

Air-Conditioning the People Next door and Next Door.

I often ask people with air conditioning 'Has the next door neighbour or the person across the road paid you for all the heating or cooling you are providing them? The biggest power user, and therefore green house gas emissions maker, in most types of buildings tends to be air conditioning. And.....most air conditioning energy goes straight out the windows. That's right! Over 60% of the heating and cooling loads you are putting into your buildings is exiting, stage right, through the windows! The outcome of that is the air conditioning plant size, related capital costs and the running costs are much, much larger than they should be.

The reason we air-condition buildings is because they are inappropriately designed for the climate they are located in. We are creating the 'igloo in Cairns' syndrome. However, this may make your neighbours happy because they are getting expensive conditioned air for free! So how do we fix this situation? Because we don't design our buildings to suit their local climate we have to use artificial heating, cooling and lighting to make them comfortable. That is why we condition them - because they're uncomfortable.

Through the use of appropriate climatic design initiatives the building that is currently air conditioned wouldn't need that air conditioning infrastructure except for peak load days (such as on a 40 degree or -2 degree day). Overall however, if we analyse the local conditions- including climate and geography - we can formulate a suitable range of sustainable design, build and operate processes. This will negate or at

least minimise the need for artificial heating cooling and to a lesser extent lighting.

The key is to identify what are we actually designing our buildings for. We need to fine tune our building's design criteria. Everyone thinks we design them for comfort but if we did we wouldn't be using so much energy to keep them that way. Current engineering practice promotes comfort as being a fixed, inflexible number based on a certain indoor temperature. Interestingly, this is not related to outdoor temperature. We assume that if we make our internal climate 23 degrees then everyone will be comfortable. This assumption is where the problems begin.

Firstly, not everyone is comfortable at 23 degrees. Secondly, by specifying such an exact parameter and then designing the system so closely around it many variables are overlooked. By attempting to maintain a rigid constant in an already poorly-designed building envelope (with single glazing and low insulation levels) we are removing the ability of occupants to have any control over their climate. We have largely ignored the natural ability of humans to adapt.

The well-designed naturally ventilated or 'mixed mode' type of building provides a much broader range of comfort criteria and offers the occupants the ability to have independent control over their internal environment. Think of the energy required to cool a building to 23 degrees if it is 35 degrees outside! If the outside temperature is 35 degrees and the inside temperature is 23 degrees of conditioned environment, most people entering that building find it too cool. (The detrimental effects of sudden 'blast effect' alteration to body temperature have also been well-documented.) Yet if the outside temperature is 35

degrees and we enter a naturally ventilated building that has an interior temperature of 30 degrees we actually find it more comfortable, and the transition is much gentler. Individuals can adjust their personal thermostats by opening a window, closing a blind, removing excess clothing or turning on a fan. Giving people a greater ability to control their own internal comfort levels improves their feeling of well being. We call it adaptation and it is defined as 'adaptive comfort'.

We have adapted to external elements throughout our history and this is a component of our natural living environment. In the sustainable age, we need to be mindful rather than manipulative of our unique human potential to naturally adjust to our surroundings. The well-designed passively heated or cooled building is based on adaptive comfort design criteria. This principle demonstrates that occupants will be comfortable in a temperature range of 18-30 degrees as long as they have some control over their internal climate. Once people adapt to the concept of natural ventilation and lose their expectation of artificial heating or cooling providing 'comfort' and are no longer consistently being 'regulated' to a fixed temperature of 23 degrees, we can rid the world of energy wasting, inefficient and outdated systems.

If you rethink your design performance criteria, understand the local climate and change your expectation of the '23 degrees syndrome' you are setting your business, staff, clientele *and* the planet on the vital road to a sustainable future. And you won't be wasting lots of money heating or cooling the people next door.