

The first two parts of this series provided an overview of Life Cycle Assessment (LCA) and addressed common misunderstandings and misconceptions. In this final part, the focus is on the use of LCA in codes now and in the future.



The Future of Life Cycle Assessment (LCA) in Codes

By Wayne Trusty,
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The California Green Building Code, the ASHRAE 189.1 Standard and ICC 700 all cite LCA, and the International Green Construction Code (IGCC) includes it in the current Public Version 2.0 as a project elective. However, there is continuing debate about how LCA should be incorporated, what if anything it should replace and even whether it should be in codes at all.

Industry Concerns

As I noted in Part Two of this series, the debate is, to some extent, a reflection of misunderstanding, but it also reflects concerns of some industries that LCA may have negative competi-



tive implications. An example is the following Steel Framing Alliance (SFA) statement in its newsletter commentary on the IGCC process:

“SFA is pleased that LCA is optional but will continue to press for its elimination from this code so that the full benefits of CFS framing always remain available as key parts of the compliance criteria.”

[Steel Framing Alliance, Framework Online, October 6, 2010](#)

What I believe this “win or lose” perception misses is the fact that all buildings reflect the use of a wide range of materials and that all materials or products have pros and cons from an environmental perspective. There is no environmentally perfect material and the task is to use each to best advantage. Certainly, choices have to be made among directly competing materials for specific functions, but the answer ultimately depends on the circumstances. One material may be selected on environmental grounds in one situation and another in a different situation. Moreover, there are usually tradeoffs in terms of specific environmental impacts. One product may have lower global warming potential but a higher water consumption impact, and these tradeoffs must be weighed in context.

How one material fares relative to others is also very much a function of the scope of the LCA itself. Direct product-to-product comparisons can lead to a different answer than a whole building-to-building comparison. In the latter, a negative result at a material level for a given material may be relatively insignificant in the context of a whole building, or outweighed by other environmental effects. For example, a given insulation material may have a relatively poor environmental footprint from a manufacturing perspective, but have such a long service life or insulating quality that the negatives are outweighed by the positives over the whole building service life when operating effects are taken into account. This point leads directly to the question of how LCA can or should be incorporated in codes.

The Options for Incorporating LCA

There are three basic options for bringing LCA into building design decisions: at the product level, the assembly level or the whole building level. Codes can incorporate any one of these, or even more than one.

The product or material level involves comparing alternative products for fulfilling a given function. We can only do that effectively if the LCAs for the alternatives are comparable in scope and rigor and

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Looking Ahead

The emphasis in codes and related standards is currently on whole building LCA, followed by the assembly approach, with product- or material-oriented LCA lagging for the reasons noted previously. That could shift somewhat as LCA-based ISO Type III labels, known as Environmental Product Declarations (EPDs), become more prominent. EPDs, which declare the environmental impacts associated with a specific brand or the average for a product group, can be likened to food labels. They are already affecting international business-to-business and business-to-consumer decisions because of rapidly emerging requirements to provide environmental information in Europe and elsewhere. International standards are focusing on the use of EPDs in building design and production selection; this will eventually eliminate the problems noted earlier with product-oriented LCA requirements in codes.

At the same time, whole building LCA will still be the most critical approach. It ties together the material interrelationships and the operating energy side, promoting optimization of building environmental performance from a full life cycle perspective. As mentioned in the previous section, the issue is how

to determine whether a given design meets a logical LCA benchmark. The LCA electives in ASHRAE 189.1 and the public comment version of the IGCC both require the final design to improve on a reference building that has to be assessed as part of the LCA process. That approach imposes additional work on the design team and opens the door to gaming the system to a degree, despite requirements that the reference building meet certain basic criteria. The development of region-specific reference building libraries that would serve as the benchmarks could overcome this problem and simplify the whole building LCA process in the future.

Where does all of this leave the assembly approach? It will remain as a valuable learning and design tool, but whole building LCA supplemented by the EPD approach to final product selection will probably supplant it, especially for the interior finishes, HVAC systems and other building elements that are not so easily incorporated at the whole building LCA level.

Finally, it is important to bear in mind that LCA is one critical tool in a toolkit that must be stocked with complementary tools. For example, work is under



way to develop a social impact version of LCA, and tools are already available and evolving to focus on product-related risks from toxic inputs and outputs. Similarly, the use of resource extraction certification systems could be expanded to handle site-specific land use effects and issues, such as biodiversity, for materials other than just wood. Irrespective of how the total toolkit evolves, however, LCA can and should be firmly entrenched in codes to ensure that environmental impacts are taken into account as holistically as possible. **bsj**

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