

Buildings account for something like 35-45% of total energy consumption in large cities globally and represent a similar percentage of CO₂ emissions – it's a wide range because large cities still vary so much.



AFFORDABLE AND SUSTAINABLE

Marc Johnson
Director, Unitised Building Group

No matter which side of the argument one sits on, the unlikely celebratory kiss between our current and former Prime Ministers on the passing of the Clean Energy Bill through the lower house of Parliament is a significant historical event. With many initiatives that seem visionary at the time or challenge the status quo, there is often an accompanying (sometimes significant) dislocation to existing industry. There are winners and losers, adjustment to or curtailing of existing business practices and sometimes more rapid adoption of innovation – in all cases, looking at issues the same way as before rarely works. When change like this happens in an industry already facing challenges of construction costs and housing affordability, the solutions become even more complex. Whether or not the bill ultimately passes, and whether or not a new Government pulls it back, it is still a wake-up call to our industry that global reduction of carbon emissions will continue to require change and innovation.

Despite some recent pullbacks in prices, affordability of housing in Australia remains an important social and political issue. The squeeze for an affordable home is causing cities to spread out, straining infrastructure and resources; house lots and apartment sizes are shrinking and quality finishes and lifestyle are regrettably becoming a necessary trade-off for more space and a manageable commute. In addition, the footprint of a building needs to be increasingly carbon neutral. The building industry has responded where it can with more efficient building practices and importing to reduce costs, but traditional materials and traditional sequential construction methods have little more to give – if we keep building the same way and with the same materials, we aren't likely to meaningfully impact our

domestic cost structure, at least without importing a significant portion of our building industry. Buildings account for something like 35-45% of total energy consumption in large cities globally and represent a similar percentage of CO₂ emissions – it's a wide range because large cities still vary so much. The emissions level includes initial construction, the long-term building environmental management and its ultimate deconstruction. While the Australian figures are lower given the heavier impact of mining and agriculture, it shouldn't come as any surprise that large-scale construction projects in our big cities will face further pressure for change and improved carbon footprints.

Global initiatives in this area are useful as guides for our own future in construction and property development. In particular, global trends towards selection and wider specification of more carbon-neutral materials (both in construction and long-term management of energy savings), greater focus on the recyclability of buildings as a whole rather than in parts, and rapid advances in investment in innovative pre-fabrication techniques are having dramatic impacts on local thinking. While none of these initiatives are new in their own right, the pace at which they impact our industry will likely increase as the Clean Energy Bill advances.





Carbon-Friendly Steel?

The building industry has for many years already been addressing the challenges of climate change on our industry – global and Australian Green Building Council initiatives for commercial and residential buildings continue to set important standards to ensure we effectively use our limited resources and move towards the most carbon-neutral and energy-economic solutions in our building structures. Recent global initiatives in the specification of sustainably-forested wood as a structural material have gained momentum with better technology and more supportive

legislation. Sustainably forested wood shows positive relative characteristics on embodied energy measures and when embedded in long-life structural elements, represents a significant and important carbon sink to offset new emissions. A number of innovation leaders in the building industry, most notably Lend Lease and Grocon, have been looking closely at the potential of wood in larger building structures. The Clean Energy Bill may well accelerate the use of wood products in Australia, particularly in taller, medium-density structures where concrete has historically been the construction material of choice.

Steel, perhaps surprisingly, also demonstrates a number of positive environmental benefits over traditional in-situ construction as a highly flexible yet strong building material for medium- to high-rise construction. With newly developing thinner and stronger steel structural materials, composites and construction methods, steel can achieve construction strengths equal to concrete at weights as low as 25% of that of concrete alternatives in mid- to high-rise buildings. Lighter weight structural materials generally have important flow-on benefits on air pollution, water usage and transportation energy used to cart the products to site. When steel structure can be recycled for reuse (as it is increasingly designed to do internationally), the embodied energy for steel can even compare favourably to wood as a viable long-term carbon sink.

Parallel Unitised Construction

Parallel unitised construction and pre-fabricated construction are accelerating rapidly across the world because of their inherent cost and environmental benefits over traditional sequential construction. The more concentrated the construction process, the more dramatically one can speed up construction timeframes and reduce embodied energy in distribution and materials handling which typically adds dramatically to construction cost. Technologies available today for accurate measurement to within microns on an X-Y-Z plane allow for pre-fabrication to take over a larger slice of the building market, whether elements are pre-fabricated locally or shipped from overseas. In Australia, we have a number of initiatives in this area serving the housing, remote housing and increasingly, residential apartment markets.

The Nicholson, a 199-apartment residential and retail development in

Coburg developed by VicUrban and constructed by Hickory Group is an important demonstration project for unitised construction in Australia. Designed by architectural practice DesignInc, the 5- and 7-storey medium-density project brief specified high quality design and finishes, generous public spaces and sweeping cantilevered balconies. Natural light and air in all apartments as well as sophisticated water, heating and cooling systems are all geared towards reducing energy consumption over the lifecycle of the building. Affordability and speed of delivery were also paramount – while most apartments were sold conventionally off the plan, a portion of the units were designated under the National Rental Affordability Scheme (NRAS), which required affordable solutions and a rapid delivery timeframe.

Hickory Group introduced parallel unitised construction methods into the Australian building industry for this building using the UB™ System by Unitised Building (UB), making it possible to achieve substantial savings in the time and cost of construction over traditional methods while enhancing the environmental footprint of construction with the introduction of concentrated manufacturing techniques. More than 60% of the building was unitised, with work completed in 12 months for what is normally a 22-month construction project. Based on its first four projects completed, UB delivered time savings of at least 50% over traditional construction in mid-rise developments and development cost savings estimated to be 10-20% of total project costs. These are real cost savings that are passed on to builders, developers and end-users to enhance affordability.

The Advantages of Staying Local

Material selection and the use of pre-fabricated systems have a major role

If we embrace these changes as an industry, we have the ability to meaningfully contribute to a reduced carbon footprint – it's something we should do, whether inside or outside an era of the Clean Energy Bill.

in controlling escalating building costs while improving our environmental position in Australia. Over the lifecycle of a building, material choices are the most important construction choice with dramatic differences in embodied energies depending on the structural solution. Meanwhile, pre-fabricated systems globally have shown the potential to consume only 45-65% of the embodied energy of traditional construction in larger buildings, 40% of the transportation and distribution energy and produce only 25% of the waste. Australia should and will inevitably want to maintain and up-skill its construction practices to world's best; if we are able to innovate with technology to produce less expensive and more environmentally friendly methods of construction at home, we should be able to meet the challenge of affordability of housing without sacrificing local inputs or a vibrant and competitive local construction industry. If we embrace these changes as an industry, we have the ability to meaningfully contribute to a reduced carbon footprint – it's something we should do, whether inside or outside an era of the Clean Energy Bill.

ADVERTISEMENT