Editorial

Sustainability: Thinking Beyond the Checklist

By Dirk M. Kestner, P.E., LEED AP

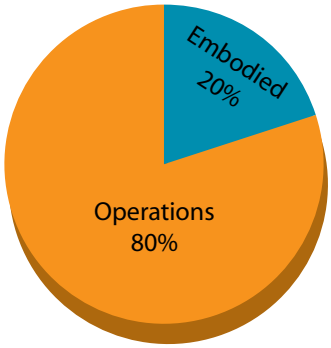

Figure 1: Total embodied and operations impacts: typical building.

A recent article in STRUCTURE® magazine, *Missed Opportunities in Structural Sustainability*, clearly articulated the relationship between adaptive reuse, sustainability, and structural engineering to help dispel the myth "There isn't much structural engineers can do for sustainability." In addition to the contributions we make through renovation, structural engineers can make sustainability contributions in new construction, and these carry significant weight because their effects are realized immediately. Owners and clients demand increasingly sustainable designs, and we sell ourselves short if we continue to believe we cannot play a role.

The myth that there are limited opportunities for structural engineers in sustainable design is largely rooted in the structure and implementation, though not the intent, of the current LEED green building rating system. This myth is born out of letting sustainability, specifically the environmental aspects, be defined by conformance to a checklist as opposed to being defined by genuinely embracing the broader, underlying objectives of minimizing deleterious effects. Although many believe LEED and sustainability are synonymous, they are not. LEED is a metric to evaluate a building's sustainable attributes. While there will always be projects that blindly follow a checklist to obtain a LEED rating, a number of trends within our industry illustrate the importance that our primary focus move from following the checklist to embracing the broader objectives of the rating system.

Increasingly, clients desire a more holistic approach to sustainability and are pursuing the concept of "beyond platinum" designs which encompass strategies exceeding those currently defined in LEED. These projects provide knowledgeable structural engineers opportunities to use their creativity and understanding of sustainable design and material impacts to realize more environmentally benign solutions. These projects may use salvaged materials, be designed for deconstruction, or mobilize the thermal mass of structural materials to reduce operations-related energy consumption.

One example of "moving beyond the checklist" is The 2030 Challenge, a request to the global building community to significantly reduce greenhouse gas emissions of both new and existing buildings. The challenge begins with a target of an immediate 50 percent reduction in energy consumption, and gradually increases to carbon neutral building operations by 2030.

The 2030 Challenge has been adopted by the American Institute of Architects, US Conference of Mayors, and many leading architecture firms. The complete list of adopters and details can be found at **www.architecture2030.org**. This initiative has been adopted by many of our clients, so we must understand and articulate specific ways we can contribute. While the challenge specifically focuses on reducing operations-related CO_2 emissions, it also acknowledges the importance of reducing embodied emissions, those related to the extraction and processing of materials.

The challenge states: "Credible scientists give us 10 years to be well on our way toward global greenhouse gas (GHG) emissions reductions in order to avoid catastrophic climate change." The urgency of the emissions reduction adds significance to the role of embodied impacts. Most current sustainability thinking is informed by the fact that roughly 20 percent of a building's total environmental impacts are embodied in the materials, with the remaining 80 percent due to operations (*Figure 1*). However, a frequently overlooked element is that the embodied impacts occur today, while the operations impacts occur over the building's lifespan. Consider a building built today with a 50 year design life. The solid lines in *Figure 2* show that, for at least the first 10 years, the majority of the environmental impacts are due to those embodied in the building, not operations. The dashed lines represent a more energy efficient building, where 60 percent of the total impacts are due to operations; in this case it takes over 30 years for the operations impacts to overtake the embodied impacts.

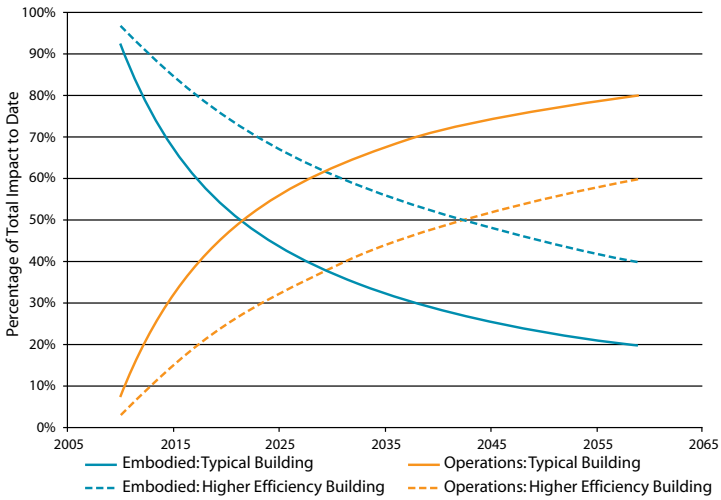

Figure 2: Embodied vs. Operations impacts over time.

Truly sustainable designs will be achieved when all parties understand the impacts of their design choices and integrate their designs to minimize consumption, both on day one and during the life of the building. As structural engineers, we must not be passive in understanding the impacts of our materials. Then, we must convey our knowledge of those impacts, as well as methods to mitigate them, to our clients. The Structural Engineering Institute Sustainability Committee's report *Sustainability for the Structural Engineer*, planned for release in late 2009, will help structural engineers understand how they can be more engaged in the sustainable design movement.▪

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