

# A GUIDE TO BUILDING GREEN:

Designs That Meet the Demands of Sustainable Construction



“Going green” is tossed around a little too lightly everywhere these days. Despite the popular song performed by one of America’s most well-loved children’s show character, Kermit the Frog, “It’s Not Easy Bein’ Green”, the world has chosen to go on with this resolve.

What does it really mean to “go green” though? Better yet, to be engaging in “green building”? If it were a matter of washing down a building with green paint, surely there would be no cause for raucous anywhere. However, for staunch advocates of the idea, it is a matter of life or death.

To go green is to embrace the practice of sustainability. It is to promote the perpetuation of life – the human race and all living things. It means to conserve and ensure the constant production or the existence of all the world’s resources in order for those lives to survive. It entails a highly interdependent process and an abundance mindset where the end goal is to have everyone come out winning. A truly altruistic goal indeed.

Certainly, there is no question about the need for sustainable construction, nor a debate on whether or not it must be implemented. The decision on whether to adopt the practice radically or go about it a little at a time is something that must be that the decision must be made now.

### **“Green Building” & Energy Efficiency**

Buildings use up nearly half of the world’s energy resources, three-fourths of its electricity, and produce a third of the world’s greenhouse gases. Greenhouse gases trap heat in the atmosphere and make the planet warmer.

The residential sector, the commercial sector, and the industrial sector all account for a large part of the world’s total energy consumption. Each sector also contributes to the total direct and indirect greenhouse gas emissions and waste which put a strain on the health of both humans and the ecology.

If left unmonitored, experts say that carbon dioxide and other greenhouse gas emissions, collectively known as carbon footprint, will have boosted world temperatures by 400% within the century. This increase in temperature will change the world’s climate, bringing it onto even worse levels.



Climate change, in turn, makes sea levels rise, leads to frequent occurrences of droughts and floods and eventually, to the rampant spread of infectious diseases or epidemics. The demand for energy, however, will only continue to climb as every country in the world gains more access to energy, increases use of energy-consuming devices, builds bigger and wider structures.

Fortunately, the awareness for achieving energy efficiency along with strategies to attain it, have as well been developing all across the globe. Green building is one of the most effective strategies for countering the ill effects of climate change. The technology to make substantial reductions in the use of energy and electricity and in emissions of greenhouse gases already exists.

Sustainable construction design principles which consider thermal mass, external shading, building orientation, cross-ventilation, and better insulation. This is to rely less on energy-intensive mechanical systems for internal temperature regulation within projects. The use of renewable energy manages and reduces wastes and carbon footprints.

While poorly designed buildings result in increased electricity use and largely contribute to greenhouse gas emissions, green building designs lower power consumption, save money and reduce the harsh effects of climate change.

Energy-efficient buildings run on lower operating costs as occupants use less electricity, less water, less of the world’s energy for daily living. On the other hand, it increases a building’s profitability as it bumps the value up for property owners when buildings become environmentally responsible and healthier places to live or work in.



## Elements of Green Building

Similar to the classical elements of nature (earth, water, air, and fire) Sustainable Construction is founded on four basic components.

### Materials

Commitment to Green Building involves sourcing and using sustainable materials, and substituting harmful, synthetic materials for natural (biodegradable and non-toxic), renewable (easily generated or manufactured to replenish consumed amounts) and carbon neutral ones (locally available to reduce transportation energy use leaving the least amount of carbon footprint).

Green Building materials are evaluated using the Life Cycle Analysis (LCA). The assessment takes into consideration the amount of energy used up versus the waste produced in delivering the materials to the site, the materials' durability, their recycled content, and their ability to be reused or recycled.

Some examples of sustainable materials include wood, bamboo, linen, wool, hemp, straw, clay, stone, coconut, and sand.

### Energy

Building designs are equally important in defining a project's ability to be energy-efficient. A well-designed structure can utilize natural sunlight and air, reducing the need for mechanical or electrical equipment. Passive solar designs, high levels of insulation, and energy-efficient windows also reduce electricity reliance, positively affecting the health of its occupants and lowers a building's maintenance costs.

### Water

Even though three-fourths of the planet is covered by water, only 3% of this resource is actually fit for consumption and only 0.5% is potable or suited for drinking. The other 2.5% is either stored in glaciers, in the atmosphere, in soil and beneath the earth's surface, or is too polluted for utilization. Because of this, water conservation is every earth dweller's duty.

## Energy

Sustainable construction specialists have responded to that call of duty. By installing greywater and rainwater harvesting systems, green buildings are able to recycle water for irrigation or toilet flushing. Through the use of water-efficient appliances like low-flow showerheads, self-closing or spray faucets, low-flush toilets, or waterless composting toilets, sustainable developments greatly minimize the use of the precious natural resource. Likewise, the installation of point-of-use hot water systems and lagging pipes save not only on the use of water but also on electricity for heating.

### Indoor Air Quality

Due to limited availability of natural building materials, insufficient knowledge and experience on application techniques, and lack of building code guidelines on their utilization, the process of sourcing and using natural materials in green building becomes more inconvenient. But going through all the trouble pays off in the end when building occupants begin to experience comfort and better performance in their daily lives.

The use of non-toxic materials and products which are emission-free and contains very little or no VOC's (Volatile Organic Compound, chemical additives that vaporize and emit gases even long after they have dried), and the installation of adequate and proper ventilation systems that control humidity allow a building "to breathe" work together to improve indoor air quality.



The improvement in air quality alone lowers the rate of sick building syndrome which occurs when building occupants experience similar symptoms without a specific identifiable cause, and building-related illnesses such as allergies and asthma from building molds, to bacterial infections from contaminated air conditioners, to cancers from prolonged exposure to carcinogens.

### **Six Fundamental Principles of Sustainable Building Design**

As with traditional construction projects, much of the time spent in creating green buildings is devoted to planning and design. Green building designs also follow some guiding principles. Unlike in traditional project development where timelines are set based mainly on financials and marketability, timelines in green building go steps further by carefully considering the site's local ecosystems. Planners measure the amount of energy to be used in acquiring and transporting materials to the site and choose the option that would yield the least amount of carbon footprint.

#### **Optimize Site Potential**

Proper site selection, in sustainable construction terms, includes considering alternatives to building on "undisturbed land". Clearly, the preference lies in retrofitting existing buildings or selecting "disturbed" or otherwise previously used land for new construction.

Green builders will also not hesitate to completely change a building's orientation if it means more opportunities for solar energy use and access to natural daylight, which potentially reduces energy costs.



Depending on the purpose of the construction project, sustainable developers study the surroundings for nearby structures such as sidewalks, parking lots, other businesses or residential areas that would complement the planned design to encourage users to choose walking over driving a vehicle which uses up energy and add more carbon footprint.

In the practice of sustainable construction, there is more than meets the eye when it comes to landscaping. In fact, the principle of site optimization heavily relies on landscaping to control erosion, provide shade for the building, and eliminate the need for irrigation.

Through landscaping, green roofs, rainwater cisterns, vegetated depressions, or constructed wetlands, the principle of site optimization addresses the problem of stormwater runoffs. These are also called polluted rainwater runoffs. It lands on man made surfaces and do not evaporate naturally, but instead pour unto the nearest waterway and consequently pollute that body of water.

Green building also seriously looks into the preservation of existing wildlife onsite and proceeding with the least amount of habitat disturbance by incorporating wildlife corridors that allow for undisturbed movement and keeping native plants to improve sustainability.

#### **Optimize Energy Use**

As the world's population continues to grow, so will the demand for energy. And there is just no way, at least for now, that it will decrease. Along with this growing demand comes the alarming concern over having sufficient energy supply for future generations and the now highly evident effects of climate change and global warming.

All sectors realize the need to find ways to reduce energy use, increase efficiency, maximize the use of renewable energy sources, and even become "energy independent".

So while technologies in the recent past paved the way for energy-efficient green building designs, construction and operation, more advanced technologies are setting the bar higher by aiming for "Net Zero Energy Buildings" which produce enough renewable energy to replenish





in amounts beyond their annual energy consumption requirements.

Organizations from both the government and the private sector are taking on this challenge to dramatically reduce the dependence on energy from fossil fuels.

### **Protect and Conserve Water**

With only 0.5% of the whole world's water being fit for drinking, it should not be any wonder why both the willing and the willful alike are working on finding wise solutions to end the scarcity of this resource.

Besides ensuring adequate supply for future generations, a solution to lower environmental and financial costs of sewage treatment must be found. At present, the effort to make potable water available to household faucets uses up much energy in pumping, transporting, and treatment. To cut corners and save on said costs, toxic chemicals are sometimes added to make water drinkable.

Green buildings aim to keep the ecological and hydrological nature of a site, designed as if the building had itself grown out of the land on which it stands. Thus, green building designs have water flowing through, around and down from the rooftops to the ground floor for efficient water use, reuse, and even recycling whenever feasible.

### **Optimize Building Space & Material Use**

As with the demand for energy, the need for additional goods and services, much of which is made from natural resources, will continue to soar alongside the growth in world population,

which is expected to hit 9 billion by 2050.

Because of this, it is imperative that green builders come up with an integrated and intelligent method of maximizing the space within buildings, rendering each one functional, and the value of materials used in projects, preventing 'upstream' pollution and conserving all types of resources.

Environment-friendly materials also lower risks on human health, and benefit the environment and workplaces altogether. It brings about safer workplaces, resulting in a decrease in liabilities and disposal costs.

### **Enhance Indoor Environmental Quality**

Green building designers realize the impact they have on the health, comfort, and productivity of their building occupants. Thus, parameters set by these buildings include:

- Installation of systems which maximize daylight
- Ensure adequate ventilation and moisture control
- Optimize acoustic performance
- Avoid the use of materials with VOC (Volatile Organic Compounds) emissions
- Provide occupants ample control over lighting and temperature.

### **Optimize Operational & Maintenance Practices**

Even while at its conception stage, a green project's operation and maintenance issues are already addressed. This is believed to lead to improved working environments, higher productivity, and reduced energy and resource costs.

This also allows building operators and maintenance personnel to get involved in the design and development of the project to familiarize themselves with the technologies, reinforce learnings from trainings, and ensure adherence to proper operations and maintenance protocols. Such efforts would lessen the risk of improper handling of equipment and maximize the sophisticated features of high-performance green buildings.

Designers may also specify materials and systems that simplify and reduce maintenance requirements, require less water, less energy, and toxic chemicals.

### **Criteria for Sustainable Construction**

Besides guiding principles for green builders to keep in mind, there are certain parameters with which their projects are judged.

#### **Innovation & Transferability**

True innovation means discovering alternative methods that need less production or work. Projects must be able to showcase new methods and share these more efficient practices with other sustainable construction specialists.

Designs must be achievable even with limited resources. Specifications must be documented for future replication or troubleshooting.

Project team members, especially the architects and engineers, involved must be willing to share their knowledge to avoid costly trial and error.

#### **Ethical Standards & Social Inclusion**

In every stage of construction, the project must abide by the highest ethical standards and serve the interests of all members of the community. Transparency must be implemented to ward off corrupt practices while considering affordability, cost efficiency, and long term benefits for all groups, especially the minority.

#### **Resource & Environmental Performance**

The satisfaction of the community relies significantly on the long-term benefits and environmental effects. This must be met through means that ensure the protection of natural resources. The project's design philosophy must embody environmentally friendly techniques.

#### **Economic Viability & Compatibility**

The project must be anchored on a circular economy, an economic system aimed at eliminating waste and the continuous use of resources. It must find means that are both

economically practical and environment-friendly.

### **Contextual & Aesthetic Impact**

The project's design must reflect high-quality workmanship and, to some degree, indigenous culture. More importantly, however, its materials must deliver a positive and lasting contribution to the physical, human, and cultural environment.



### **Resiliency & Adaptability**

The project should withstand the harsh effects of global climate change, function, and operate under extreme conditions, natural disasters, and the like. At the same time, it must have the capacity to be used for various functions, where its design may be easily transformed to suit other future needs.

### **Green Codes**

The realization of the direct and indirect impact construction projects have on the environment has prompted the creation of green building standards, certifications, and rating systems to regulate, limit or even eliminate the harmful effects construction may bring to the natural environment.

While a few are already in place, new green building codes continue to be developed and adopted all across the globe.



Green building may not necessarily be a path the faint of heart should take at this point what with the birthpain challenges to be faced at the project's onset: the inaccessibility to natural materials, the inconvenience of assessing the origin and content of each material to be used, the lack of technical experts in the field to execute designs and implement environment-friendly practices from start to finish.

But a true-blue green builder is a visionary, a maverick and a community builder. In that, he will not succumb to pressures from complacent advocates of outdated methods.

So while initial investment on green building technologies may seem daunting, she realizes its economic benefits such as protection from future fuel price hikes and other costs of inflation. And that the long term health benefits far outweigh the seemingly high capital expense.

In the final analysis, the decision to go green, which must be made now, is both a personal choice and a responsibility. It must be done with conviction. The resolve to adopt a sustainable mindset, whether immediately or gradually, must be done holistically. A half-hearted attempt will simply not cut it. It is, after all, a way of life.