Green Building

Credit: Tammy Thompson, CHE, Univ of Texas

Outline

- What is Green Building?
- Why is Green Building Important?
- Three aspects of new project planning
- Obstacles
- Support for Green Building?

What is Green Building?

- USEPA definition:
  - *"Green or sustainable building is the practice of creating*
  - *healthier and more resource-efficient models of*
  - *construction, renovation, operation, maintenance, and demolition."*
- More than just installing solar panels on your roof

Credit: Tammy Thompson, CHE, Univ of Texas

Why is Green Building Important?

- Construction waste
  - 8000lbs of waste are typically thrown into a landfill during the construction of a 2000sqft home in USA
- The buildings are a problem
  - consume more than twice as much energy as all the cars in the US
  - Buildings account for 68% of total electricity consumption in the US
  - Buildings use 80% of total drinking water consumption in the US
  - Indoor levels of pollution are commonly 2 to 5 times higher than outdoor pollution levels

New Project Planning

- Construction
  - Reduce the amount of waste generated at a construction site
- Design
  - Building design details will help to reduce construction materials, and energy/water requirements when completed
- Material Selection
  - Careful selection of construction materials will leave less of an environmental impact

Credit: Tammy Thompson, CHE, Univ of Texas

New Project Planning

- Construction
- Construction waste accounts for 10 to as much as 30% of municipal waste stream
- Goal: Reduce / Reuse / Recycle
  - Building design based on standard sizes of materials
  - Buy higher quality to reduce rejects
  - Recycle (use scraps)
  - Train crew
  - Renovate an existing building

New Project Planning

- Design
- Goal: To design the building so that it requires less energy/water and is healthier for inhabitants when it is complete and in use
  - Air ducts for an efficient and healthy air flow
  - Insulation
  - Windows designed for maximum daylight
  - Passive Solar Control
  - Solar Cells
  - Heat Exchanger for climate control system
  - Location

New Project Planning

- Materials
- Goal: Choose materials that have low environmental costs and do not contribute to indoor air pollution
  - Engineered Lumber (recycled and reclaimed material)
  - Doors and Windows (energy and placement)
  - Floor Coverings (recycled with no off-gassing)
  - Roof Materials (Reflective and light)
  - Energy Efficient Appliances

Credit: Tammy Thompson, CHE, Univ of Texas

Support for Green Building

- LEED (Leadership in Energy and Environmental Design)
  - Green Building Rating System
  - Voluntary
- India
  - GRIHA system
  - Rating system by Indian Green Building Council (https://igbc.in/igbc/redirectHtml.htm?redVal=showratingSysnosign)

GRIHA

- Five ‘R’ philosophy of sustainable development
  - Refuse
  - Reduce
  - Reuse
  - Recycle
  - Reinvent

GRIHA

- ‘What gets measured, gets managed, GRIHA attempts to quantify aspects, such as:
  - Energy / power consumption (in terms of electricity consumed in kWh per square meter per year)
  - Water consumption (in terms of litres per person per day)
  - Waste generation
  - Renewable energy integration

GRIHA

- GRIHA
  - Current version is *v. 2019.*
    - Previous version is *v. 2015.*
  - assesses building out of 30 criteria and awards points on a scale of (100+5)
    - 100 points for defined criteria
    - 5 points extra for innovation criterion
- Eligibility
  - All new construction projects with built up area more than 2500 m^2 (excluding parking, basement area, and typical buildings) are eligible for certification under GRIHA v.2019.

https://www.grihaindia.org/griha-rating

GRIHA Certification

Online registration on GRIHA website

Orientation workshop
For info regarding GRIHA rating

Due Diligence I & II
I – Site visit by GRIHA Council official after project reaches plinth level; 2nd site visit by officials to validate internal finishes, electrical, plumbing, and mechanical components installed (post completion of the building structure work).

Submission of documents & preliminary evaluation

Final due diligence and final evaluation (valid for 5 years)

Additional due diligence:
Green awareness drive for residents living in there

Rating renewal for next 5 years may also be obtained.

https://www.grihaindia.org/griha-rating

GRIHA

Section	Criteria points
1. Sustainable Site Planning	12
2. Construction Management	4
3. Energy Efficiency	18
4. Occupant Comfort	12
5. Water Management	16
6. Solid Waste Management	6
7. Sustainable Building Materials	12
8. Life Cycle Costing	5
9. Socio-Economic Strategies	8
10. Performance Metering and Monitoring	7
11. Innovation	5

https://www.grihaindia.org/griha-rating

GRIHA

UHIE – Urban heat island Effect

GRIHA v.2019			
Section	Criterion No.	Criterion Name	Maximum Points
1. Sustainable Site Planning	1	Green Infrastructure	5
	2	Low Impact Design	5
	3	Design to Mitigate UHIE	2
2. Construction Management	4	Air and Soil Pollution Control	1
	5	Top Soil Preservation	1
	6	Construction Management Practices	2
3. Energy Efficiency	7	Energy Optimization	12
	8	Renewable Energy Utilization	5
	9	Low ODP and GWP Materials	1
4. Occupant Comfort	10	Visual Comfort	4
	11	Thermal and Acoustic Comfort	2
	12	Maintaining Good IAQ	6

https://www.grihaindia.org/griha-rating

GRIHA

Rating Threshold

GRIHA V 2019 Rating Thresholds	GRIHA Rating
25-40	★
41-55	★★
56-70	★★★
71-85	★★★★
86 or more	★★★★★

https://www.grihaindia.org/griha-rating

GRIHA

GRIHA v.2019 fees

Built-up Area (sqm)	Fees
Till 10,000 sqm	Rs 3,74,000 + GST
For every sqm above 10,000	Rs 7.5/sqm + GST

*A maximum fee of Rs 15,00,000 + GST only to be charged from projects not withstanding of built up area.

https://www.grihaindia.org/griha-rating

Obstacles

- 93% of consumers worry about their home's environmental performance.
  - However, only 18% are willing to pay more to reduce the impact.
  - There are higher initial costs for Green Building but returns may be realized in long run.
- Customers are concerned they would be sacrificing comfort

Bibliography

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