NY ENGINEERS

GREEN BUILDINGS & SUSTAINABLE ARCHITECTURE

A DETAILED GUIDE

INDEX

1 The Zero Code: An International Standard For Green Buildings

- *How the ZERO Code Improves Buildings.*
- *ZERO Code: Complementary Technical Guide and Software.*
- *Conclusion*

2 The High Potential Of Solar Power In Developing Countries

- *Reasons to go solar when the local grid is Unreliable*

3 How The Us Green Building Council Is Working Against Covid-19

- *USGBC actions to fight the coronavirus Outbreak*
- *Building Certification: Changes to the review process*
- *Leed Exams are now Available Online*

4 Types Of Solar Power Incentives : A Detailed Guide

- *Tax Incentives for Solar Power*
- *Tax Exemptions*
- *Tax Credits*
- *Solar Power Rebates*
- *Performance-based Incentives for Solar*
- *Bonus Payments Per Kilowatt-hour*
- *Favorable Laws: Net Metering and Simple Interconnection Rules*

5 Elements Of Sustainable Architecture

- *Solar Shingles*
- *Green Roofs*
- *Rainwater Harvesting*
- *COB*
- *Shipping Containers*

6 Green Certification Systems For Buildings

- *LEED: Leadership in Energy and Environmental Design*
- *BREEAM: Building Research Establishment Environmental Assessment Method*
- *CASBEE: Comprehensive Assessment System for Built Environment Efficiency*
- *Energy Star Certification*
- *Green Globes*
- *EDGE: Excellent in Design for Greater Efficiencies*
- *NGBS: The National Green Building Standard*
- *Living Building Challenge*

THE ZERO CODE: AN INTERNATIONAL STANDARD FOR GREEN BUILDINGS

Author
Michael Tobias

Architecture 2030 is a non-profit research organization, which has the goal of transforming the building sector globally. Buildings are currently a major source of greenhouse gas emissions (GHG), which means there is a huge opportunity to reduce their impact with energy efficiency and renewable generation.

According to the United Nations, the number of buildings in the world is expected to grow at a very fast pace over the following decades.

- Globally, building area will increase by 2.5 trillion sq.ft. by the year 2060.
- This is like adding new buildings equivalent to an entire New York City every 34 days.
- The global urban population is increasing by around 1.5 million per week.

If construction continues at such a pace without giving attention to energy performance and emissions, the impact on global climate can be severe. The Paris Agreement target is to keep global temperature rise below 2°C, and this is only possible if all buildings become carbon neutral by 2050. Building emissions have been steadily rising by 1% annually since 2010, and this trend must be stopped as soon as possible.

To address the issue of building emissions, Architecture 2030 published the ZERO Code on June 2018. The main goal of the code is to provide an international framework for Zero-Net-Carbon (ZNC) buildings, which can be adapted to local building codes.

- As its name implies, a ZNC building has zero net emissions. This can be accomplished if 100% of the energy used by the building comes from renewable sources.
- In cases where the building is forced to use energy sources that produce emissions, it can still become ZNC by producing surplus renewable energy until the carbon footprint is offset.

The ZERO Code has a very broad scope, covering new commercial and institutional buildings, as well as mid-rise and high-rise residential projects. These building categories cover most new projects in modern cities. The code proposes an international framework for ZNC buildings, which can become mandatory if adopted by local governments.

HOW THE ZERO CODE IMPROVES BUILDINGS

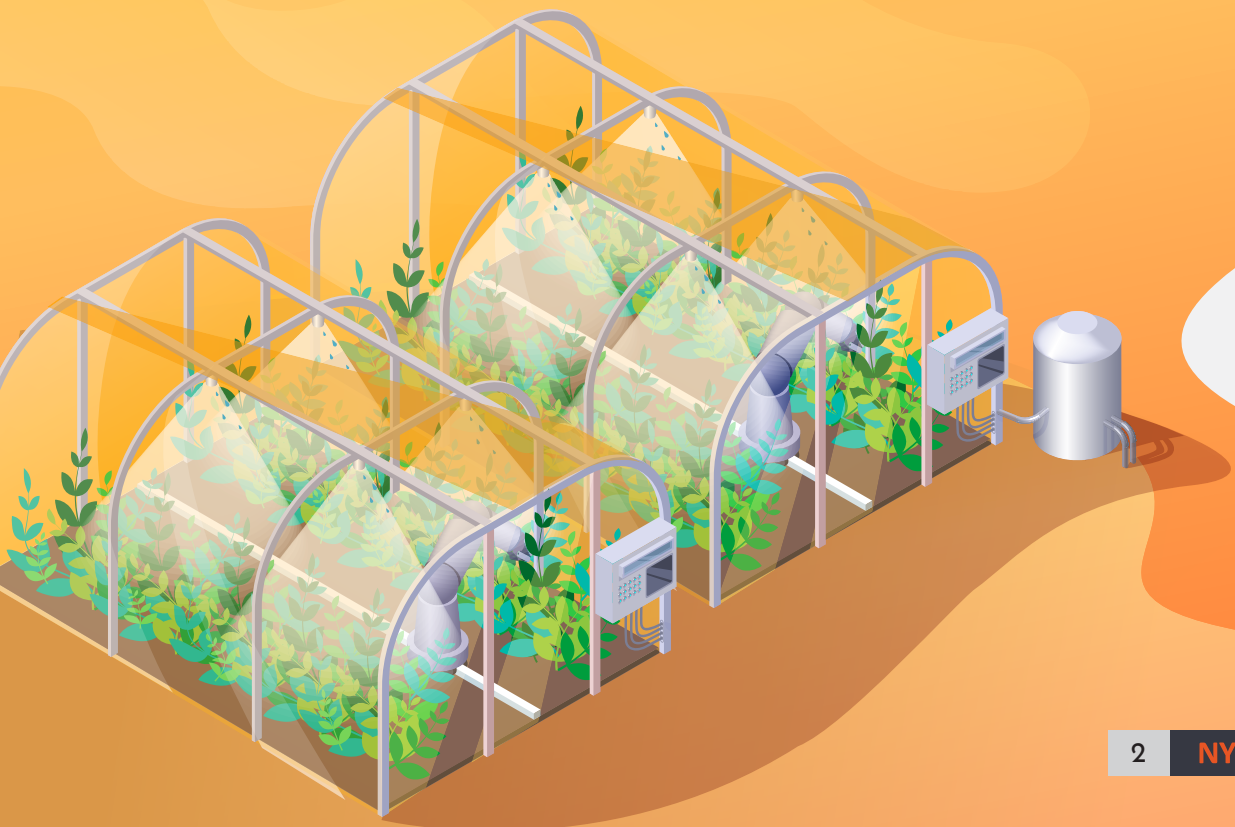
To minimize the energy consumption and environmental footprint of buildings, the ZERO code proposes a three-step approach:

- Minimizing energy demand with a high-performance building envelope, daylighting, passive design, energy efficiency measures and building controls.
- On-site renewable energy generation, deploying the highest capacity that is feasible.
- If the building's energy demand cannot be met only with on-site generation, the rest can come from off-site renewable systems like solar farms, wind turbines or hydropower.

Similar to how the NYC Energy Conservation Code works, the ZERO Code provides two compliance paths. It is based on the ASHRAE 90.1-2016 Energy Standard for Buildings Except Low-Rise Residential Buildings.

- The prescriptive approach uses predetermined measures that are outlined in the code.
- The performance approach validates building performance based on energy modeling.

In theory you can have a zero emissions building without energy efficiency, but that is an extremely expensive approach, since you need more renewable generation capacity to compensate for energy waste. For this reason, the ZERO Code adds energy efficiency requirements, even when it would be possible to reach zero emissions without them.



The ZERO Code focuses on new buildings, since the opportunity to control emissions is greater. Existing buildings can also reduce their energy consumption and emissions, but passive design features and envelope improvements have limited applications on existing structures and walls.

Just like the NYC Energy Code, the ZERO Code includes documentation and labeling requirements, along with project commissioning to validate performance.

ZERO CODE:
COMPLEMENTARY TECHNICAL GUIDE AND SOFTWARE

Renewable energy is a complex topic, and selecting the best sources for a project can be a significant engineering challenge:

- Some technologies may perform better than others depending on property conditions, local regulations and incentive programs.
- On-site deployment is not possible in many cases, but there are many ways to purchase renewable generation from third parties.

Architecture 2030 has created a technical support document along with the ZERO code, which provides a detailed guide on how to procure renewable energy when on-site generation is not possible or insufficient. The guide provides a detailed description of the purchase options available, pointing out advantages and limitations.

The ZERO Code Energy Calculator was developed to simplify code compliance for property owners following the prescriptive approach of ASHRAE 90.1-2016. The software tool is free and open source, and it is available as both a website and a mobile application.

CONCLUSION

The ZERO Code only becomes mandatory if adopted by local authorities, but a high-performance building is a valuable asset even when energy efficiency and renewable generation are optional. In addition, New York City has been characterized by building performance leadership, and it is very likely that the ZERO Code will be adopted in the near future.

THE HIGH POTENTIAL OF SOLAR POWER IN DEVELOPING COUNTRIES

Author
Michael Tobias

Technology is constantly evolving, and problems that have greatly challenged mankind in the past can now be solved easily. Electricity is taken for granted, but achieving a stable and reliable power supply is still a challenge in many remote places.

This point was stressed at the 2019 African Real Estate Conference & Award, recently attended by PSC Solar (UK) in Lagos, Nigeria:

- Technology can solve many of Nigeria's main problems, which include intermittent power, insecurity and pollution.
- With its population of over 190 million, Nigeria needs a power generation capacity of 180,000 MW to achieve a stable electric supply.

Homes and businesses can become less dependant on the grid if they generate their own electricity with renewable sources. Solar power systems are especially promising, since they generate electricity without an external fuel input. Sunlight is an abundant resource in Nigeria, especially in the northern regions of the country.

REASONS TO GO SOLAR
WHEN THE LOCAL GRID IS UNRELIABLE

In general, solar power has the benefit of being a low-cost electricity source, which does not rely on external inputs. However, it brings additional advantages when the local power supply is unreliable:

Enabling a 24-Hour Power Supply: Solar power systems can be sized to produce all the electricity needed by a building, and combined with battery arrays to store energy for nighttime. When the power grid supply is stable, you can continue using it to conserve battery charge. In the case of businesses, solar power with energy storage can ensure continuous operation even when the grid fails.

Reduce or Eliminate Your Power Bills Permanently: All the electricity provided by solar panels is electricity that is not drawn from the grid. Solar panels from the top manufacturers have a service life of over 25 years, ensuring a long-term power supply. This is an excellent benefit in places where the grid has intermittency issues. Even if the solar power system does not meet 100% of the building's electricity consumption, it reduces power bills while making you less dependent on the grid.

Eliminate Noise and Combustion Gases: Diesel generators are a common as backup power supplies, but they are noisy and highly polluting. On the other hand, solar panels operate silently and without emissions. For this reason, solar panels can be considered a healthier power supply, especially when electricity is being generated on-site.

Solar street lights are an excellent complement for photovoltaic arrays and batteries. They have a built-in solar panel and battery, which lets them recharge during the day to provide lighting at night. Since these lights can operate continuously without connecting to an external power source, PSC Solar often recommends them to its clients in Nigeria.

Solar photovoltaic systems are field-tested technology, which has been deployed successfully in thousands of projects in developed countries. For example, Germany is now generating over 36% of its energy from renewable sources, and solar power represents 7% of the total. By the year 2050, Germany plans to increase its usage of renewable energy to 80%.

HOW THE US GREEN BUILDING COUNCIL IS **WORKING AGAINST COVID-19**

Author
Michael Tobias

We spend 90% of our time indoors, according to the US Environmental Protection Agency. The coronavirus outbreak has revealed that modern society is very vulnerable to infectious diseases, and improving resilience should be a top priority. One possible strategy is improving the built environment with features and protocols that reduce the risk of COVID-19 infection. These features will continue to be useful after the current emergency, making building occupants less vulnerable to infectious diseases.

The US Green Building Council (USGBC) published its official position on COVID-19, in a strategy document called Healthy People in Healthy Places Equals a Healthy Economy. The USGBC challenges the notion of "choosing" between health and the economy, considering that both are important to recover from the coronavirus outbreak.

- LEED is a well-developed rating system, and there is a global professional community who has been using it for over two decades.
- Taking advantage of this starting point, the USGBC can direct efforts towards healthier buildings that are more resilient against COVID-19.

The USGBC will be publishing emergency guidance based on the latest knowledge about COVID-19, and LEED will be updated with credits that focus on disease prevention. The USGBC will also offer more options for professional credentials and building certifications that were in progress when the pandemic started.

USGBC ACTIONS TO FIGHT THE CORONAVIRUS OUTBREAK

Currently, the USGBC is focusing on indoor environmental quality, cleaning, occupant comfort, operations, better materials, risk management and innovative solutions. Several actions are being taken in this direction:

- New LEED strategies and pilot credits to help prevent COVID-19. These will be expanded and updated as necessary, based on the latest knowledge.
- Regional CEO advisory councils, to provide more effective feedback for the USGBC.
- The USGBC Equity program, which focuses on disparity within communities. The program intent is delivering LEED benefits for all socioeconomic levels.
- Calling for ideas, to hear perspectives and suggestions from the global green building community.
- Adapting the LEED review process, adjusting deadlines and requirements while incorpo rating lessons from the COVID-19 pandemic.
- Guidance reports, based on the latest knowledge and incorporating best practices when reopening buildings.

The USGBC focuses on providing guidance to help building owners through the emergency, while adding LEED features that improve building health permanently. The council is also adjusting its operating procedures, to keep professional accreditations and building certifications moving through the emergency.

BUILDING CERTIFICATION: CHANGES TO THE REVIEW PROCESS

Building projects that are currently under review for LEED certification get a six-month extension, compensating for the disruption caused by COVID-19. Experts have been appointed to review unique cases, and remote visit options are being implemented.

Some building certifications have not been possible, since they must pass critical tests that require a site visit. However, a Precertification option is being offered in these cases, and the full certification can be obtained after the pending tests.

LEED for Operations and Maintenance (O+M) is a special case, since many requirements are based on building performance during normal occupancy. However, there is no way to measure this performance when a building has been empty for several months. The USGBC is changing requirements and reporting periods for LEED O+M certification, making the certification possible in spite of COVID-19.

When working with LEED documentation, you will notice that Green Business Certification Inc. (GBCI) is mentioned frequently. GBCI manages LEED professional accreditations and building certifications in partnership with the USGBC. They also manage the WELL certification from the International Well Building Institute (IWBI).

LEED EXAMS ARE NOW AVAILABLE ONLINE

Building professionals who were preparing for LEED Green Associate or LEED Accredited Professional credential now have the option of online exams. Under normal conditions, these exams are applied by the firm Prometric in special testing centers.

Due to the coronavirus pandemic, Prometric is now offering online exams.
The computer used to take the exam must first pass a system readiness test. It must have a camera, microphone, and stable Internet connection to allow remote monitoring.
This way, building professionals can get their LEED GA or LEED AP credential without having to wait until the COVID-19 emergency ends.
LEED exams that were already scheduled when the COVID-19 outbreak started can be replaced with online exams. Normal tests are available in places where local government orders allow them, but applicants must follow additional health and safety protocols at the Prometric Testing Center.

TYPES OF SOLAR POWER INCENTIVES
A DETAILED GUIDE

Author
Michael Tobias

Solar panels are simple devices, and that is a key factor that has contributed to their success in the energy industry. Having a modular design, solar panels can be used in projects of any scale. They also have a service life of over 25 years, and simpler maintenance requirements that other power generation systems.

However, solar power is a complex business, since many external factors influence the viability of photovoltaic systems. In general, solar power is effective in places with abundant sunshine or expensive electricity, and the return on investment is even better when both are found together.

Local regulations have a significant impact on the solar power industry. With unfavorable legislation, solar panels have limited usefulness even in sunny places. On the other hand, incentives and favorable laws can make solar power work even with modest sunshine.

There are many types of solar incentives, and it is unlikely that you will find all of them in a single city or state. However, by getting familiarized with how incentive works, you can gain insight on how the solar industry works in your city.

TAX INCENTIVES FOR SOLAR POWER

When governments want to motivate the use of solar power, a very common solution is reducing the tax burden for photovoltaic technology. Alternatively, governments may introduce tax benefits for homes and businesses that go solar. The two most common types of tax benefits are exemptions and credits.

TAX EXEMPTIONS

A tax exemption for solar power consists of removing a tax that would normally apply. This reduces the ownership cost of solar panel systems, motivating their use by homeowners and businesses. The following tax exemptions are applied by many states in the US:

- Sales tax exemption: When you purchase a solar power system, the sales tax is not charged. This essentially acts like a discount, making solar panels easier to afford.
- Property tax exemption: Since building improvements increase value, they raise the corresponding property tax. However, many states have decided not to apply taxes for any increase in property value that comes from solar panels.

TAX CREDITS

A tax credit is a reduction of your tax burden, which is granted as a reward for going solar:

- The 30% federal tax credit is perhaps the best-known example, since it applies for the entire country. However, it will be gradually phased out between 2020 and 2022. If you are considering solar power for your home or business, act quickly to get the full benefit.
- There are also state tax credits, which are added to the federal incentive. For example, the state of New York gives you back 25% of your solar power investment as a tax deduction, with a cap of $5,000.

If you purchase a $20,000 solar power system in New York, you get 30% back as a federal tax credit ($6,000) and 25% back as a state tax credit ($5,000). The net cost is reduced to only $9,000, and you get more than half of your investment back in the form of tax benefits.

SOLAR POWER REBATES

A rebate is a cash incentive for going solar, which is subtracted directly from your upfront costs. Solar rebates are normally granted through programs that are managed by governments or utility companies. Note there are eligibility requirements, so you should make sure that your solar power system is designed and installed by professionals. The NY-Sun program in the state of New York is an example.

When both solar rebates and tax credits are available, the rebate is applied first and the tax credit is calculated for the net cost. For example, if you get a $2,000 rebate for a solar PV system priced at $20,000, the federal tax credit is calculated with the net cost of $18,000. In other words, the federal incentive is $5,400 and not $6,000.

PERFORMANCE-BASED INCENTIVES FOR SOLAR POWER

Reducing the net cost of solar power systems with rebates and tax benefits is one incentive option. There are also programs that focus on increasing the cash flow of a solar power system. There are two common options:

- Adding a performance payment per kilowatt-hour produced.
- Creating a Solar Renewable Energy Credit (SREC) program.

BONUS PAYMENTS PER KILOWATT-HOUR

When performance payments are available, owners of solar power systems get extra cash for every kilowatt-hour generated. For example, if the local electricity price is 15 cents/kWh and there is an incentive of 5 cents/kWh, the total benefit is 20 cents/kWh. This shortens the payback period of solar panels, while increasing the return on investment.

Since this type of incentive is so good, there is normally a capacity limit that gets filled quickly. One example is the Solar Massachusetts Renewable Target (SMART), launched in 2018. The program will grant incentives for solar power systems until a capacity of 1,600 MW is accumulated. The incentive is higher for the first movers, and it is gradually reduced as the program approaches its target.

SOLAR RENEWABLE ENERGY CREDITS

SREC programs are an alternative to bonus payments per kWh. They can be applied when local governments have introduced clean energy targets for utilities and large energy consumers. These organizations can meet their target by producing clean energy on their own, by purchasing an amount of SRECs equivalent to their target, or with a combination of both. There are hefty penalties for missing the target, which creates a high demand for SRECs.

- Owners of solar PV systems are awarded one SREC for every 1,000 kWh of generation.
- SRECs are then purchased by the organization subject to clean energy targets.
- The SREC price is determined by supply and demand, which means the benefit is variable. However, it represents a cash bonus beyond the savings from solar power.

For instance, a SREC price of $100 is equivalent to an incentive of 10 cents/kWh, since one SREC is awarded for every 1,000 kWh.

FAVORABLE LAWS: NET METERING AND SIMPLE INTERCONNECTION RULES

Legislation that favors solar power can also be considered an incentive, since home and business owners can get more benefits from solar panels.

- Net metering gives full credit for every kilowatt-hour sent from a solar power system to the electricity grid. This happens all the time in solar paneled homes that are empty around noon, since there is nobody to use the electricity. Businesses with large roofs can also reach surplus production if they cover a large area with solar panels.
- Some power companies offer a feed-in tariff instead of net metering. This tariff is normally lower than the electricity price, with the argument that power companies must handle the surplus energy from solar panels.
- Simple interconnection rules help reduce the upfront cost of a solar power system, improving the return on investment. When utilities impose complex connection requirements with high fees, power consumers are less likely to go solar.

Having a Renewable Portfolio Standard (RPS) can also be considered an incentive for solar power. In simple terms, an RPS establishes a minimum renewable energy percentage for investor-owned utilities in the corresponding state. Since clean energy systems owned by consumers count towards the goal, utilities subject to RPS laws normally create incentive programs.

CONCLUSION

There is a wide variety of solar power incentives, and the business case for going solar improves when many of them are available. With favorable legislation and incentive programs, solar power can work even in places with modest sunshine. The US Northeast is an example of this: the region is not particularly sunny, but favorable laws and incentives have created an excellent market for solar panels.

ELEMENTS OF SUSTAINABLE ARCHITECTURE

Author
Michael Tobias

Sustainable architecture aims to incorporate structural and MEP systems in building designs that engage positively with their surroundings. Green design is also known as sustainable development, eco-design and eco-friendly architecture. All these terms refer to an architectural approach that promotes environmental conservation and sustainability in building designs.

Architects who specialize in green design are constantly searching for new techniques to improve the quality of green buildings, without compromising their functions. This article provides an overview of promising technologies and materials that can be used in green buildings.

The following are some key aspects of sustainable architecture:

- Energy-efficient lighting fixtures and appliances
- Efficient heating, cooling and ventilation systems
- Water-saving plumbing fixtures
- Windows placed strategically to maximize natural light
- Rainwater harvesting
- Greywater reuse
- Landscaping with native vegetation
- Incorporation of renewable energy sources, such as solar and wind power
- Using local construction materials to reduce transportation distance and costs
- Incorporating old structures and using recycled materials

SOLAR SHINGLES

Solar panels are an excellent way to save energy and reduce power bills, and in some cases they can even provide extra income. For example, if the solar array produces more energy than what the building consumes, many utility companies will buy excess power back from building owners. This energy is then distributed to other users through the electric grid.

Solar shingles are an emerging technology, which combines solar panels and roof shingles. Unlike solar panels laid on top of the roof, solar shingles are part of the roof, serving as a power source for the building. Solar shingles are more expensive that solar panels: in addition to being a power source for the building, they are actual roof shingles. Solar shingles are wired and connected to the electrical system of the building. Ideally, they should have an optimal orientation that maximizes sunlight, to minimize electricity consumption from the grid.

GREEN ROOFS

A green roof or rooftop garden is a space or lawn that hosts a variety of trees, plants and grass. This helps lower the temperature of an entire building, while improving the quality of outdoor air. Green roofs can be considered urban lungs, and can even serve as a habitat for birds and other animals. The main steps to install a green roof are the following:

- Waterproofing the roof by laying specialized barriers.
- Installing a drainage material above the waterproof layer.
- Placing soil and low-maintenance plants.

Consider that a green roof adds weight, and this must be considered during the structural design. To ensure a correct installation, working with a contractor who is experienced in green buildings is recommended.

RAINWATER HARVESTING

Rainwater harvesting is a great opportunity for building owners to reduce water consumption, especially the water used to irrigate landscaping and gardens. This feature is commonly used by architects in their green designs, since its application is fairly simple. Rainwater harvesting also reduces runoff, while helping prevent overflow in sewage systems.

Rainwater collecting systems can be as simple as containers and rain barrel, placed strategically to collect water from rooftops. Some rainwater harvesting systems are more complex, using materials like pervious concrete or arrays of fountains and containers.

Proper research is important before considering a rainwater collection system. Some areas don't allow rainwater harvesting, so make sure you check local laws before investing in a system that is not compliant. Also consider that rainwater is considered greywater, and some cities require special permits to reuse greywater in homes.

COB

Cob is an ancient building material that is made of wet earth and straw mixed together, and molded into brick-like pieces or cobs. The mixture has a consistency similar to clay, and can be used to create uniquely shaped houses. Builders stack cobs and use a clay-like material to mold the walls by hand, resulting in crafted structures with curving lines, instead of sharp edges and angles. Cob structures normally include built-in features like shelves, couches, tables and other types of furniture.

Cob is made of natural materials, and it has a very low carbon footprint compared with conventional materials like concrete and masonry. Transportation and manufacturing costs are minimum when mud and straw can be found close to construction sites. Since cob is handmade, its labor requirements are simple.

SHIPPING CONTAINERS

Old shipping containers can be reused to create homes or other prefabricated structures. Shipping crates are stacked vertically or lined side-by-side to create residential and commercial buildings. These containers can then be equipped with electrical, plumbing and HVAC systems. Similar to cob buildings, shipping containers help prevent the environmental impact of conventional construction materials.

GREEN CERTIFICATION SYSTEMS FOR BUILDINGS

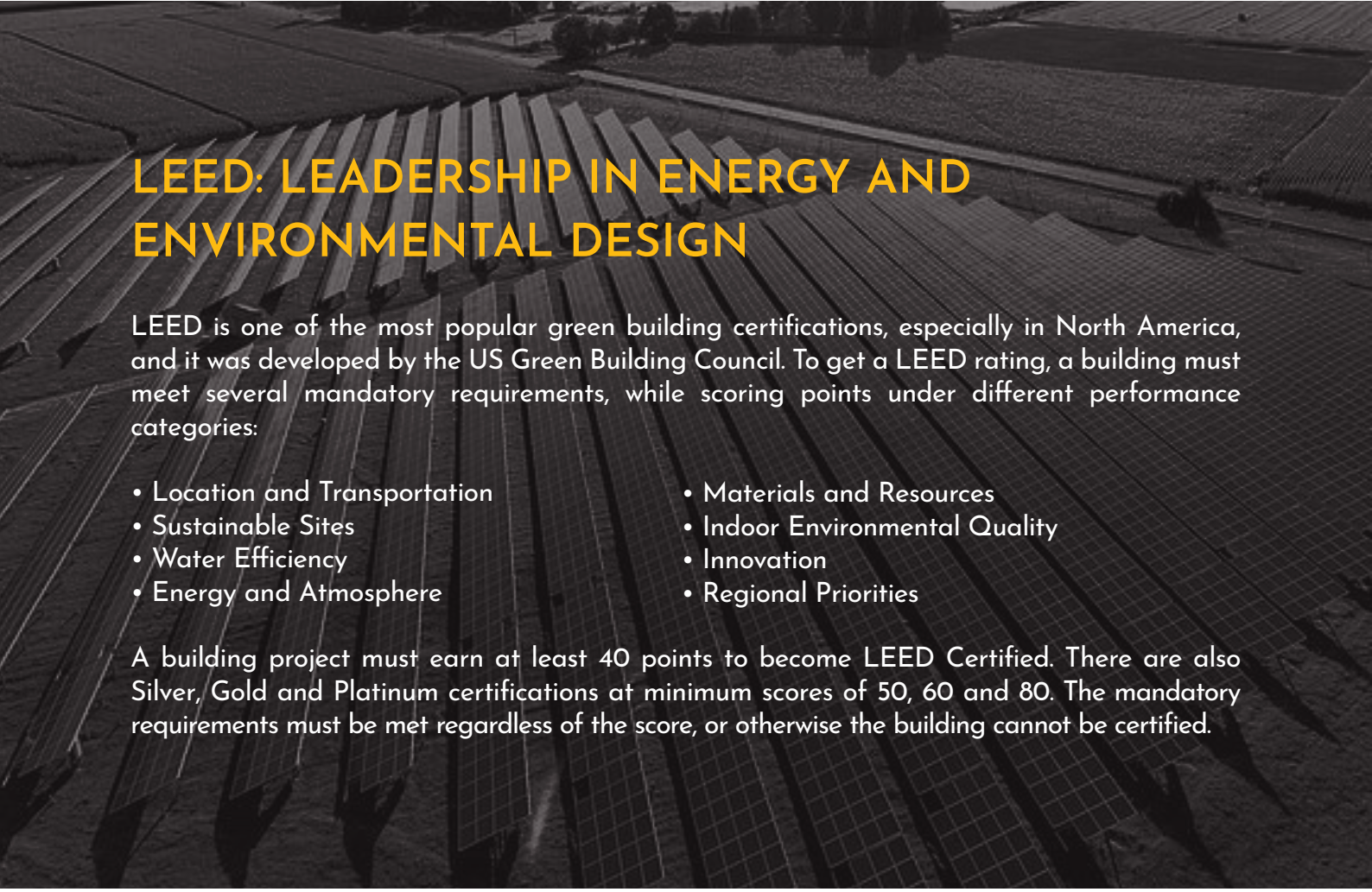
Author
Michael Tobias

Sustainable construction reduces the environmental impact of the building sector, but it also makes sense as a business decision. When sustainability is considered during the design and construction process, buildings achieve a lower ownership cost throughout their lifetime. Green buildings also offer indoor environmental quality, which is beneficial for human health and comfort. Occupants save on medical expenses when the built environment is healthy, and companies can achieve a higher productivity.

Any project can use sustainable construction practices to reduce its environmental footprint and improve the built environment. However, a green building certification shows that the project has been approved by an impartial and recognized organization. This brings several advantages:

- A green building certification can attract tenants, since they expect operating savings and an improved indoor environment.
- Depending on where a building is located, a green certification may earn financial incentives from the local government or utility companies.
- Companies with certified green buildings can improve their image as corporate citizens.
- Sustainable design practices can achieve a higher performance in certified buildings, since the process has been approved by a qualified external party.

Many green building certifications have been developed around the world. They use different performance categories and scoring systems, but they have a common goal - making the built environment more sustainable. This article provides an overview of several green certifications.



LEED: LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN

LEED is one of the most popular green building certifications, especially in North America, and it was developed by the US Green Building Council. To get a LEED rating, a building must meet several mandatory requirements, while scoring points under different performance categories:

- Location and Transportation
- Sustainable Sites
- Water Efficiency
- Energy and Atmosphere
- Materials and Resources
- Indoor Environmental Quality
- Innovation
- Regional Priorities

A building project must earn at least 40 points to become LEED Certified. There are also Silver, Gold and Platinum certifications at minimum scores of 50, 60 and 80. The mandatory requirements must be met regardless of the score, or otherwise the building cannot be certified.

BREEAM: BUILDING RESEARCH ESTABLISHMENT ENVIRONMENTAL ASSESSMENT METHOD

Published in 1990 by the UK Building Research Establishment, BREEAM was the first green building certification system in the world. BREEAM considers the following performance categories when scoring a building:

- Energy
- Health and wellbeing
- Innovation
- Land use
- Materials
- Thermal Comfort
- Sound
- Materials
- Mind
- Community

The BREEAM scoring system uses six stars, which describe the performance level of the building: Acceptable (1), Pass (2), Good (3), Very Good (4), Excellent (5) and Outstanding (6). The Acceptable score (1 star) can only be obtained by existing buildings in use. For all other project types, the minimum score for certification is Pass (2 stars).

The first version of WELL was more stringent, with 41 mandatory preconditions and 59 optimizations to choose from. WELL v2 is more flexible, reducing the preconditions to 23 and increasing the optimizations to 92.

CASBEE: COMPREHENSIVE ASSESSMENT SYSTEM FOR BUILT ENVIRONMENT EFFICIENCY

CASBEE is a green building certification that was developed by the Japan Sustainable Building Consortium (JSBC). CASBEE analyzes the performance of a building under four categories, which are used to calculate a metric called the Built Environment Efficiency (BEE):

- Energy efficiency
- Resource efficiency
- Local environment
- Indoor environment

The CASBEE certification provides four assessment tools for different stages of the building life cycle: Pre-Design, New Construction, Existing Building and Renovation. CASBEE can also be applied at different scales: Housing, Building, Urban Development and City.

Buildings can get five ranks based on their Built Environment Efficiency: C (Poor), B- (Slightly Poor), B+ (Good), A (Very Good) and S (Superior). CASBEE was originally developed to be used only in Japan, but there is growing interest for the certification internationally.

ENERGY STAR CERTIFICATION

The ENERGY STAR program was created by the US Environmental Protection Agency. The certification is normally associated with energy efficient products, but it can also be applied at the scale of whole buildings. Unlike other certification systems, ENERGY STAR focuses exclusively on energy efficiency:

Building owners report energy consumption using a tool called the Portfolio Manager.
The building's energy efficiency is compared with others of the same type, under the same climate conditions.
The ENERGY STAR score is a percentile. For example, a building with a score of 80 in the top 20%, and a building with a score of 95 is in the top 5%.
The minimum score for an ENERGY STAR Certified building is 75, which means it must be among the top 25% most efficient buildings of its type.

Building scores under ENERGY STAR are recalculated each year, based on the most recent performance data. This means that buildings must stay within the top 25% to keep the certification. Also, the data submitted must be validated by a Professional Engineer or Registered Architect.

GREEN GLOBES

The Green Globes certification was developed by the Green Building Initiative, using BREEAM as the main reference. Green Globes applies for both new construction and existing buildings, and it considers the following performance categories:

- Project management
- Energy
- Water
- Materials and Resources
- Emissions
- Indoor Environment
- Site

A building can earn up to 1000 points, and the minimum score for certification is 35%. There are four certification levels, which depend on the score obtained: One Green Globe (35-54%), Two Green Globes (55-69%), Three Green Globes (70-84%), and Four Green Globes (85-100%).

EDGE: EXCELLENT IN DESIGN FOR GREATER EFFICIENCIES

The EDGE certification was developed by the International Finance Corporation (IFC), and it focuses on three areas: direct energy consumption, water consumption, and embedded energy in construction materials. Instead of providing specific requirements, the EDGE certification requires a 20% reduction in the three performance areas.

There are two additional levels beyond EDGE Certified, which are achieved with improved performance. The EDGE Advanced level has the same requirements for water consumption and embedded energy, but energy consumption must be reduced by at least 40%. The next level is Zero Carbon, with the same requirements as EDGE Advanced, and the building must also become fully carbon neutral with renewable energy and carbon offsets.

The IFC developed EDGE to meet the needs of developing countries, where complex certifications with detailed requirements are more difficult to obtain.

NGBS: THE NATIONAL GREEN BUILDING STANDARD

NGBS was developed by the National Association of Home Builders, and it focuses on residential properties such as single-family homes and apartments. NGBS covers six performance areas:

- Energy efficiency
- Water efficiency
- Resource efficiency
- Lot development
- Operation and maintenance
- Indoor environmental quality

The NGBS certification has four levels: Bronze, Silver, Gold and Emerald. The certification level is determined by the project scores across the six performance categories.

LIVING BUILDING CHALLENGE

The Living Building Challenge is more demanding than other certifications, since it has the goal of eliminating environmental impacts completely. To get the Living Building Certification, a project must meet 20 requirements (called Imperatives) divided into seven performance categories (called Petals):

- Place: Ecology, urban architecture, habitat exchange, human scaled living
- Water: Responsible water use, net positive water
- Energy: Energy + carbon reduction, net positive energy
- Health and Happiness: Healthy interior environment, healthy interior performance, access to nature.
- Materials: Responsible materials, red list, responsible sourcing, living economy sourcing, net positive waste
- Equity: Universal access and inclusion
- Beauty: Beauty + biophilia, and Education + inspiration

The Petal Certification is a less demanding version of the Living Building Certification, since it only requires 3 of the 7 categories. However, one of the categories must be Water, Energy or Materials. The Living Building Challenge also includes the Core Green Building Certification, which only requires 10 of the 20 Imperatives, called the Core Imperatives:

- Ecology of place
- Human scaled living
- Responsible water use
- Energy + carbon reduction
- Healthy indoor environment
- Responsible materials
- Universal access
- Inclusion
- Beauty + biophilia
- Education + inspiration

In addition, projects can apply for a Zero Energy Certification or a Zero Carbon Certification. The Zero Energy Certification requires that buildings generate all their energy on-site, without using combustion. On the other hand, the Zero Carbon Certification establishes energy efficiency and carbon neutrality requirements.

CONCLUSION

Energy efficiency and other resource conservation measures mitigate the environmental impact of the building sector, while reducing ownership costs. However, a green certification proves that the building has a sustainable design. Real estate developers can certify their projects to attract tenants, and corporations in general can improve public perception by certifying their buildings.

The building sector is responsible for 40% of global energy use and emissions, and sustainable construction can greatly reduce its environmental impact. Green buildings also make sense for businesses: they have lower ownership costs, and the improved indoor environment benefits human health and productivity.

NY ENGINEERS

135 West, 41'st Street,
5'th Floor, New York, NY.
Tel- 888-575-8844
Sales/ DOB /Proposal- info@ny-engineers.com
Media/ Marketing- Ravindra@ny-engineers.com