

Cool walls for cooler comfort

POTENTIAL: There is a need for laws to encourage energy efficiency in commercial and residential buildings

ENERGY efficiency simply means being able to do the same amount of work with less energy input. Efficiency improvements are so important to our energy future such that without it, our energy demand in 2030 is estimated to be 65 per cent higher.

Energy efficiency gains can be realised in every sector, and one of the lower hanging fruits is in reducing energy consumption in residential and commercial buildings.

Most of this energy is consumed in order to maintain a comfortable interior temperature. Fortunately, whereas those in temperate climate have to consider heating requirements during winter and cooling requirements during summer, we in Malaysia have a straightforward challenge of keeping cool throughout the year.

The answer to this challenge can be quite simple, as demonstrated by Mohammad Peter Davis, a former lecturer at Universiti Pertanian Malaysia, who built his two-

storey house in Bangi 22 years ago.

Applying some basic science and utilising commonly available materials, he is able to maintain an interior temperature within the thermal comfort zone (defined as between 24 and 28 degrees Celsius) but for a couple of hours during the hottest part of the day when he would have to retreat to the ground floor.

His methods are simple – insulate the roof, shade the walls from direct sunlight with the roof and mechanically ventilate the house through the night to cool the walls. Thus he is able to substitute air-conditioners with low-energy ventilation fans.

The result is tangible – by his own reckoning, he has effectively recovered the cost of his house through savings in electricity bills. In contrast, if the house was fully air-conditioned, the electricity bill over the same period and the cost of replacing the air-conditioners every 10 years could have exceeded the cost of the house.

Keeping walls cool is crucial to energy efficient buildings. It is central to the impressive research being undertaken by Dr Forrest Meggers at the Future Cities Laboratories (FCL) at the National University of Singapore.

The FCL is a joint effort by the National Research Foundation of

Singapore and the Zurich Institute of Technology of Switzerland. One of the key developments there is the low-exergy cooling system which involves, among other things, pumping chilled water through tubes built into the wall and floor concrete to cool them.

(Exergy is the energy required to bring two levels of temperature into equilibrium. The cooler the walls and floor, the less energy is required to bring the interior temperature to a comfortable degree).

In fact, surface temperature affects comfort by an estimated 40 per cent more than air temperature. A one degree cooling of surfaces seems like a 1.4 degree lowering of air temperature. This means that cooling walls and floors is 40 per cent more efficient than air-conditioning.

On the other hand, standard concrete walls exposed to direct sunlight will collect daytime heat and remain above the thermal comfort zone throughout the night. This is why Malaysians feel the need to have air-conditioning while they sleep, despite the comfortable air temperature outside.

Whereas larger companies can respond to cost pressure and profit-seeking by investing in energy efficient technologies, house buyers by and large merely choose from what is available in the market.

Property developers are increas-



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ingly catering to the demand for energy efficiency, and they inform the buyers of this feature through ratings.

In Malaysia, we use the Green Building Index (GBI) which comprehensively rates a building from various aspects of sustainability, not only energy efficiency. There are 146 GBI certified projects to date, 42 per cent of which are residential, 49 per cent non-residential, with the Energy Commission's "Diamond" building perhaps being the foremost example in the region.

To realise the potential energy efficiency gains in commercial and residential buildings, it may be

necessary to do it through regulation.

One that only requires the interior of buildings to remain within the thermal comfort zone without air-conditioning can easily be met with some ingenuity.

Insulate the roof, shield the walls from direct sunlight; with some low-energy dehumidifier and mechanical ventilation, air-conditioning will not be necessary.

This would make it a minimally intrusive regulation that levels the playing field for developers, extends the benefits of energy efficiency to more Malaysians and conserves the nation's precious energy resources.