

IF A building can clean its own air, save its own water, and produce its own energy, it becomes part of the solution instead of part of the problem. Imagine the enormous environment and economic benefits if every building could do this. And they can, if they're designed for it.

How do buildings imitate nature? They take in water, use it and eliminate it, like all plants and animals. In urban areas, a city usually provides the supply and manages the wastewater, so most buildings are not exactly self-sufficient. Some high-rise buildings capture, recycle and reuse their wastewater. That's what wetlands do. Green roofs capture and purify storm water, and plants clean the air and provide habitat. Buildings with solar skins use the sun's energy as a power source, just like butterflies, flowers, and wheat.

Why does this matter? Because buildings consume 40% of all energy. Designing a green building goes beyond incorporating elements and practices such as monitoring devices for lighting, heating and cooling. It needs to consider use of building materials that maximise energy performance and minimise environmental impact; use of salvaged and refurbished building materials; maximisation of interior solar lighting; and evaluation of the environmental impact and lifecycle of building materials.

What makes a building green? There is no single definition of what makes a building green, and any analysis should consider the following:

- Sustainable sites: Addresses the size, location, and other effects of the building on its environment
- Water efficiency: Rewards the frugal use of water indoors and out
- Energy and atmosphere: It covers the installation, verification, and monitoring of heating and cooling systems, lighting, and other equipment as well as the use of renewable energy
- Materials and resources: Outlines earth-friendly strategies for using local, renewable, and recycled materials, reducing waste and encouraging recycling
- Indoor air quality: Focuses on reducing indoor gases that can cause harm, and incorporating daylight and fresh air

A United Nations Environment Programme report entitled *Buildings and Climate Change* stated that more than one fifth of present energy consumption and up to 45 million tonnes of carbon dioxide per year could be saved by 2010, provided appropriate actions are taken during the lifespan of buildings. This will help mitigate the impacts of global warming.

The report said that to achieve improved energy efficiency in buildings, there was no need to use advanced and expensive high-tech solutions, but simple approaches such as smart design and flexible energy solutions.

The 71-storey Pearl River Tower in Guangzhou, China, for example, will be the most energy efficient super-tall tower ever built when completed in 2009. It is designed to significantly reduce the building's dependency on the city's infrastructure and shaped to optimise the energies around it. The tower's overall form is based on a sponge principle, absorbing and using the energy around the building rather than deflecting it. Simply put, it is powered by the sun, wind and water.

Design and development professionals can get a better handle on the costs of green design techniques and materials by using the right design software.

Building developers should take a step back and think about how green their buildings can be, before they start building. Sustainability is simply good engineering and architectural design.

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