

Climate Responsive Design in a Tropical Climate

Quick turn on the aircon! Oh wait, maybe people don't REALLY want that after all!

Summer for many typically means significant use of air-conditioning and soaring electricity bills, and for some this isn't only limited to the summer months. Of course it doesn't have to be this way, if only the building had been designed to be cool, naturally, through sensible design principles.

Would you believe that three-quarters* of people in the Twin Cities believe that it's possible to have a house in Townsville that's cool enough to live in without air-conditioning. (* *Market Research by ecoSAVVY, May 2005.*)

So what benefits would there be for your clients?

- A home that's more relaxing.
- A home that doesn't confine living to inside spaces because they're air-conditioned.
- Shady, breezy, pleasant indoor and outdoor spaces to sit, eat, read, relax, work and play
- Increased enjoyment of your garden
- Cheaper electricity bills and reduced contribution to global warming.
- Fresher, healthier air.

SO HOW CAN YOU ACHIEVE A CLIMATE RESPONSIVE HOMES IN A TROPICAL CLIMATE?

Promote cooling breezes

- Orient the house plan on the block so that a central corridor/breezeway is aligned with the prevailing breezes.
- Slight elevation helps to overcome breeze losses resulting from surrounding fences.
- A pavilion style floor plan does cost more but creates a higher proportion of external walls to assist in achieving good cross ventilation.
- Provide at least three openings – typically a minimum of two windows and a doorway to all rooms, including bedrooms. The greatest air-movement will occur in the direct path between the openings. Small openings and poor orientation to prevailing breezes limit airflow.
- Use louvre windows.
- Encourage interaction with cool outdoor spaces eg the garden and shaded water feature.
- Modify potential barriers to enable airflow, eg instead of solid walls use slatted, louvered, sliding or open panels to define spaces yet enable ventilation.
- Fit secure screen doors.
- Use roof vents to mechanically assist the breeze to exhaust hot air from the spaces below.
- Fit ceiling fans.

Ventilate by convection

- Sloping ceilings leading to a vent or window at height enable warm air inside to rise up by convection along the ceilings to be exhausted to the outside.

Reduce radiation of heat

- Elongate plans so that the narrow sides face east and west, minimizing exposure of walls and windows to low angled sun from the east and west.
- Use light colours for external surfaces to reflect and reduce radiant heat.
- Ensure insulation has reflective foil. Some may wish to avoid using bulk insulation to help the house to cool down at night and after a tropical shower or seabreeze.
- Preferentially use low mass and light weight walling systems with reflective foil insulation.
- If using high thermal mass walls eg rendered concrete block design the building to minimise heat gain through walls by ensuring that walls and openings are well shaded. (It is very important to prevent direct sunshine from heating up thermal mass).
- Plant dense vegetation to provide shade from low sun in the east and west.
- Ensure outdoor living areas are well shaded.

Shelter walls and openings

- Provide wide and low overhangs over openings to protect from rain intrusion (including torrential and horizontal rain).

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