

Energy efficient built- environment and LEED ratings



Made by: -

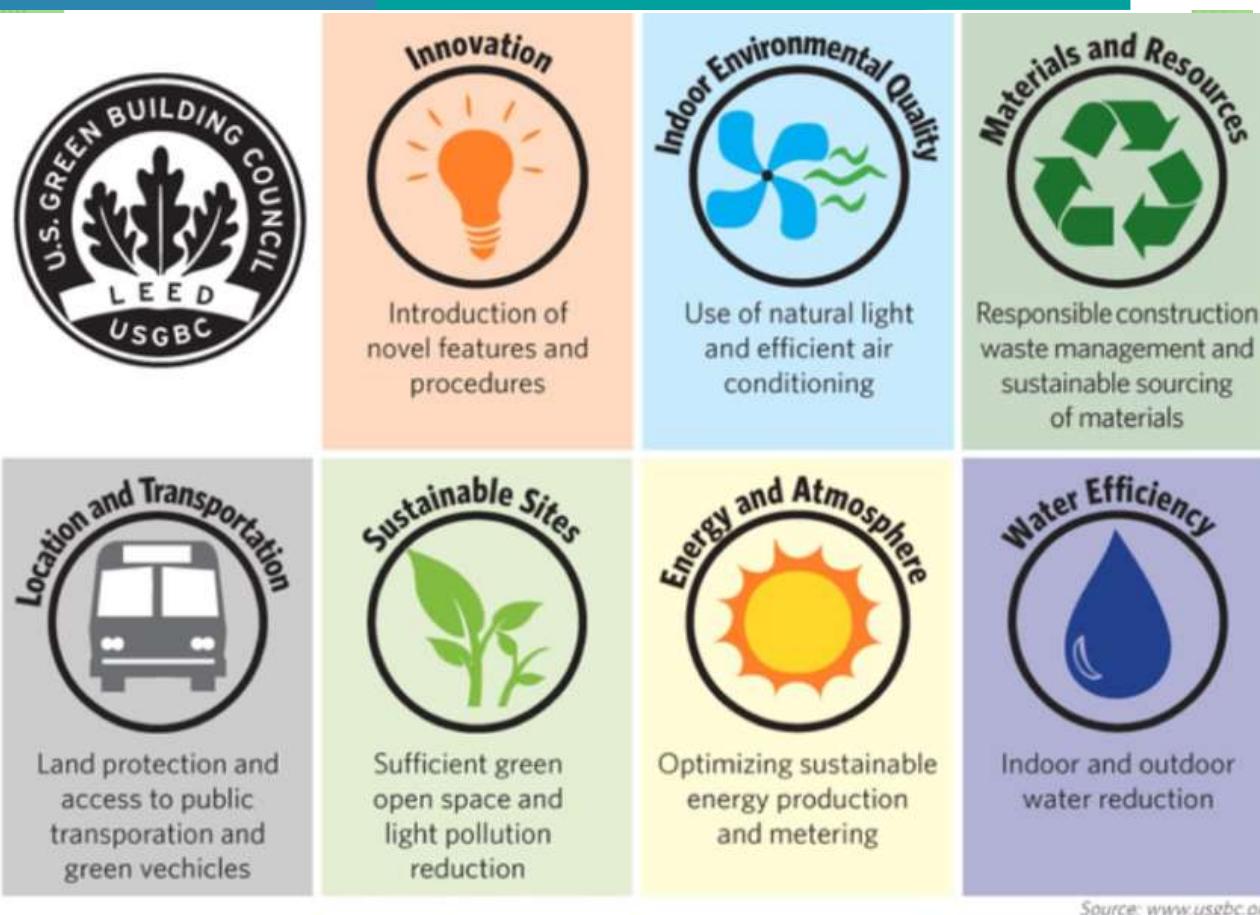
Jagjit Singh
(2314116)

World's most polluted countries & regions		Annual average PM2.5 concentration (µg/m³)																								
Rank	Country/Region	2023					2022					2021					2020					2019				
		0-5 Meets WHO guideline	5.1-10 Exceeds by 1 to 2 times	10.1-15 Exceeds by 2 to 3 times	15.1-25 Exceeds by 3 to 5 times	25.1-35 Exceeds by 5 to 7 times	35.1-50 Exceeds by 7 to 10 times	0-5 Meets WHO guideline	5.1-10 Exceeds by 1 to 2 times	10.1-15 Exceeds by 2 to 3 times	15.1-25 Exceeds by 3 to 5 times	25.1-35 Exceeds by 5 to 7 times	35.1-50 Exceeds by 7 to 10 times	0-5 Meets WHO guideline	5.1-10 Exceeds by 1 to 2 times	10.1-15 Exceeds by 2 to 3 times	15.1-25 Exceeds by 3 to 5 times	25.1-35 Exceeds by 5 to 7 times	35.1-50 Exceeds by 7 to 10 times	0-5 Meets WHO guideline	5.1-10 Exceeds by 1 to 2 times	10.1-15 Exceeds by 2 to 3 times	15.1-25 Exceeds by 3 to 5 times	25.1-35 Exceeds by 5 to 7 times	35.1-50 Exceeds by 7 to 10 times	
1	Begusarai, India	18.9	31.2	235.3	156.8	113	109.3	99	63.8	61.8	71.5	61.8	210.5	285	19.7	24.9	--	--	--	--	--					
2	Guwahati, India	55.4	220.2	168.1	129.2	112.2	69.5	51.3	46.6	60.2	76.7	76.4	126.9	128	51	53.1	62.1	--	--	--	--					
3	Delhi, India	52.1	171.8	114.3	77.4	71	67.4	42.9	35.3	34.8	39.7	106.3	255.1	210	92.6	96.4	84.1	98.6	113.5	108.2	--					
4	Mullanpur, India	50.4	106.3	123.7	78.1	56.6	53.4	53.9	63.2	59.7	59.6	110.4	253	201.4	185.5	--	--	--	--	--	--					
5	Lahore, Pakistan	59.5	143.2	117.3	73.8	52.9	52.4	46.4	39.8	42.2	53.8	125.9	251	197.5	97.4	86.5	79.2	89.5	114.9	133.2	--					
6	New Delhi, India	52.7	162.6	98.2	67.1	59	57.7	40.1	31.7	35	38	94.7	234.7	193.8	89.1	--	--	--	--	--	--					
7	Silwan, India	50.6	223.6	167.5	108.3	71.7	59.8	48.9	35.7	30.4	54.7	48.9	136.3	77.6	58.5	--	--	--	--	--	--					
8	Saharsa, India	59.4	202	147.1	108.8	88.8	60.3	43.6	16.7	24.3	33.6	41.8	115.8	167.8	76.6	--	--	--	--	--	--					
9	Goshaingaon, India	59.3	205.3	117.5	63.8	63.3	60.7	39.2	27.3	38.3	33.9	81.1	152	156.1	--	--	--	--	--	--	--					
10	Katihar, India	58.8	224.1	113.3	94	74.1	49.9	34.7	17.7	27.6	33.9	63.9	134.1	180.5	72.1	--	--	--	--	--	--					
11	Greater Noida, India	58.6	166.5	85.9	64.4	69.2	59.5	42.9	28.1	33.9	38.7	111.6	215.4	142	83.2	87.5	89.5	91.3	--	--	--					
7	United Arab Emirates	43	45.9	36	29.2	38.9	49.9	9,365,145																		

GREEN BUILDING CONCEPT



Context



- What is green building?
- Positive impact on environment and human health
- Main strategies of green building and type of green building technologies
- What is energy conservation building code (ECBC)
- What is LEED certification





WHAT IS GREEN BUILDING?

IT IS A CONCEPT OR PROCESS THAT DEVELOPS A RELATIONSHIP
BETWEEN NATURAL AND BUILD ENVIRONMENT



- A **green building** is an environmentally friendly structure designed to reduce energy and resource use, improve indoor air quality, and minimize environmental impact. It focuses on energy efficiency, water conservation, sustainable materials, and waste reduction while enhancing the well-being of occupants.



- It is a smart way of constructing buildings that help protect the environment and keep people healthy, it involves design, construction, and managing structures in way that don't harm nature and keep us safe
- The goal is to reduce the impact on the environment and make sure people stay well, it means constructing buildings in a way that is good for the environment and safe energy and resources
- it looks at all parts of the building and managing them to be efficient and not harm the environment
- the goal is to create structure that use less energy and use material wisely and responsibly to the environment



BUILDINGS HAVE BOTH NEGATIVE AND POSITIVE IMPACT ON OUR SURROUNDING

How Green Buildings change negative impact of building to Positive Impact

"Green buildings often incorporate this concept as a central principle."

Positive impact on our surroundings



Reducing trash



Using renewable, sustainable & non-toxic materials



Reducing pollution and global warming



Efficient use of energy

Positive impact on our surroundings



Proper utilization of water and using other resource



Improve productivity of people



Protecting people health

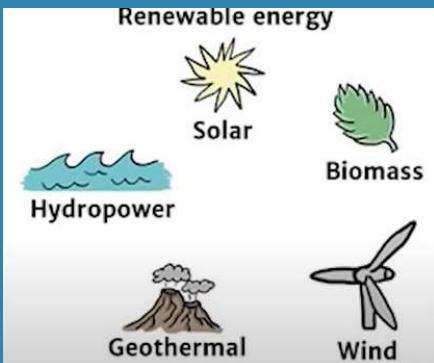


Reducing emissions of green house gases



Environment friendly at any climatic condition

MAIN STRATEGIES OF GREEN BUILDING



Materials

Using the type of material that can be
Renewable,
Recycle,
Non-toxic.

Building insulation

The building's exterior should be designed to protect its energy and also help it resist any climatic conditions.



Indoor air quality

Good ventilation should be there



Roof & walls

It must be designed to reflect solar heat, which will help to reflect heat and save energy consumption, and maintenance costs.

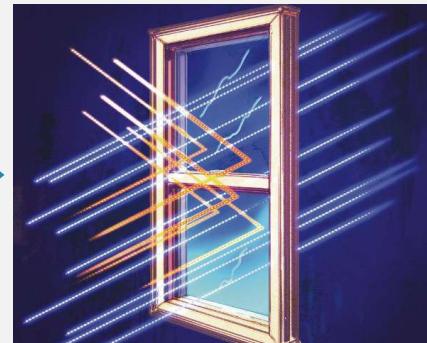
MAIN STRATEGIES OF GREEN BUILDING



Windows

Its placement and positioning, depend on the angle of the sun.

Types of windows
Smart window



Lighting

Must use fluorescent lamps and LED bulbs, Green building design also depends on this theme, that how much natural light we can use for our surroundings.



Water

Ultra flush toilet concept

And also it includes rainwater harvesting and water treatment plant



MAIN STRATEGIES OF GREEN BUILDING



Renewable energy

How we can develop electricity and use water heaters with the help of solar technology which will help energy to be reused and renew.



Landscaping

It helps us to keep our surroundings good, we can use rain water, can use proper irrigation tech., and use of chemical fertilizers can be reduced.



Cost of building

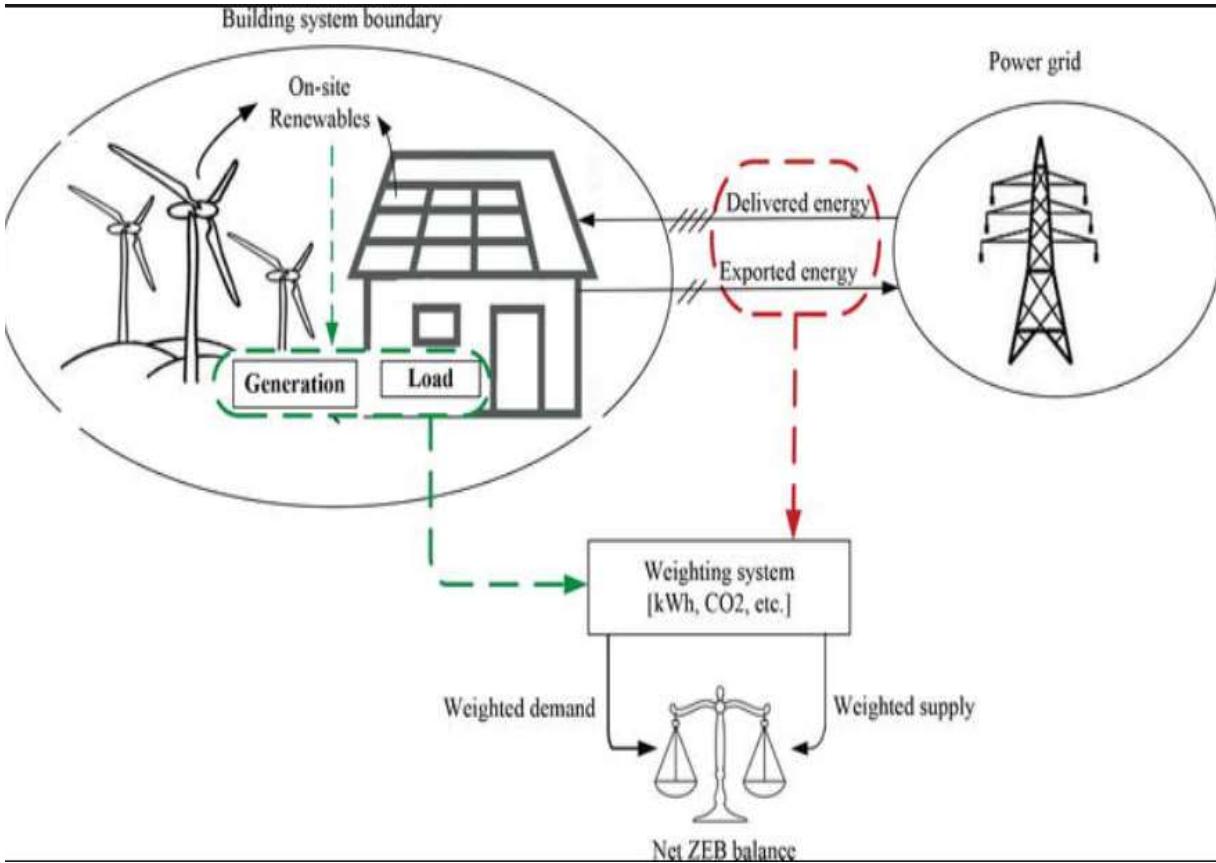
Its initial cost is more as compared to normal buildings but it can be covered in 6 months by saving maintenance and energy costs.



Green building standards

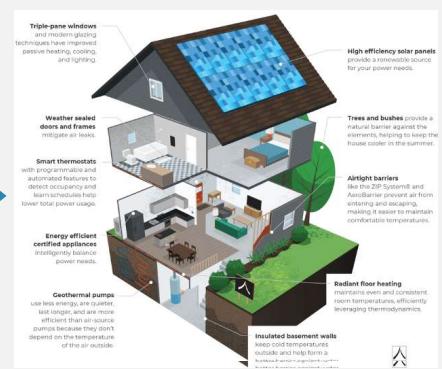
A Leed certificate is provided. Which depend on design, construction, operate and maintenance.

Types of green building technology



Net zero concept(zero energy building)

The building which can renew its own energy with help of solar technology or any other equipment or facilities.



Near zero energy building

If the building is developing less energy than its requirement it comes under near zero energy building.



Nearly Zero Energy Building

Energy plus building

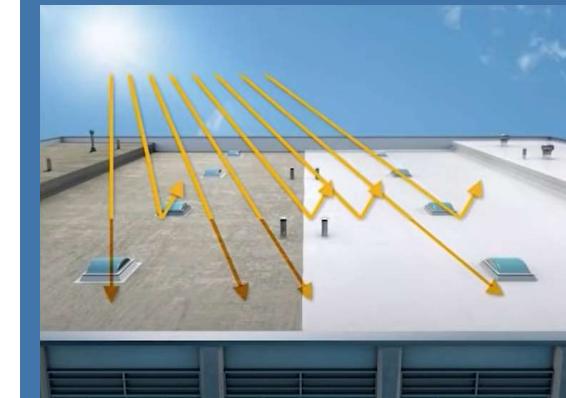
If the building is producing more energy than its requirement the it comes under energy plus building.



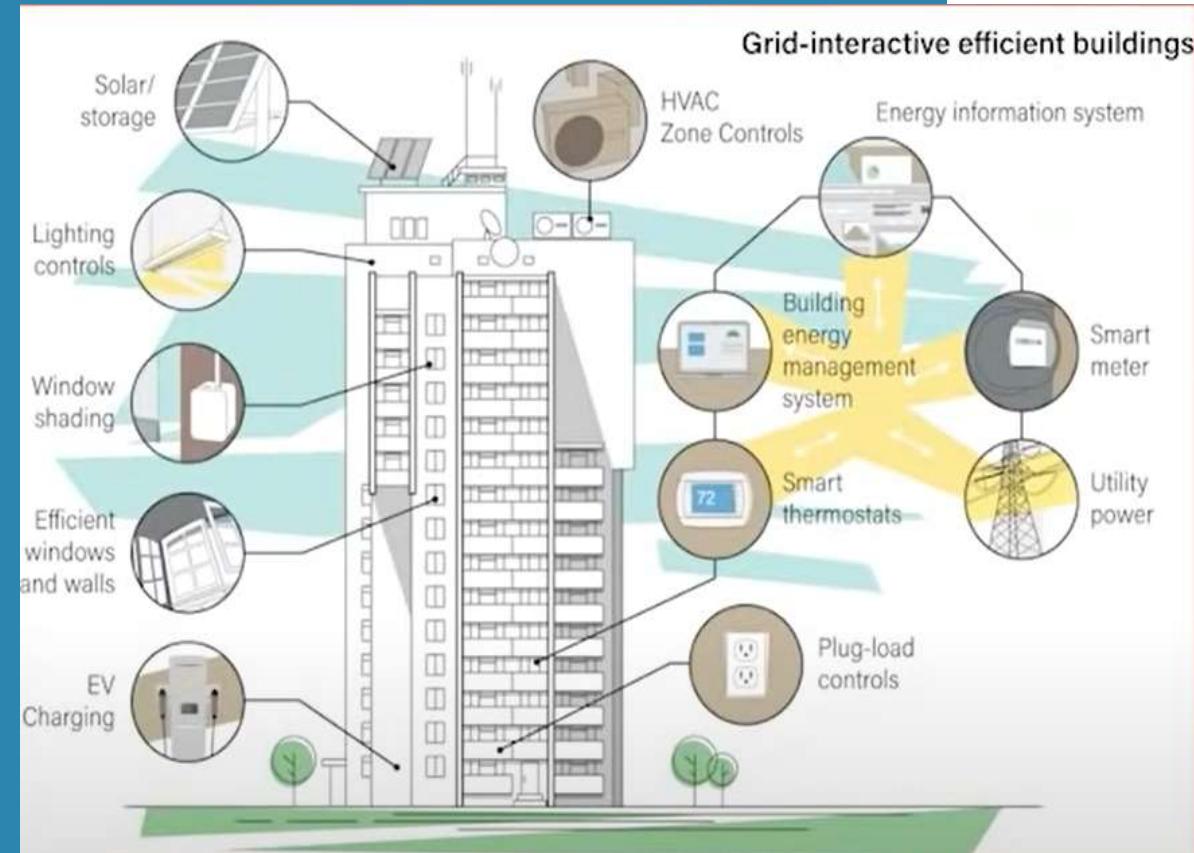
TYPES OF GREEN BUILDING TECHNOLOGY



- HVAC
- LOW-EMITTING MATERIAL
- COOL ROOFS
- GREEN INSULATION
- SOLAR POWER
- SMART APPLIANCES
- WATER



WHAT IS ECBC & BEE?



- BEE (bureau of energy efficiency) is an organization in India that runs the concepts of green building.
- BEE developed ECBC (energy conservation code) which was started by the central government of India on 27 May 2007.
- Its main concept was to design, construct and maintain energy efficiency buildings.

ECBC code: -

https://beeindia.gov.in/sites/default/files/ECSBC%202024_Building%20Code%20for%20Commercial%20Buildings.pdf

CASE STUDY –India's first zero energy building /energy efficient building {Indra Paryavaran Bhavan}

- It's India's first net zero energy building that has been constructed with the adoption of solar passive design and energy-efficient building materials.
- Functional since a year, a tour of the Indira Paryavaran Bhavan, a building under the Central Government, was organized by The Energy and Resources Institute (TERI)



Indra Paryavaran Bhavan

- The building boasts an earthquake-resistant structure with a total plinth area of 31,488 sq. m. It covers only 30 percent of the total area, while more than 50 percent area outside the building is a soft area with plantation and grass. The building has a robotic parking system in the basement that can accommodate 330 cars. Thin-client networking system has been provided instead of conventional desktop computers to minimize energy consumption.



- The building has received GRIHA 5-star (provisional) rating for the following features:
- The design allows for 75 per cent of natural daylight to be utilized to reduce energy consumption.
- The entire building has an access friendly design for differently-abled persons.
- With an installed capacity of 930 kW peak power, the building has the largest rooftop solar system among multi-storied buildings in India.

LEED CERTIFICATION

- Leadership in Energy and Environmental Design (LEED) is a green building certification program used worldwide. Developed by the non-profit U.S. organization U.S. Green Building Council (USGBC), includes a set of rating systems for the design, construction, operation, and maintenance of green buildings.

*What is
LEED?*



Criteria Involved in LEED



SITE
SELECTION



PUBLIC
TRANSPORTATION
ACCESS



WATER USE
REDUCTION

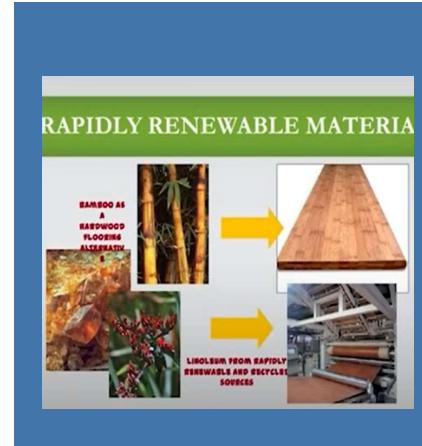


ENERGY
EFFICIENCY

Criteria Involved in LEED



GREEN POWER



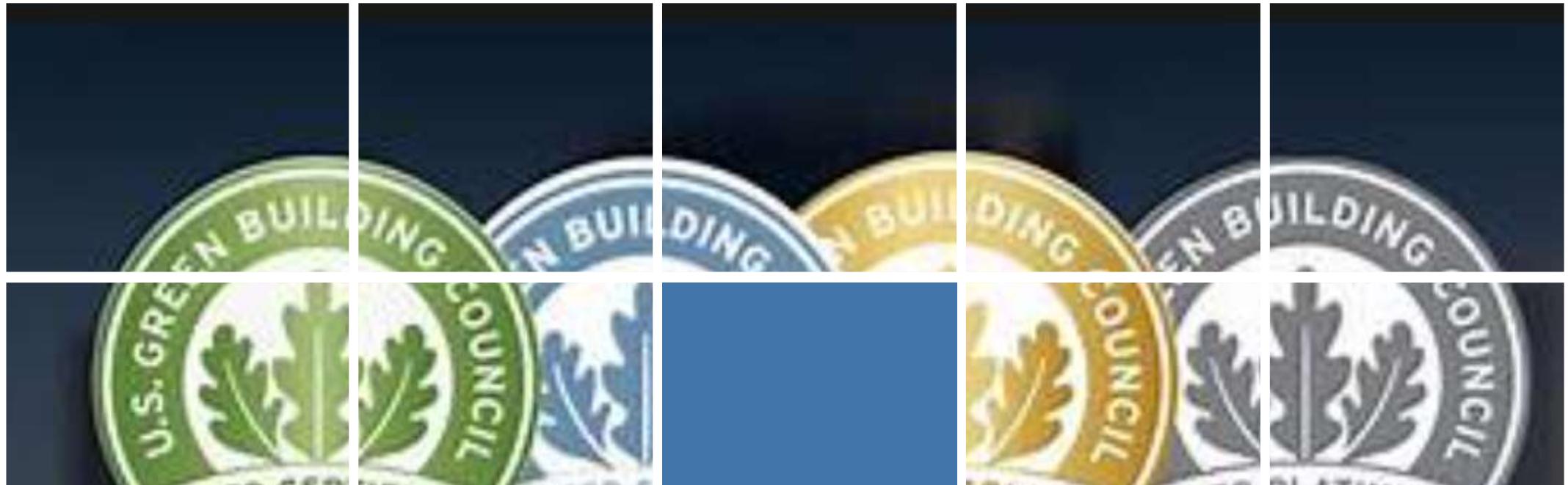
RAPIDLY RENEWABLE MATERIALS



RECYCLED AND REGIONAL MATERIAL



CONSTRUCTION WASTE MANAGEMENT



**VENTILATION
INDOOR AIR QUALITY
DAY LIGHT VIEWS
INNOVATION IN DESIGN**

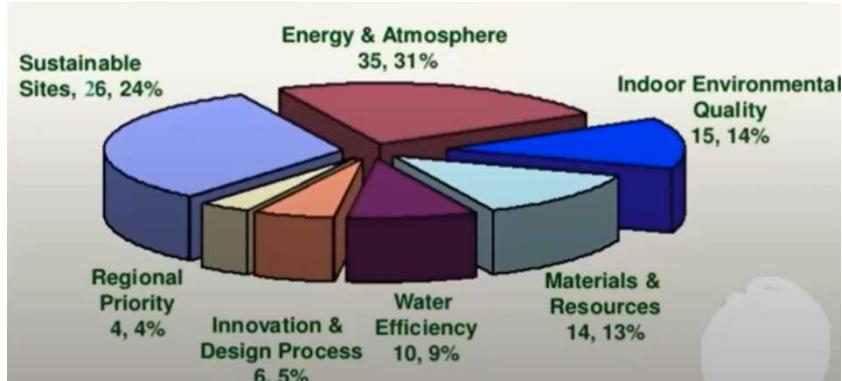


RATING SYSTEM FOR LEED CERTIFICATION

Category	Points	Percentage
1. Energy & Atmosphere	35	31%
2. Sustainable Sites	26	24%
3. Indoor Environmental Quality	15	14%
4. Materials & Resources	14	13%
5. Water Efficiency	10	9%
6. Innovation & Design Process	6	5%
7. Regional Priority	4	4%



40-49 50-59 60-79 80+



IT HAS 4 LEVELS OF CERTIFICATE

CERTIFICATE

40 – 49 points

SILVER

50 - 59 points

GOLD

60 – 79 points

PLATINUM

80 points and above

References

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Thank
you