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Triple Bottom Line Is Best Measure of Sustainable Building Design

By Gail Sullivan

SUSTAINABILITY IS A TERM SO BANDIED ABOUT and casually applied to building design today that it sometimes seems meaningless. Can a 10,000-square-foot residence truly be sustainable, even if it is constructed of lumber certified as 'sustainably harvested' and 'stone quarried on site'? Can a building be deemed sustainable because it has a green roof or utilizes renewable energy systems, even if it costs three or four times more than typical construction for its location and use? Real sustainability involves far more than using natural materials and adding innovative technologies to a building. In fact, sustainability is best measured by how few resources we use to achieve a project's goals.

Achieving real sustainability requires balancing three critical bottom lines:

• *Environmental* – Minimize the use of non-renewable resources, thus restoring and conserving the biologically diverse ecosystems, both local and global, on which we all depend;

• *Social* – Promote individual well-being and creation of livable, vibrant and prosperous communities; and

• *Economic* – Maximize investment of resources, both immediate and long term.

Environmental Goals

It's unrealistic to demand that every private and public development project can contribute equally to each of these bottom lines. However, all should be measured for their movement toward or away from real, triple-bottom-line sustainability.

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Buildings currently use a staggering 48 percent of energy consumed in the United States, while industry uses 25 percent and transportation accounts for 27 percent. The 2030 Challenge, unanimously adopted by the U.S. Conference of Mayors in June this year, calls for an immediate 50 percent reduction in fossil fuel energy consumption in new and renovated buildings by 2010 and elimination of fossil fuel usage in buildings by 2030. According to the Institute of Public Policy Research, the world has less than a decade to reverse the growth in greenhouse gas emissions if dangerous climate change is to be avoided. This presents a tremendous – and urgent – challenge to those of us in the design, development and construction fields.

Most architects jump at the opportunity to include green design elements such as solar energy, wind power and other innovative technologies in our projects. However they are not always possible or practical, and architects should strive to develop a common-sense discipline in the design process.

The first building block of sustainability is using fewer resources. In designing a building, we first should ask whether we can meet the client's program needs and aesthetic desires with less building. The architect could look for spaces and design elements that serve multiple purposes to reduce space. Buildings, major spaces and systems all need to be right-sized, thereby using fewer natural resources as well as reducing capital cost.

The hope is to design high-performance building envelopes and systems that exceed required energy efficiency and reduce fossil fuel use. This also means we must strive to use materials efficiently and elegantly.

The second building block of sustainability is maximizing the value of each element. Once the architect has minimized demand, we can then examine opportunities to utilize renewable energy systems and other technological innovations to achieve the immediate goal of reducing fossil fuel use by 50 percent. While this latter receives the most attention as "sustainable" design, all of these steps are critical to meeting the challenge before us.

Social Considerations

Socially sustainable design should promote the sustained health and well being of inhabitants. Most people have heard of sick building syndrome. Yet too few people, even in the development world, grasp the importance to people's health of designing buildings to provide fresh air and daylight, two of the most significant aspects of healthy buildings. Numerous studies have reported what

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common sense tells us: natural ventilation, indoor air quality and daylight are critical for adults to work productively and students to learn. It's probably safe to add that they are equally important in providing healthy homes. All buildings should provide natural ventilation, typically with operable windows. Testing of mechanical systems should be required in building inspection but it is not. Providing healthy buildings is a first step in people's well-being, and one that should reduce the social cost of health care, thus impacting the economic bottom line.

A far less tangible – but nonetheless critical – consideration is that buildings should contribute to the sense of well-being and self-esteem of inhabitants. Functional, comfortable, elegant buildings do so. As was made abundantly clear by the infamous failure of the Pruitt-Igo housing development in St. Louis, deteriorating, poorly maintained, uncomfortable buildings contribute to crime and social disintegration.

Sustainable design also should be measured in whether a project creates or reinforces livable, vibrant, diverse and prosperous communities. Each project needs to be planned with this broader perspective in mind – how is this building or development contributing to community vitality? With each project, we ask how it can build sustainable community. The answer can be as simple as good landscaping in the front for neighbors to enjoy or removing security grates from storefronts so that passersby can enjoy the window display in the evening. The answer can be providing retail space at the ground floor in a commercial or transitioning neighborhood, or it can be more substantial, such as designing rooftop courtyards for residents adjacent to vegetated roof areas. The latter reduces the heat island effect of urban areas and gives nearby high-rise neighbors greenery to enjoy from upper-floor windows.

Economic Impacts

Economic sustainability requires efficient, wise and responsible use of resources, both in initial capital costs and over the long term. In both public and private projects, pressure is great to reduce initial costs. We should utilize lifecycle cost analyses to help determine which first-cost savings offer real value and which will result in greater costs over the long term. Energy conservation offers reduced utility bills and operation and maintenance costs. Substituting renewable resources for non-renewable ones protects our assets for the future.

Sustainable economic development should focus growth in existing cities and towns. Architects, developers and real estate professionals need to use sustainable criteria to evaluate the first real estate decision – where to locate new construction.

In New England, we don't need "new" urbanism on virgin land. We have existing urban fabric, often in desperate need of reinvestment, both financial and intellectual. Smart growth is promoted for suburban locations with public transportation. However, the smartest growth, the truly sustainable approach, is to first revitalize our existing cities and towns by preserving and adapting existing buildings; by expanding them with additional stories above and behind; and by infilling vacant land, including brownfields. In so doing, we can create the density and intensity that remakes our cities and towns the vibrant, livable, prosperous places we need to sustain us in the 21st century. ■