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Green Building and Sustainable Construction as per IGBC Rating

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Abstract – India is witnessing tremendous infrastructure growth and construction development. Indian construction industry being the one of the largest economic activities is rising at an average rate of 9.5%. Indian Green Building Council (IGBC) has been established to enable the construction industry environmentally sensitive. The IGBC promotes, developers, architects, the owners, builders, and the consultants are promoted to develop the green buildings to enhance the environmental and economic performance.

National issues such as water efficiency, energy efficiency and reduce the fossil fuel use, management of all types of consumer waste and preserving & conserving natural resources are being addressed and resoled with the concepts and techniques of green building construction. The energy savings shall range from 20 - 30 % and water savings shall arrange from 30 - 50%. Other benefits of green buildings shall include enhanced/improved air quality for building occupants, health & well-being of the occupants of the building, excellent/efficient daylighting use, safety aids and preservation & conservation of national resources.

***Key Words*:** IGBC, Platinum Campus Certification, Sustainable Construction, Water and energy efficiency

1.INTRODUCTION

Sustainable Green Buildings are commonly defined as a building, which can generate enough energy for its defined operational use without harming to the environment and with less uses of external energy. Green Buildings is also called energy efficient buildings or eco-friendly buildings. A Green Building drains minimum natural resources during its life cycle i.e. construction and operational stages.

The campus level certification is aspiring to achieve platinum Campus Rating for India International Convention & Exhibition Centre under IGBC Green Campus Rating system. A Campus certification is selected in order to maximize the greener potential of the Masterplan level strategies (urban planning, landscape transportation, etc.,)

Green features such as Sustainable Transportation, site planning and management, Water Conservation, Material and Resource Management, Energy Efficiency, Health & Well-being, Innovation in Design and Green Education, are being discussed IGBC Green Campus rating system.

To achieve the IGBC Platinum rating in Green Campus certification, IICC need to achieve at least 75 points out of total 100 available points in the IGBC Green Campus Rating system.

2. BACKGROUND

Vision of IICC is to create a state of art, Exhibition and Convention Center for India. The facilities created at IICC shall be the best in the industry worldwide, in ambiance and size. It shall offer an efficient and quality setting for national as well as international conferences, exhibitions, meetings and trade events. The project is envisioned to be developed to a scale of a Central Business District (CBD) with spaces for commercial offices, retails, hospitality, lifestyle and entertainment opportunities for all types of end users complying to IGBC platinum campus certification (Global leadership).

3. METHODOLOGY

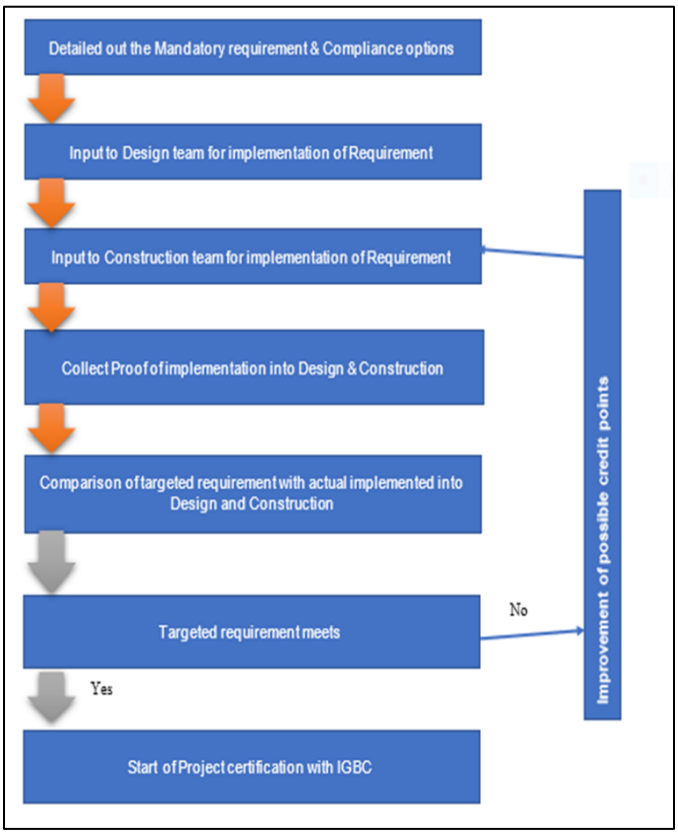
The methodology under this research work is to detail out the compliance requirements, collection of proofs, comparison of the targeted and actual parameters, evaluation of the actual parameters and study/suggestions for improvement/cost analysis/conclusion to be drawn. The process involved are explained as under:

- Detailed out the mandatory requirement and compliance options
- Collect proof of implementation into design and construction
- Comparison of targeted requirement with actual implemented into design and construction
- Evaluation of targeted requirement achievement
- Study and suggestions for improvement
- Cost analysis and conclusion

The mandatory and targeted requirements are explained below for the collection of proof and conducting the analysis for deriving the conclusion/suggestions.

Global leadership is the threshold criteria i.e. platinum campus certification for IICC based on the mandatory and targeted requirements.

4. FLOW CHART



5. STUDY & REVIEW THE COMPLIANCE REQUIREMENTS

A. Preliminary Study:

Preliminary study is conducted to check the feasibility to evaluate the achievable, doubtful and non-achievable credit requirements and is presented in the table below:

Y	D	N	Credits
16	2	7	Site Planning and Management
7	0	4	Sustainable Transportation
15	0	4	Water Conservation
17	4	0	Energy Efficiency
6	0	0	Material and Resource Management
7	2	0	Health & Well-being
3	0	0	Green Education
6	0	0	Innovation in Design
77	**8**	**15**	**Total**

B. Detailed Study: Review of detailed study of credit requirements as per IGBC is carried out and explained under following sections:

i) Site Planning and Management: Out of twenty-five (25) credits, sixteen (16) credit points are achievable along with the two (02) mandatory compliances.

ii) Sustainable Transportation: Out of eleven (11) credits, seven (07) credit points are achievable.

iii) Water conservation: Out of nineteen (19) credits, fifteen (15) credit points are achievable along with the one (01) mandatory compliances.

iv) Energy efficiency: Out of twenty-one (21) credits, seventeen (17) credit points are achievable.

v) Material and Resource Management: Out of six (06) credits, all six (06) credit points are achievable along with one (01) mandatory compliances.

vi) Health & Well-being: Out of none (09) credits, seven (07) credit points are achievable along with one (01) mandatory compliances.

vii) Green Education: Out of three (03) credits, all three (03) credit points are achievable.

viii) Innovation in Design: Out of six (06) credits, all six (06) credit points are achievable.

From the study carried out, total credit compliance achieved is 77 out of 100 which shall enable the project to qualify for IGBC platinum certification.

6. BENEFITS OF ADOPTING THE GREEN CAMPUSE REQUIREMENTS

Green buildings shall have tremendous both, tangible and intangible benefits.

Intangible benefits: Major intangible benefits of green buildings are enhanced/improved air quality for building occupants, excellent/efficient daylighting use, health & well-being of occupants of building, safety benefits and preservation & conservation of national resources.

Tangible benefits: Major tangible benefits are the reduction in water and energy consumption form the day one of the operation of the building. Water savings shall arrange from 30 - 50% and energy savings shall range from 20 - 30 %.

7. COST ANALYSIS

Under this research work cost analysis of some of the major components, described below, is carried out:

- Energy saving due to uses of low power density in compliance to Green building requirements
- Energy saving due to use of Solar panels and life cycle and payback period analysis

a) Energy saving on account of compliance to low power density requirement of IGBC

TABLE NO. 7.1 – Energy saving

S. No.	Area	Total Wattage	Total Kwh	% impro vemen	Saving of energy
1	Outdoor Sales Area	11,960	11.96	93%	158.90
2	Landscape area	17,037	17.04	59%	24.52
3	Walkways	589	0.59	93%	7.83
4	Driveways	33,084	33.08	75%	99.25
5	Parking Areas	4,374	4.37	84%	22.96
	Total	**67,044**	**67**		**313.45**

TABLE NO. 7.2 – Cost saving

S.	Item Description	Saving
1	Total energy saving in 1 day, 10 hours uses **(Kwh)**	3,134.55
2	Total energy saving in a year (365 days) in **Kwh**	11,44,109.24
3	Fixed charges @ Rs. 250/Kwh,	Rs. 28,60,27,310.74
	Say	**Rs. 28.60 Cr.**
4	Tariff charge @ Rs. 8.7/Kwh,	Rs. 99,53,750.41
	Say	**Rs. 1 Cr.**
5	**Total cost saving (3 +4)**	**Rs. 29.60 Cr. in a year**

CONCLUSIONS

The targeted credit of 77 out of 100 as per IGBC platinum campus certification requirements for IICC under site planning and management, water conservation, energy efficiency, sustainable transportation, material and resource management, health & well-being, green education and innovation in design, is achievable along with the compliance of the mandatory requirements.

Tangible benefits such as reduction in water and energy consumption right from day one of occupancy can be achieved once the IICC becomes operational. Water savings shall arrange from 30 - 50% and energy savings shall range from 20 - 30 %.

Intangible benefits such as health & well-being of the occupants, enhancing air quality & promoting biodiversity, safety aids and conservation/preservation of national resources are being maintained during the construction stage.

Design of the open area for low power density to reduce the light pollution resulted into huge energy saving and cost saving. Total energy saving amount to approximately 11,44,000 Kwh i.e. 1,144 Mwh. Due to the power saving the cost benefit shall be approximately Rs. 29 Cr.

Power saving with installation of 18,551 nos. solar panels which shall generate solar energy of 11,000 Mwh in a year. The installation cost for solar panels is approximately Rs. 74 Cr. and net cost saving shall be Rs. 9.5 Cr. Therefore, the payback period shall be approximately 8 years.

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