Green Architecture

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What is Green Architecture?

Green architecture believes in reducing the harmful environmental impact of built structures. It is designed to be adaptable, beneficial and have a minimal carbon footprint.

There are some common goals and practices when constructing green buildings. These include-

- sourcing sustainable materials
- focusing on conserving energy
- Preserve the biodiversity surrounding the area
- Yield health and productivity benefits for the residents

For example, solar power systems, composting toilets, rainwater harvesting, community gardens with composting facilities, etc. are some instances of conscious, green construction.

Green and sustainable architecture does not only avoid environmental harms. It also enhances the integrity of nature.

Apart from creating better structures, green architecture is preferred more as they are more resilient to natural disasters.

Green constructions are built by a certified group of individuals who work on every aspect.

These specialists pay attention to all factors like soil quality in the area, patterns of sunlight, etc. From design to the final execution, every part of the process is carefully deliberated and tailored to the height of environmental perfection.

Once the building is completed, the occupants are responsible for reducing energy use, and following other guidelines to make optimal use of the eco-friendly structure.

Most importantly, green buildings are not a one-time effort. Instead, they are a continuous process involving everyone- designers, inhabitants, planners and policy makers. The main goal is to reduce the harmful environmental impact of structures.

Green architecture is a portal to the next generation healthy lifestyle. those who continue to help reduce the impact on the structure. It thrives on both prudence and participation.

Green design today

Imagine the life cycle of products in your everyday life, For instance, say you purchase a single-use water bottle to take to the gym and then dispose of – hopefully in the recycling bin. This product took energy to make, to ship to you, and was only in use for an hour.

Let's apply this to a building. Skyscrapers use steel that is manufactured in an energy intensive process, then shipped via trains or trucks to the construction site where it ultimately becomes part of a building that will occupy the site for decades to come. All the energy used in production, transportation, and construction of that steel is counted as "embodied energy."

One way to think about green architecture is reducing the embodied energy of a building. Any licensed architect can assist clients in sourcing materials that are less labor intensive to construct and require less transportation. It's easy to specify windows from Germany, but when a product manufactured in North America can cut out transportation, why not choose something more local?

Another way to minimize embodied energy during building creation is by using materials that have been recycled, like steel or reclaimed wood. This gives new construction a smaller footprint opposed to those buildings that require entirely new materials to be fabricated.

Buildings breaking ground today have the potential to use a fraction of the energy their counterparts used even 10 or 20 years ago. One main driver for the increase in efficiency standards can be attributed to LEED.

LEED, or **Leadership in Energy Efficient Design**, is a building standard that certifies buildings meet a certain level of performance. This has been encouraged by tax incentives for owner's who achieve LEED-certified buildings. Governments and municipalities have seen the benefit to lower maintenance cost of the buildings and have mandated LEED building as the standard.

In recent years designers have proposed new building challenges, like the Living Building Challenge, that looks more holistically at a building's construction and ultimate performance. Factor sheet are taken under consideration, including weather materials using release chemicals that are harmful to the environment or humans.

For this challenge, weather materials are made in an eco friendly process, where materials are sourced locally and designers look closely at building performance after construction. The Living Building Challenge is more stringent because it tests buildings to see if they meet the standards promised by designers, whereas LEED does not.

Groups of architects have also become more active recently. Chicago architect Tom Jacobs founded Architects Advocate, a group of architects trying to enact meaningful tessellation policy to mitigate climate change.

Green architecture for any budget

After looking at the massive energy consumption reduction that can be made to new buildings, what can the average occupant of a pre-existing building do? New buildings require energy and materials to construct and are in addition costly. There are small simple changes you can make today, on any budget, to you can reduce the energy consumption of your building.

One of the most basic is be upgrading your light bulbs from incandescent to LED. LED (Light Emitting Diodes) have come a long way and offer different color temperature, making them feel warmer than the earlier generation. If your water heater is in need of replacing, consider changing to a high efficacy tankless water heater this will reduce energy consumption, reduce your bill, and free up space in a closet. If you have the budget, properly installed windows can have an impact on air infiltration and result in a space that is less subjected to temperature swings. Also, if you're doing any remodeling, you can add rigid insulation in exterior walls to increase the R value, or their resistance to heat transfer, over the typical batt insulation that has been the industry standard for years.

If you're in the market to renovate a home, think about all of the above energy improvements as well as incorporating a new cladding system, such as a rain screen. These systems are an outer façade and pre condition air keeping structures cooler in summer months and warmer in the winter. They also allow for more insulation to be added to the wall assembly. Replacing a

window on a home is a project any contractor should be able to undertake to help bring your home into the 21st century.

But what about updating the windows on a building like the Seagram's tower, a modern glass and steel tower completed in the late 1950s? It's a bit more daunting. Tenants in these spaces can help improve building consumption by using occupancy sensors that detect people's movements, and shutting off the lights when people are not in the space. Also using a smart switch that dims lights as sunlight increases to reduce unnecessary electric draws.

Common Features of Green Architecture

Green buildings vary in style and design depending on the location and purpose of their creation.

However, there are certain principles at the core of green architecture followed by all eco-friendly constructions. Here are some of them:

Materials Used in Green Architecture

The materials used in green architecture are those that encourage good thermal performance, energy efficiency, water efficiency, resource management and save general construction costs. The materials long-term

effects on the environment are a key criterion for selection. The following list provides a guide to the types of materials which are suitable for green building. The best materials are those which combine several of these features; materials like Accoya modified wood. This is sustainable, durable, manufacture is resource efficient, it is made from renewable material and it is non-toxic. Materials like these are the mainstay of the most ecological builds and their use helps towards obtaining certification such as LEED.

1. Recycled products

Recycled content products are used in green architecture on account of their resource efficiency. Examples of recycled products include paper insulation from recycled newspapers and cardboards, cotton insulation from recycled denim, recycled stone and recycled steel. They are effective because they use fewer chemicals and energy to process and also require fewer virgin resources.

2. Materials manufactured with resource efficient processes

These materials are preferred in green construction because they not only require less energy to produce but also minimize resource wastage and greenhouse gas emissions. An example is sustainable concrete made from crushed glass and wood chips or slag.

3. Natural, abundant or renewable materials

These materials can be obtained from sustainably managed and naturally occurring sources. They must also be renewable and adequately abundant in nature. Examples are certified wood and solar tiles.

4. Refurbished, salvaged or remanufactured

As the name suggests, these are the materials that are refurbished, salvaged or remanufactured. Their essentiality includes their inherent capacity to create value and saving materials from disposal or generating landfill waste. The materials are renovated, repaired or improved in performance, functionality or quality. Examples include plastic ceilings.

5. Reusable and recyclable materials

These are the materials that were previously used, but are still in good condition and can be used in new construction. Examples include old plumbing and old doors.

6. Durable materials

Materials that last longer are more environmentally friendly because they eliminate the need for frequent replacements and maintenance. They also reduce the overall costs of dependence of new upgrades in an already constructed building or house. Besides, durable materials have high reusable and recyclable value.

7. Locally available

The use of locally available materials is also part of green architecture since it minimizes transportation costs, greenhouse gas emission during transportation, and the interference with the local ecology.

8. Non-toxic materials

Non-toxic materials are highly recommended in green architecture. They promote IAQ and they are substantially low in carcinogen elements, irritants or reproductive toxicants.

9. Moisture resistant products

Moisture resistant materials are the ones that hinder the growth of biological contaminants in buildings. They are 100% moisture resistant and thus highly preferred in green architecture in terms of improving IAQ.

10. Low VOC products

Products with low VOCs are a greatly desired in green architecture designs. They improve IAQ since they are non-toxic and less hazardous to the occupant's health.

11. Water and energy conserving materials

Water conserving materials help in reducing the overall water requirements during construction and also in the lifecycle of the building or house. The materials are designed to reduce water wastage and enhance water quality in the landscape areas and within the building. Energy conserving materials, on the other hand, capitalize on scaling down energy costs and improving energy efficiency of the buildings. Examples of energy efficient materials are solar tiles and smart insulators.

Energy conserving mechanisms

Green constructions are designed to be energy-efficient.

They use alternative energy sources like solar power and wind power, energy-efficient lighting, electrical appliances, rainwater harvesting systems, etc.

Caring for the surrounding natural habitat

Green buildings are always designed with the surrounding natural habitat in mind.

These structures help the surrounding ecosystem thrive rather than obstruct the growth of nature.

Improving the Resident's Quality of Life

Ensuring the well-being of the occupants is another primary goal of green constructions.

They provide occupants with a safe, healthy, and eco-friendly living space. A sustainable and non-toxic indoor environment is an essential facility.

Adaptive Designing

While enhancing the natural habitat and reducing the environmental impact are necessary goals, designing also plays an active part.

These buildings adapt to all the changes the community might go through on the way to a sustainable future. Besides visually enhancing the surroundings, they are highly functional.

Reducing pollution, reuse & recycling

Green buildings are constructed with the least possible pollution of natural resources.

The finished structure also enables reusing and recycling facilities to minimize waste and manage it efficiently.

Social benefits

Factors like location and transportation facilities are considered in sustainable architecture.

The chosen area is ideally close to public transport hubs to help minimize the use of private vehicles. Advancing social equity and public health is also fundamental.

There are many ways to make a building green. But these are some of the essential requirements.

While an eco-friendly construction process is the highlight of green architecture, the finished structure should also help occupants lead a sustainable lifestyle.

Going green does everyone a favor

Green buildings today are some of the most beautiful works of architecture. They take inspiration from the natural world, and try to live with the environment not conquer it.

A Chicago firm, Urban Lab, built their home/studio to embody a plethora of sustainable features. It includes passive heating to take advantage of the sun in winter and shading from the sun in the summer. Care was taken in designing the site's water retention so to reduce the processing demand on the city. Large operable doors allow for ventilation when exterior temperatures allow reducing the demand for interior climate control, rain screens are also used to further sustainability.

Larger strides are being taken in high-rise construction as well. The global firm Perkins and Will is experimenting in building tall with timber. Trees capture carbon, and if replanted and harvested sustainably, have less embodied energy than steel.

As innovative architects like these lead the way, green architecture is becoming more mainstream in society. Everyone can benefit from the reduction in energy consumption and improved spaces green architecture creates – and it's in the best interest of our planet if we follow this philosophy.

Curious about other ways to "go green" and achieve sustainability? Read all about green marketing and how going green can help not only the environment, but also your bottom line. And then check out the top-rated sustainability management software on the market today, only on G2.

Principles of Green Architecture

As the world migrates towards a more sustainable future, architects are confronted with an important goal of design models that lessen the negative impacts on our environment due to construction. To make this a reality, the designs are guided by the principles of green architecture. Here are the principles.

1.Energy efficiency

The principles of green architecture incorporate various measures that encourage energy efficiency. It is done through designs that cut down energy consumption including the energy requirements for energy use and the exploitation of alternative and sustainable energy sources such as wind and solar. For instance, green architecture takes care of natural air flow patterns and natural lighting to reduce the needs for heating, ventilating, and air conditioning; and artificial daytime lighting respectively. The designs simply insist on reducing the lifetime costs of heating, lighting, air condition and other electric power usage requirements.

2.Water efficiency

Green architecture works with the inspiration of ecological surrounding to protect water quality and reduce water consumption or wastage. It is part of the sustainable principles in green construction which encourage the efficient use of water. This green architecture principle makes certain that water is harvested, used, purified and re-used during the entire construction period. At the same time, the architectural design ensures that in the entire life cycle of the building not only supports efficient water use but also preserves the quality of surrounding water systems and makes use of water recycling mechanisms.

3.Land use efficiency

Land use efficiency pertains to architectural designs that encourage suitable site development in terms of preservation of the surrounding environment and reuse of existing local materials. It advocates for the incorporation of roof gardens, earth shelters and extensive landscaping around and throughout the building.

4.Low environmental impact and conservation of natural characteristics

Construction projects are proven to be responsible for more than 50% of environmental impacts and the destruction of natural systems. Construction

projects also contribute to about 10% of the total global emissions every year. One of the principles of green architecture is to therefore use green designs to lessen these environmental impacts. Particularly, this green principle is all about preventing degradation of the site during construction, sprawl management, and the controlled use of resources as well as ensuring energy-efficient buildings lessen the overall impacts on the environment. The design aids in the conservation of natural resources, improved water and air quality, and the protection of ecosystems and biodiversity.

5.Material efficiency

The proper management and use of materials in construction is also another huge concern. Proper construction techniques have to be employed and this is where green architecture comes in. As such, material efficiency is one of the green architecture principles as it creates designs that inspire sustainable construction by optimizing the construction operations. Material efficiency as a green architectural

principle sees to it that the lifetime of the building enhances efficiency in terms of maintenance and operations. Energy efficiency and resource conservation are the aspects incorporated in the designs to guarantee overall material efficiency.

6.Low maintenance costs

As stated earlier, the operational and construction costs associated with the conventional construction mechanisms prove quite high and are equally material demanding. Green architectural design facilitates the use of materials and construction techniques that help in cutting back the operational and construction costs by more than half, all attributed to their cost-effectiveness. This green architecture principle necessitates the need of using renewable plant products, recycled metal and recycled stone among other non-toxic products. Renewable and reusable products ensure high performance while at the same time reducing the long-term maintenance costs.

7.Waste reduction

Green architecture advances the demand for reducing the wastage of water, energy, and materials during and even after construction. On this basis, the green

architectural design offer easier ways of reducing the amount of consumer product wastage generated by the building occupants through the integration of on-site solutions like compost bins and eco-friendly waste management system. The design also takes care of water recycling and energy saving approaches in construction to reduce water and energy wastage respectively.

8.Use of renewable energy

Among the green architecture principles is the use of renewable energy. This principle ideally works to make renewable energy part of the architectural design or a highly recommended feature. The use of wind power, solar energy and biogas are examples of renewable energy technologies which are often included in the green architecture designs. The architects are keen at tailoring the designs based on the geographical locations to take full advantage of the available renewable energy. For instance, green oriented architects design buildings to fully utilize the seasonal changes in the sun’s position and other regional renewable energy sources such as wind and biomass.

9.Indoor environmental quality

Indoor environmental quality is also part of the green architecture principles. The designing of a house or commercial building based on the green principles involves the features of comfortable interior space with an emphasis on natural temperature control, proper ventilation and the use of products that do not give off toxic compounds or gases. The purpose of the principle is to assure the quality of indoor environments.

5 Stunning Green Architecture Examples

Now that you know the basics of green architecture, let's take a look at some of the most striking and eco-friendly structures in the world. These 5 buildings and sites are stunningly beautiful and efficient, taking green

architecture to the next level! How we wish the world would take a 180 degree turn like this!

1. Shilda Winery, Georgia by X-Architecture

Shilda is a wine tasting complex in Kakheti, Georgia, built in 2016 with the concept of appreciating every aspect of wine, from harvesting to consuming. It is fully embedded into the land, responding to the environmental factors of the area.
The elevated structures look like three hills. They accommodate three main functional areas for wine tasting, wine storage, and wine knowledge sharing.

Shilda receives a lot of sunlight. Therefore, the complex has been designed to use the thermal mass of the soil to optimize the cooling system.

The facade is north-facing, which aids all round cooling. The building consumes minimal energy instead of letting the environment regulate the temperature.

2. Vertical Forest, Milan by Stefano Boeri Architetti

Two Vertical Forest buildings in Milan were built between 2007 and 2014. They represent architectural biodiversity, including human well-being and the relationship between humans and biodiversity.

These were the first of their kind, and have received prestigious architectural awards.

These residential buildings were powered by the idea to create a “home for trees that also houses humans and birds”. With approximately 800 trees, the buildings also house second-stage and small varieties of perennials and shrubs.

This dense vertical jungle creates a clean and healthy indoor living environment by filtering harmful toxins from the atmosphere. As a result, it is a thriving hub for all living species. As of a few years ago, there were around

1600 species of birds and butterflies that lived alongside people in the buildings. Harmony personified.

3. Knox College Whitcomb Art Center, Illinois by Lake Flato

The Whitcomb Art Center is the a sustainable art building at Knox College.

Built with materials gathered from demolished projects in other areas of the college campus, it is stylish and functional.

The center highlights Knox College's commitment to sustainability.

The roof of the structure holds solar panels. As a result, the entire building uses 17% less energy.

The design and spacing are made to endure harsh winters, mild swing seasons, and the acute sunlight in central Illinois. These techniques conserve a lot of energy and do not release wasteful residue into the nature.

Knox College also uses green stormwater management that lets the runoff water from roofs enter the storm drains. The runoff is utilized to nourish native shrubs and flowers.

The Whitcomb Art Center has also received the Gold Certification from LEED.

4. DISC Lab, Busan by Cre-te

The Descente Innovation Studio Complex (DISC) in Busan is a research and development facility for shoes designed by Cre-te.

The track covering the inner courtyard is called the ‘CIRCLE’. The CIRCLE and the rising portion around the courtyard are aesthetic, functional and support the surrounding ecology.

With this artificial hill-like appearance, the DISC lab has a sleek urban look while being eco-friendly and sustainable.

The structure promotes research, creative communication, and sustainability. It received the iF Design Award in 2021.

5. Tongan Wenbi Pagoda Park, Xiamen

The Tongan Wenbi Pagoda Park in Xiamen, China, was designed by Xiamen Urban Environment Design and the Tongan government to restore historically significant farmland.

This vast park spans 8 hectares, protecting the ecology of the land and enhancing the lifestyle of residents.

The once lush farmland is culturally important to the people of Tonga. This encouraged the government to restore and preserve the land and its natural habitat.

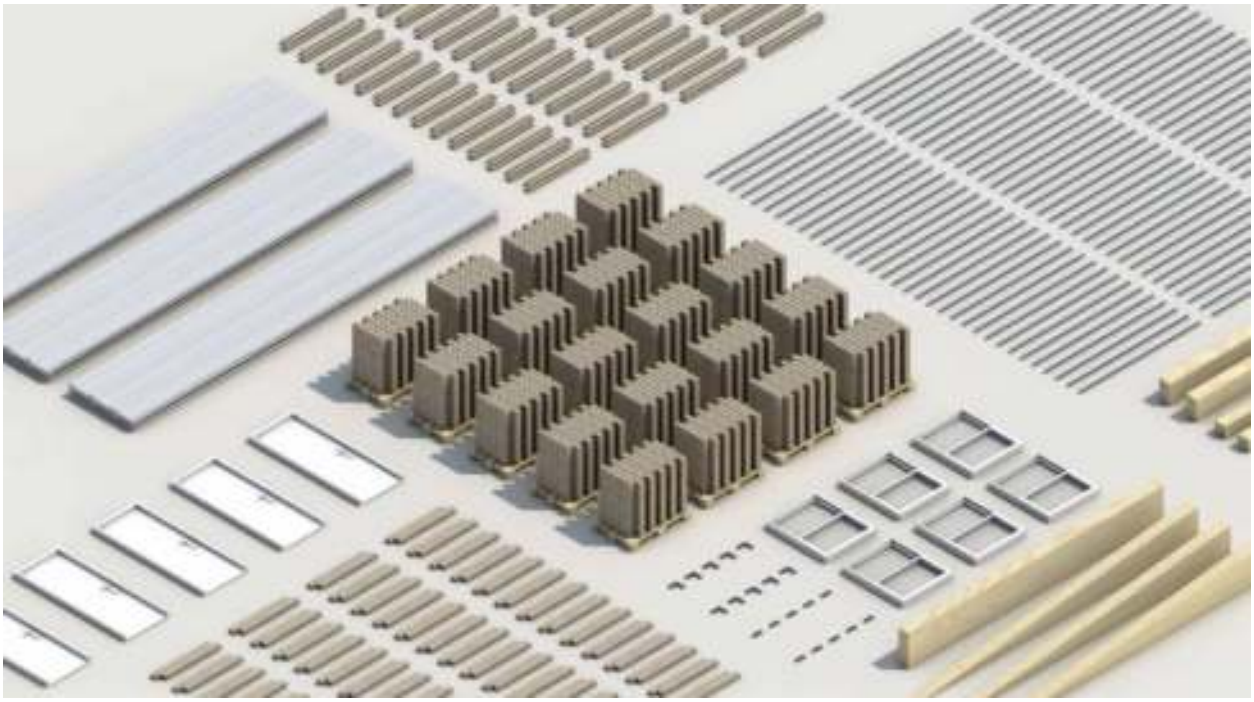
It represents the idea of ecological unity and aims to protect the outdoor green spaces. The construction also won the iF Design Award in 2021.

The Future of Sustainable Architecture

The building industry is one of the major polluters on the planet.

Green architecture is an essential solution for a sustainable future. Today, we've already paved the way with decades of research and experimentation. We can say that the future of green buildings is bright.

Several innovations are taking the sustainable turn today. For instance, Polyblocks by Polycare, referred to as LEGOs for adults, are building blocks made with sustainable materials used to build a structure.



The main aim behind Polyblocks was to help people build sustainable, safe, affordable space for themselves. Polycare has already built 100 sustainable homes in Namibia.

International certifications like LEED are also advancing the green construction movement by making green building compliances more accessible.

Newer additions like the LEED Zero Program set up more comprehensive standards that can recognize standout green builders. Measures like these are driving the movement by persuading architects to invent competent, sustainable solutions.

As we hurtle towards the future, it is important to note that green construction goes beyond mere building.

It is about bringing humans and biodiversity together in a habitat equilibrium, where we respect the environment and also improve our standard of living.

To truly make buildings an asset to the planet, builders, creators, authorities and residents have to collaborate and take responsible steps. The dream of a green infrastructure will then transform into a powerful reality and a political statement with concerted action.

Conclusions

Green spaces should ideally become the norm rather than the exception. As we continue to move towards an uncertain future, it is important for us to transform our living spaces.

It does not have to be a colossal revolution. Even incremental efforts to make structures more impactful and environment-friendly will go a long way.

However, authorities and states all over the world need to emphasize the importance of green architecture more than ever. It is the genuine need of the hour.

Besides other lifestyle changes and revolutions in fashion, food and living- we need to consider a structural aspect to zero-waste sustainable living. It's safe to say that green architecture is the next big shift in our landscape. Maybe the future does not look too pessimistic after all.

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