THE THIRD WAVE OF SUSTAINABILITY

BY TONE WHEELER

Introduction

Sustainability or ESD, most commonly called "green", has become a mainstream political issue around the world in the last 10 years. Central to increases in energy efficiency and reductions in greenhouse gases (so called E2G2) are improvements in urban planning and building. But this hope, more like hype, is misplaced, either being simplistic in its intentions, or missing the mark in its effects.

This article which was originally published in Architectural Review Australia, forms the opening chapter of a soon to be published book "*How the Green Karma will run over the Brown Dogma*". The book explains why the current orthodoxy is causing more harm than help, but also shows how a culture of "real green" design could lead to a more sustainable future.

The Third Wave of Sustainability

Now that sustainable design is such a prominent force in Australian architecture it is timely to ask about the origins of the movement, chart its rapid recent growth, but also to ask why it continues to be all talk and little action.

Sustainable architecture is centred on climatically appropriate buildings. We had a good start with the early veranda style Georgian buildings brought to Australia via India by the NSW Corps, but for the next 100 years architecture tended to follow the stylistic influences of England and climate waned as an influence. In the early 20th century it returned, with the popular Queen Anne style being adapted to "Federation" houses of verandas and eaves, and the widespread use of tin roofs and timber sun screens in the hotter north. Through his drawings of deep verandahed colonial buildings Hardy Wilson literally revived climate as a design force.

Climate-derived architecture became a conscious movement with the publication of *Homes in the Sun* by Walter Bunning in 1945. An elegant book, it showed the history of climate design to that date (including Hardy Wilson's drawings), summarised good planning at both the city and building scale, and emphasised modern technologies. Its centrepiece is a series of modest freestanding houses that he called Suntrap Houses.

The movement grew into "passive solar" in the 1950s and '60s, became "alternative technologies" in the '70s and turned "green" along with the political movements of the '80s and '90s. Over that time there was increased knowledge of better ways to design sustainable buildings, and many publications on how designs could use less energy and water, while being built with materials that were less harmful to the environment.

So the obvious question is: what happened? Why do our current subdivisions take no account of orientation, why are most house designs dumbed-down to take no account of the climate and why are our larger buildings, with a few notable exceptions, tricked-up business-as-usual modernism?

The failure of the green design movement is everywhere: houses have doubled in size in the last 40 years, on sites half the size, thus necessitating two storeys, overshadowing their closer neighbours. They have twice the glazing to floor ratio, and have garages for twice the number of cars, more energy hungry appliances and double the number of fridges; and yet on average only half the number of occupants live in them. We might call it the 2x2x2x2x2x2 conundrum.

Industrial design has similar failures: the integrated tank/solar water heater was developed in the 1950s in Australia and Israel. Today only 5% of Australia's houses have solar water heaters but almost every building in Israel has one. We classify the star ratings of appliances, but energy-hungry one and two star rated fridges and TVs continue to be sold.

Like Julius Sumner Miller, we ask: why is it so?

Firstly, moral encouragement hasn't worked. For all of our raising of green consciousness, the public has not taken the practical action. Project homes are advertised with granite benchtops and

multiple ensuite bathrooms as standard, but roof and wall insulation is an extra. Homeowners buy a huge four or five star fridge, thinking that is the right thing to do, and then put the old one star fridge, with its leaky CFCs, in the garage for the frozen bait. The "market penetration" of air conditioners is now 80% of new homes, whereas it was only 20% a decade ago. And you can buy one of these air conditioners, with a low star rating, from the local electrical retailer, but not a solar water heater.

Sustainability was sold as something you had to do for the planet, but the implication was that you had to give up something; it was a threat to your lifestyle. So everyone developed an excuse not to go green: elderly parents or young babies that needed air-conditioners, workers needed longer showers, shoppers wanted big fridges. It was good for your neighbour to do, but not for you.

Sensing that people were reluctant to adopt sustainability on their own, some state governments sought to regulate for it (mind you their interest was not entirely altruistic, peak demand for electricity, especially for air conditioners, is very expensive, and no one wanted to run the gauntlet of getting a new dam past the greenies). They had two choices: control supply or control demand. Changing the supply of energy and water to sustainable sources is extremely costly, and moreover requires considerable political will, something that is itself in short supply in Australia right now. So they chose to regulate demand, but not in a traditional market economy way, by increasing the price through taxes (think petrol or cigarettes), but via "demand side management". This is the complex art of persuading people to change habits without them noticing it, so they don't feel their lifestyle is under threat.

Picking the low hanging fruit was easy: subsidies for solar water heaters and water tanks, legislation for low flow taps and showers, and the promotion of fluorescent light fittings. But house design is difficult: it's a wicked problem with so many varying parameters that the traditional methods of specifying insulation levels and controlling glazing areas doesn't produce the desired results; and it is staunchly resisted by the design community.

For 30 years the CSIRO has been developing software that simulates a building's thermal performance, using real weather data and showing the expected temperatures internally, or the amount of electricity required to maintain thermal comfort. In the mid '90s government legislators seized on this as an answer to their prayers, and had it re-configured as the National Housing Energy Rating Software, or NatHERS. By establishing benchmarks for the energy required to maintain comfort levels they could allocate "stars", and then set the minimum number of stars required for approval. It was a shemozzle: the software had considerable lacunae, the star bands were arbitrary, the system could be easily manipulated and there was little verification. Worst of all, the benchmarks measured energy per square metre, not total energy, which favoured big houses over small, the exact opposite of what was desired.

All of these problems have been sorted in more recent versions of the software, with better implementation schemes, but the horse had bolted: the government was encouraging people to build houses that looked and worked like eskies, while designers held out for houses that worked like sophisticated tents. Only now, 10 years later are we seeing the development of "tentskies" that can do both.

Like moral encouragement before it, regulation has largely been a failure, and for the same reason: it is seen as a lifestyle threat. Solar water heaters, which should be mandatory, are only "encouraged", there are no restrictions on air conditioning, and despite having introduced star ratings for electrical goods there is no minimum standard. And governments have reintroduced simplistic methods for the thermal rating of houses, allowing the horrors of the past to continue to be built.

There needs to be a third way that can encourage sustainability through better design. In this approach there would be a clear demonstration of the value of green design in improving lifestyle. Far from being a threat it will be best seen as a boon to users. Two examples show the way forward.

Research in the late 1960s showed that radiant temperature of the enclosing walls of a space has a greater impact on our sense of thermal comfort than the internal air temperature. In other words, building conditioning is more important than air conditioning. Passive solar design, with its emphasis on insulation and thermal mass can provide a better sense of warmth and coolth than a heavily air-

conditioned space. Good climate design should be sold primarily on the basis that it is better for the occupants (and by the way it is also good for the environment and saves you operating costs).

Another win-win story is in green commercial buildings: the better interiors, with fresh air supply, chilled beams and higher indoor environmental quality (IEQ) have lower absenteeism, better productivity and less churn in the workforce. The economic gains from these considerations far outweigh the savings in energy and water. The aim of a happier workforce, with a better lifestyle if you will, has greater impact on the bottom line than the pursuit of cost savings alone.

For sustainability to succeed it needs to tell a story about improvements in the quality of life – with smaller but more flexible spaces and better indoor environmental quality that is not only better for the environment, but moreover better for the occupants. That is the only way that green design will succeed in today's personally selfish and politically timid environment.

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