weather seals on gaps under and around outside doors to stop hot wind blowing through, and on any gaps around windows; • Stretch shade cloth or canvas between the veranda posts for shade as well as a wind break. This can work well on all sides of the house.	• Open up the house in the evening and during the night to let the cool air flow through.	• Build shade structures and bough shelters from local timber, wire and grass. Shade cloth can also be used. Make sure that you use a long life shade cloth type suited to high sun exposure. They can be attached to the house or free standing. Remember to check if you need to meet particular building rules; • Make wind breaks that will stop hot winds blowing through the yard and into the house.
WITH VERY LITTLE COST	• Put curtains or blinds over windows, especially those facing the late afternoon sun — make sure the lighter coloured side faces outwards. Outside blinds work best as they stop the heat hitting the window; • Cover windows with tinted foil; • Paint outside walls a light colour, especially those not protected from the sun.		• Plant shade trees, bushes and vines to protect roofs and walls from the hot sun, act as windbreaks and keep the ground around the house cooler. This not only helps to keep the house cooler but also makes outdoor living more comfortable.
BY TRADES PEOPLE, AT A COST	• Install awnings over the west, east and north windows; • Build verandas on the west and east side of the house and add more shade cloth and awnings to block out early morning and later afternoon sun; • Build a veranda on the north side that provides shade from the hot summer sun but allows the winter sun inside; • Paint the roof a very light colour; • Install a 'false wall' or heat shield on the western and eastern walls. Make sure that the shield is light colour, that there is 60mm of clear space between it and the wall (see drawing above right, and photo on front page); • Install foil and insulation in roof space (see drawing above left); • Fix broken windows, screens and doors.	• Install whirly birds or other roof vents – make sure that air can move through the roof space and can enter at the eaves; • Cover openings and eaves with bird mesh to keep out birds and vermin; • Install ceiling or wall fans; • Install security and fly screens on windows and doors to keep uninvited people, animals and insects out.	**CONTRIBUTORS** Tony Ackland – CAT-Rio Tinto Fellowship Project 2007 Anna Szava – Tangentyere Design **REFERENCES AND RESOURCES** Sustainable Housing in Central Australia (www.nt.gov.au/nreta/environment/greenhouse/pdf/sustainablehousingca.pdf) DKA COOLmob: www.dkacoolmob.org Home Technical Manual: www.greenhouse.gov.au Warm House Cool House – Nick Hollo (Boomerang Books 1995) National Indigenous Housing Guide (2007) (www.facsia.gov.au/indigenous/housing_guide3/default.htm) Alice Springs Cool Living House (www.alec.org.au/eng/projects/cool_living_house) Building Code of Australia (2008) Government of Western Australia, Sustainable Energy Development Office CAT Bush Tech # 37, Smart Desert Gardening