glazing

hot humid

This fact sheet deals specifically with glazing solutions for hot humid climates. These are climates where houses use more than 70 percent of their total space-conditioning energy for cooling. Warm humid and hot dry (tropical, subtropical and hot arid) climates are called "cooling climates". For a general introduction to glass and windows [See: Glass and Windows]. **For information on the Window Energy Rating Scheme (WERS) and generic window types** [See: How to Use WERS]

DESIGN GUIDELINES

Cooling climates include tropical, subtropical and hot arid areas. Although the first two are frequently humid and the last is not, all three climates can subject a home to overheating at any time of the year.

Overall glazing performance is dependent on a combination of passive design features as well as the performance of the glass. [See: Shading; Passive Cooling]

Windows that provide the largest reduction in predicted annual cooling energy under WERS provide the greatest benefit in terms of energy use and comfort in a cooling climate.

The window's role in a cooling climate is to reduce the amount of heat entering the building without reducing natural light to the extent that artificial lighting is required inside.

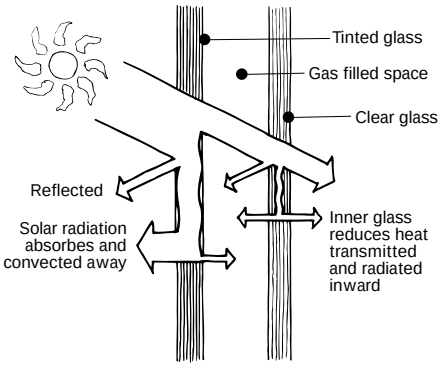
Low Solar Heat Gain Coefficient windows are designed to block the sun's heat and are appropriate in cooling climates.

Low U-value windows keep hot outside air from entering the house, and are particularly important if the house is air-conditioned.

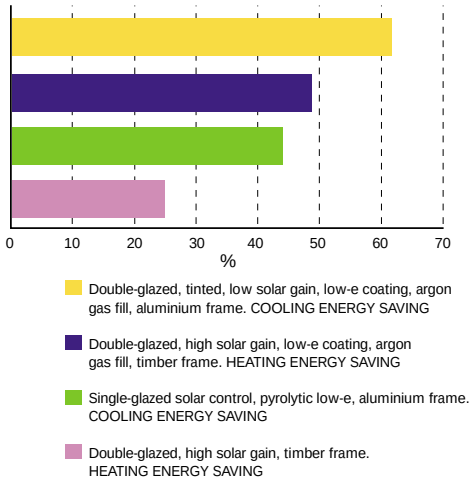
From the WERS table of 27 generic windows, the window types WIN15 to WIN27 are best suited to cooling climates. See [How to Use WERS]. These windows all use solar control (tinted) glazing to reduce solar heat gain. Some use a single pane of tinted glass, while others are double-glazed.

Tinted windows reflect some heat and absorb some heat, which is then radiated both inwards and outwards. In cooling climates, heat radiated inwards can reduce thermal comfort near the window. A double glazed unit provides better performance in a cooling climate because the inner pane blocks some of the heat radiated inward by the outer pane. The best performance is obtained by using a low-emissivity (low-e) glass for the inner pane (as in WIN22 to WIN27).

Double-glazing also gives a low U-value, reducing infiltration of warm air from outside.



Solar control characteristics of a toned insulating glass unit.



ANNUAL ENERGY SAVINGS

The above graph illustrates the savings of home cooling energy in cooling climates for four window types, compared with using typical clear, single-glazed aluminium-frame windows.

The graph shows that double-glazed windows with a high performance external tint, a low-e coating, an argon gas fill and an aluminium frame can reduce cooling energy requirements by almost 70 percent.

The window comparisons above were made with the help of the NatHERS building energy simulation for an average home. NatHERS assumes that the house is typical in terms of the:

> continuity of heating or cooling,

> desirable internal temperatures,

> proportion of heated and cooled areas,

> number of people in the home.

The actual amount of energy that homeowners purchase depends on many individual preferences and on the efficiency of heating and cooling systems. [See: Rating Tools]

CONSUMER CASE STUDY

BOB BRENNAN – SUNSHINE COAST, QUEENSLAND

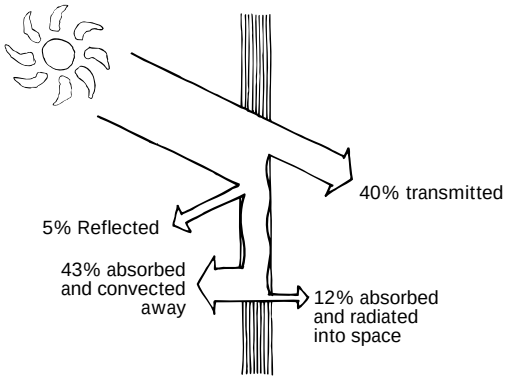
This home is located on Queensland's Sunshine Coast. With views across the hinterland and toward the coast, the requirement was to maximise the outlook with extensive glass while minimising the entry of heat.

With so much glass, keeping the house cool without high air conditioning costs could have been a problem. Bob also wanted to use the same product on all elevations for aesthetic reasons.

The windows were not adequately shaded externally so it was important to select a window with a low solar heat gain coefficient and avoid products with a low level of light transmission so that the same type and colour of glass could be used on all elevations. [See: Shading]

External shading should always be the first solution considered. Advanced glazing options can provide effective solutions on difficult sites where other shading options are not possible.

Aluminium-framed windows and doors, single-glazed with a green "supertoned" solar control glass were used on all elevations. The glass has a solar heat gain coefficient of 0.54 and a light transmission of 58 percent.



Solar control glass reflects some of the sunlight, absorbs some heat, convects most of it away outside and transmits the rest. These windows reduce cooling energy requirements and are rated 2.5 stars by WERS. [See: How to use WERS]

ADDITIONAL KEY REFERENCES

Window Energy Rating Scheme Training Manual, Version 1.0. Available from the Australasian Window Council Inc. (info@wers.net).

WERS website, www.wers.net

Carmody J, Selkowitz S, Arasteh D K and Heschong L (2000). *Residential Windows, 2nd Edition*. W W Norton & Co. ISBN 0-393-73053-0. (Available through the Australian Window Association, info@awa.org.au).

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