DESIGNING FOR CLIMATE WEBSITE

Concerns about how to best design buildings for Australia's differing climates has led Think Brick Australia (the peak industry body for clay and concrete bricks) to commission a website called "designingforclimate.com.au". Given that the largest proportion of energy used in buildings is to achieve thermal comfort, and that is in response to the climate, and that there is plenty of evidence that many buildings fail in this regard, it is a timely initiative, The website is intended to address 3 issues:

Climate data
Whilst there is substantial data about climate, particularly based on weather data collected by the Bureau of meteorology (see bom.gov.au), it is not available in a form that is readily interpreted by architects and designers. There are many different aspects to climate measurement that are seemingly conflicted (temperature measured by averages, means or extremes, heat measured by temperature versus heating and cooling degree hours, absolute or relative humidity using the psychrometric chart etc).

Architects, despite having some training in science, often rely on perceptions rather than hard data, with consequent simplified or incorrect design responses. A prime example is the idea that Brisbane has a subtropical climate that has greater heating loads than cooling. The data says otherwise: there is 4 times the heating load in winter than cooling load in summer. As a consequence there is a long tradition of building houses with ventilation but not insulation or thermal mass (the timber-and-tin Queenslander).

The website sets out climate data in a way that shows clearly the information needed by an architect, for instance showing the relevant comfort zone and showing the heating and cooling loads and wind direction and strength in clearer diagrams. This means that the information can be more easily understood, not for its own sake but as it implies design responses.

Thermal comfort
Similarly to the lacunae in the science of climate, there are lots of misconceptions about thermal comfort. Principal amongst these is the role of radiant versus convective heating. Most architects, following the lead of mechanical engineers, assume that heating and cooling the air is the best, or even only, way to achieve thermal comfort. However the human body perceives thermal comfort as much, if not more, from the temperature of the surrounding surfaces as it does on the air temperature.

This has profound impacts on building design, as it implies that the temperature of the building is more important than the air temperature, and that designer's efforts should go into "building conditioning" rather than air conditioning". We can see this in the long tradition of architecture that maintains comfort without mechanical engineering: for instance the coolth in the Alhambra in summer or the warmth in highly insulated and earth covered.

So how did we come to rely on air conditioning? J'accuse Willis Carrier, the inventor of reverse cycle AC that is only 80 years old (first installed in Graumans Chinese theatre, the home of the Oscars, in the 1920's. Sadly less than a few decades of reliance on cheap energy has overturned centuries of intelligence of keeping buildings comfortable naturally.

Climate design
Combining these two ideas of climate and thermal comfort is one of the basic tenets of architectural design, yet it is surprising how many myths and mistakes have developed in this area and this is the third area that the website addresses. Every architect can recall the lectures on climate design, but most do so through a fog of misapprehension: they either slept

through the "dry" lectures, or the exigencies of making "real buildings" has corrupted the purity of the design science, or more simply erroneous rules of thumb have replaced good science.

This is nowhere more clearly evident than in the current idea of "passive design": a belief that large areas of glass, hopefully facing north, will make a "green" or environmentally sensitive building. Nothing could be further from the truth: glass is the worst insulator in the external envelope of a building, often by a factor of 8 or 10, so it promotes huge air-to-air and radiant heat losses and gains, which cannot be offset by some "passive solar" or cross ventilation. Without resorting to high performance glazing in double and triple assemblies, that maximum area of glazing ion most houses should be restricted to about 20% of the external wall area.

Another are of confusion is the role of cross ventilation: in most architects designs it is intended, intentionally or not, to cool the occupant in humid conditions. A much more useful use of cross ventilation is "night purging", which cools the building rather than the occupants and makes a far lasting contribution to thermal comfort and lowering energy use.

All these areas, and many more are discussed on the website which shows good climate design for 23 principal cities around Australia, together with the science and research that backs up the design ideas.