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Low Carbon Building Design

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Forum 16 provides a demonstration of the complexity that faces us when setting out to design Low Carbon Buildings (LCBs). In the 1990s we focussed on energy efficiency in buildings, following the simple design mantras like those embedded in the Passive House movement: Good windows, no draughts or cold bridges and lots of insulation. Towards the end of the 20th century the fashion appeared for relying largely on mechanical ventilation and heat exchange for air changes, though how this led to low carbon emissions than simply opening a window in most seasons is unclear. By the 2000s the integration of solar energy into buildings provided a very successful means of substantially reducing carbon emissions from buildings and so became popular. By the 2010s the falling price of solar energy made it a must have feature of LCBs, except with some architects who could not grasp its benefits and some who felt that solar panels spoilt the clean lines of their designs.

In the 2000s Sustainability became the over-riding concern for environmental designers but rather to the confusion of many as they tried to juggle apples and pears in order to ascertain the relative merits of designs. Parallel to the sustainability ratings programmes there also emerged the typically much more detailed and scientific field of carbon accounting, involving various methods of assessing the carbon emissions resulting from buildings over their build or life time. Life Cycle Assessment enabled a much more rigorous approach quantifying carbon impacts but one clear problem was that the top down accounting methods, designed for use by governments to enable them to mark their progress against national and international carbon reduction targets, were incompatible with the bottom-up approaches used on the ground to base-line, benchmark and rate comparative performances between buildings.

Then in the 2010s, as the impacts of a warming climate began to seriously manifest themselves on the ground, the European, American and Australian quests to move to lower carbon building types and stocks moved, as energy efficiency had a decade before, towards the back seat and the driving concerns turned towards issues of resilience.

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What became apparent in Forum 16 was that actually good design decisions lead not only to lower carbon buildings but also to more robust, and resilient, ones in which people are more likely to be able to survive successfully than in many high energy, fragile, high carbon models. What is also clear from the papers is that for designers, things have become much more complex in the quest for carbon reductions than simply upping the U Value of a wall.
For those interested in following the ideas deliberated on in this Forum – turn to the fourteen opening papers in the third Volume of the PLEA 2017 Proceedings, available from the home page of the conference website: www.plea2017.net.

The papers in this Forum cover many different aspects of issues related to the field. Three papers deal with the challenge of managing and designing for carbon reductions at the city and district levels, others then look at effecting generic reductions on different sectors of the housing stock, from historic to high rise buildings. Several deal with low carbon designing for actual individual buildings and building elements, like the envelope, and two others deal with the metrics of accounting for carbon reductions. Some take a first cost approach to carbon assessments whole others look at whole life costs for the stocks.

What is really interesting are the 'next step' papers, that are now not only looking at how the buildings are structured, fitted out and furnished, but also how they are used, viewed and habituated to with evidence from studies in schools, homes, offices and timber historic buildings. There is even a paper on 'productive' envelopes where the skin of the building offers a carbon exchange opportunity through its covering of living plants. Perhaps most fascinating of all is the example of energy (and hence) carbon storage in ice – in the historic ice-houses of Iran. See how they do the math on that one, which raises another important question of 'how do you carbon account for energy storage'?

Read the papers and explore the challenges they embody in the proceedings if you are interested. Everyone should be because once the scale of the climate change impacts currently unravelling become even more apparent everyone will eventually have to learn how to count and reduce their building carbs. A final thought – when exactly will that great Building Diet begin?