



1. GREEN RATING OF BUILDINGS TAKING ROOTS

The idea of green rating of buildings has taken roots in India. This is in line with the global trend in which the rating tools set benchmarks for green measures for constructing and using buildings to make them sustainable and to reduce their negative impacts on environment. Based on the magnitude of green measures adopted, points are awarded to a building and, after appropriate weighting, a total score is ascribed to determine the rating of the building. This helps to convey the range of application of green measures in building construction.

Globally, this is emerging as a popular tool to drive the building construction sector to adopt sustainable practices. This complements the command and control measures including regulatory mandates and standards. Ratings are largely voluntary schemes that are expected to stimulate market and consumer interest in green buildings. In fact, in most regions voluntary building rating schemes have often preceded regulatory mandates and have also helped in defining standards.

One of the reasons for interest in voluntary rating schemes is that the green buildings require a complex set of sustainability criteria related to a wide range of resource and material use which is often difficult to package as a single regulatory instrument upfront for enforcement. The advantage of the rating system is that it helps to disseminate green building practices outside the realm of regulations that are often impeded by structural and institutional barriers. This is a quicker way of increasing market outreach and build consumer support and awareness at the societal level. Green building rating is a practice that has the potential to become the standard. But it needs to be widely understood by building owners, architects, building managers, and occupiers to make an effective impact.

The developers see `reputation` advantage in marketing improved environmental performance of buildings and capitalize on their investments in green buildings. Aware consumer clientele can also influence the property market by pitching demand for green credentials of the buildings. Ratings help the consumer to compare buildings and make the appropriate choice. This creates incentives for resource efficient buildings that are urgently needed in our cities to reduce the resource impacts. Rating is a legitimate way of changing practice and influencing change. It can also be a powerful tool in mainstreaming a large number of green measures that can collectively make the impact.

Globally, large numbers of rating tools have evolved in a number of regions that are influencing property markets towards more sustainable practices. Particularly, multi-national corporate offices, and large retails have begun to demand sustainable spaces to meet their global environmental policies and also national policy obligations. They are looking for rating systems that are easily understood and fairly simple to implement. A wide range of rating systems have evolved in different regions of the world based on local climates and geographical conditions. (Table 1: Key global rating systems by region)

Table 1: Key initiatives by region

Country	Rating system
United States	Leadership in Energy & Environmental Design (LEED-United States)
	The Green Globe Rating System
	Energy Star (United States Environment Protection Agency)
Canada	Leadership in Energy & Environmental Design — Canada (LEED-Canada)
Australia	Green Star
	Australia Greenhouse Building Rating (AGBR)
United Kingdom	Building Research Environment Assessment Method Consultancy (BREEAM)
Europe	European Environment Agency rating
Hong Kong	Building Environment Assessment Method- Hong Kong (HK-BEAM)
Japan	Comprehensive Assessment System for Building Environment Efficiency (CASBEE)
Taiwan	Ecology, Energy Saving, Waste Reduction and Health (EEWH) (Taiwan)
Singapore	BCA Green Mark
Philippine	Philippine Green Building Council
South Korea	Green Building Council (Korea)
India	GRIHA
	India Green Building Council

Green building rating in India: India has also joined the race. It started to mirror the global trend when LEED-India Programme was adapted from United States Green Building Council's LEED (Leadership in Energy and Environmental Design) in 2007. This is purely a private initiative which is run by the Indian Green Building Council (IGBC) in India. The IGBC, which is part of the Confederation of Indian Industries - Sohrabji Godrej Green Business Centre (CII-GBC), has been promoting Leadership in Energy and Environmental Design (LEED) now for a decade. According to IGBC website, LEED India works on a whole-building approach to sustainability by recognizing performance in the five key areas namely sustainable site development, water savings, energy efficiency, materials selection and, indoor environmental quality. LEED-INDIA programme includes LEED India for New Construction (LEED India NC) and LEED India for Core and Shell (LEED India CS). Core and Shell buildings are those where the owners or developers do not control all aspects of the building's design and construction. These are leased or rented spaces, for example an IT park. IGBC also has its own set of ratings for homes, townships, SEZ, green factory buildings and green landscapes.

The alternative system that soon followed is the Green Rating for Integrated Habitat Assessment (GRIHA) which has been conceived by the The Energy and Resources Institute (TERI) and jointly developed by Ministry of New and Renewable Energy (MNRE) as the national rating system for buildings. GRIHA was adopted as the National Rating System (NRS) under the MNRE, as of 1 November 2007. It is a green building 'design evaluation system', and is suitable for all kinds of buildings in different climatic zones of the country. According to GRIHA website, GRIHA attempts to quantify aspects such as energy consumption, waste generation, renewable energy adoption, etc. so as to manage, control and optimise the same to the best possible extent. It is a 100 point system with a set of 34 criteria of which some are mandatory. Minimum qualifying score is 50 and rating given in 1-5 stars, 1 star for every 10 points over 50.

Both GRIHA and LEED-INDIA are operating at the national level. Both these ratings have a checklist of criteria and points that are assigned to these criteria based on their relative importance.

Demand for voluntary rating is still very small and nascent in India. Though the two



rating system are around for a while – LEED since 2001 and GRIHA effectively since 2007, – the number of buildings that have come forward to get rated is a small drop in the ocean. The total number of buildings registered with GRIHA is 179 and that with LEED is 1505. The number of buildings actually rated is still much smaller – 8 for GRIHA and 223 under IGBC. (See Table 2: Details of IGBC and TERI's Green Building rating Systems). Clearly, the Indian building sector has yet to warm up to the voluntary rating system.

Table 2: Details of IGBC and TERI's Green Building rating Systems

Heads	LEED and LEED- INDIA	GRIHA-NRS
Inception Year	2001	2007
Total buildings registered	1505	179
Total Buildings rated	223	8
Square ft registered	1.09 billion sq.ft	Not provided
Square ft rated	Not provided	Not provided
Professionals trained	16,000	10,000
Accredited Professionals	887	466

Source: GRIHA and IGBC website

2. WHAT MAY GO WRONG WITH RATING?

The reason why it has become necessary to assess the impacts of the rating system is that the rating systems are now getting linked with governments' promotional policies for green buildings. Increasingly, governments are linking official incentive programmes to promote rating of buildings to give a push to the green building movement. This makes performance based appraisal of this tool critical to ensure that it is delivering on its stated objectives.

The Indian government has also begun to look at a variety of ways to build regulatory obligations and financial incentives. Incentives designed by the MNRE are targeting the builders and developers. MNRE has adopted GRIHA as a national rating system. In a communiqué in September 2010, Deepak Gupta then the secretary MNRE had stated, "A National Rating System- GRIHA has been developed by the Ministry which is suitable for all types of buildings in different climatic zones of the country. Through various qualitative and quantitative assessment criteria, GRIHA would be applied to different types of new and existing buildings, whether commercial, institutional or residential". This message is a prelude to the GRIHA document published by TERI and MNRE in 2011.

Initially, MNRE started with a series of incentives for projects to go for GRIHA-NRS and to provide some financial support for on-site renewable systems since it is perceived that green buildings cost more than regular buildings (See box 1: MNRE incentives for GRIHA rated projects).

The local governments have also come forward to announce incentives. For instance, the Pimpri Chinchwad Municipal Corporation has announced incentives for developers and owners who voluntarily comply with GRIHA. NOIDA authority has gone one step further to award 5 per cent extra FAR (floor area ratio – extra built up area) to projects which commits for LEED gold rating. "It's a virtual goldmine and everyone who is anyone wants to encash it. Infact, in the past few months over 50 builders have approached us and they include some of the biggest names in the real estate business. It seems whole of Noida is suddenly interested in green ratings" says P. C Jain, Chairman Indian Green Building Council (IGBC). Jain adds that Delhi and Maharastra governments have also shown interests in the scheme of FAR incentives..



These carrots are offered by the government agencies as it is perceived that not many developers are investing in green buildings and face barriers of split incentives, lack of interest amongst customers, etc.,. Split incentives imply that the building is based on make and sell principle wherein it is constructed by a developer but is bought and occupied by others. Actually the payoffs of green buildings come to the occupiers or the buyers and not to the developer. Therefore, the developers are reluctant to go green unless they are assured of a premium over conventional projects. The developers often do not have convincing evidence about energy, water savings etc. And the occupier is also not sure whether they are paying for a green image or for actual savings coming from green measures.

Box 1: MNRE's Incentives for GRIHA rated projects

The MNRE granted following incentives to various stakeholders under its 'Energy-efficient solar/green buildings' scheme to GRIHA-NRS projects under the 11th five year plan period.

- Building Owners*- Reimbursement of 90% of the registration-cum-rating fee for projects upto 5000 sq. m. built-up area with minimum 3 star rating & for projects > 5000 sq.m. built-up area with minimum 4 star rating
- Architects / Design consultants*- Rs.2.5 lakhs for projects upto 5000 sq. m. built-up area with minimum 3 star rating & Rs. 5 lakhs for projects > 5000 sq.m. builtup area with minimum 4 star rating
- Municipal Corporations / Urban Local Bodies - Rs. 50 lakhs to Municipal Corporations & Rs. 25 lakhs to other Urban Local Bodies that announce rebate in property tax for Green Buildings & make it mandatory to get the new buildings under Govt. & Public Sector rated under GRIHA.
- Annual Awards - Awards of Rs. 50 lakhs to Municipal Corporation & Rs. 25 lakhs to other Urban Local Body who performs best.
- Annual Awards to 5 star rated buildings under GRIHA.
- Promotional Activities- Upto Rs. 2.00 lakh for each activity to specialized Institutions for organizing workshops/ seminars/ training / publications/ awareness campaigns etc.
- *Scheme presently confined to commercial and institutional buildings including housing complexes with minimum built area of around 2500 sq.m. Release of incentives will be made by MNRE on reimbursement basis through GRIHA Secretariat after validation of Star Rating Post - Construction by the National Advisory Committee of GRIHA.

Source: Ministry of New and Renewable Energy (MNRE)- Government of India , Revised Scheme on "Energy Efficient Solar/ Green Buildings", Issued vide sanction No. 3 / 5 / 2008-UICA (SE) dated 5th February, 2009.

There are other forms of incentives as well. The Ministry of Environment and Forests (MoEF) in 2011 has given special consideration to pre-certified LEED India and GRIHA projects by having a separate queue for clearance. This is supposedly with the faith that the green rating agencies have carried out the due-diligence of these project designs and will be accountable for the environmental performance of such projects. However, pre-certification is only a pledge and there is no legal provision for requiring the project proponents to achieve the level of rating promised in the pre-certification application. "The developer can promise the moon but do nothing. We can only hope the users would demand final rating from the building and that would encourage the developers to come back for final rating" Jain says. Infact GRIHA had no pre-certification mechanism prior to the MoEF order. Now, it has come up with a special Pre- Certification mechanism to 'support' the MoEF clearance process.



Clearly, the incentives are coming more swiftly than the ability of the rating agencies to get fully prepared to handle them.

A pre-certified LEED Platinum project can be finally rated as LEED Gold or lower and the rating agency can not hold the project proponent accountable for the under-performance. The rating agency can not even ensure that the projects come back for actual rating after getting the pre-certification and the fast-track environmental clearance. GRIHA had no pre-certification mechanism prior to this. Now, they have come up with a special Pre-Certification mechanism to 'support' the MoEF clearance process. This is certainly a welcome gesture for those developers who are already committed to a LEED India or a GRIHA rating. The interest amongst others in this fast-track clearance will depend entirely on cost/benefit figures. A regular environmental clearance might take 4-6 months, after which one is only expected to finish the project within 5 years and submit the compliance reports periodically thereafter.

With the fast track clearance, one has to hire an extra team of green consultants for green rating which entails fees for the rating agency, fees for consultants and incremental costs toward including green features which might be mandated by the rating agency. The preparation of pre-certification documents, queuing at IGBC / ADaRSH for pre-certification and the whole extra commitment of getting a green rating might be worth more than 4 months delay if one were to assume that fast track clearance works instantly. If the fast track clearance indeed entices more developers to go green, it is a welcome beginning but there is long road to achieving results on ground. Overall, this is an alarming trend in the government to favour developers with sops on 'green' grounds without ensuring transparency in these market-led mechanisms. These green incentives might prove counterproductive in the absence of follow-up and monitoring of the beneficiary projects.

For the first time in India the voluntary rating systems are being backed by government policies and subsidies/incentives. This therefore demands verifiable post-construction performance, accountability and transparency to justify the investments. Also as the business investments in green rating begin to expand it will require close monitoring of actual performance.

It is therefore very important to ensure that the buildings that are being rated continue to remain high performing and without much deviation during its operational phase. Currently, India has not developed effective institutional and regulatory system for performance monitoring of the buildings.

There is no legally backed means of verifying whether the rated buildings are delivering on their intended goals.

3. LEARN FROM GLOBAL EXPERIENCE WITH RATING

This is a very critical issue as globally now governments are stepping back to assess how the green rated buildings are performing and delivering. The smattering of evidences that have emerged shows that there can be a cause of concern.

Rating under scrutiny: Over the past few years international research and media have been abuzz with news about green rated buildings' poor performance as compared to their tall promises. According to a The New York Times article, several of buildings in US with LEED certification are under performing. Even though rating covers a wide range of resource use, energy performance of the buildings has come under immediate scrutiny due to concerns over climate change in the developed world.

Growing body of evidence shows that there is an emerging gap between design and construction which LEED rates and the actual building's performance post occupancy. The USGBC itself agrees that a



quarter of the new buildings that have been rated are using more energy than their design predictions. USGBC also stated that of the 121 new buildings rated through 2006, more than half — 53 percent — did not qualify for the Energy Star label and 15 percent scored below 30 in that program, meaning they used more energy per square foot than at least 70 percent of comparable buildings in the existing national stock. A majority of the labeled buildings also do not keep track of their energy consumption once operational, thereby offering no assurance of operational savings which is touted as the most obvious benefit of Green Buildings.. These concerns have been raised by several architects, engineers and energy experts in the green building sector besides asking for the energy-use data from every rated building to be made public. There have been questions on what would drive the buildings to perform better once they have received the label?

In 2006 the US Green Building Council (USGBC) had contracted the New Buildings Institute (NBI) to study energy use by LEED-certified commercial buildings. Their report 2008 concluded that the average LEED energy use was 25–30 per cent better than the national average but there was also a wide variability in LEED energy performance which was a cause for concern. A study by the National Research Council Canada, in 2009 shows that on average, LEED buildings used 18-39 per cent less energy per floor area than their conventional counterparts. But, 28-35 per cent of LEED buildings used more energy than their conventional counterparts. This study has recommended improved rating schemes to ensure more consistent success at the individual building level. There is need for measures for buildings' performance. Actual operational variables may have differed from those assumed in the baseline models, and that operational optimization was still underway in some buildings

The federal building in Youngstown, Ohio, for instance, failed to score adequate score to even qualify for Environmental Protection Agency (EPA) Energy Star label which ranks buildings after looking at a year's utility bills. In fact the building had an energy intensive cooling system and had scored high points in criteria like native landscaping rather than energy-saving features. Not surprisingly, a \$US5 million lawsuit was filed against the US Green Building Council and the programme for misleading.

The LEED label, was developed by the US Green Building council (USGBC) in 1998 to have a third-party verification of a building's environmental performance; certifies new offices, homes, schools and other buildings, as well as existing ones. LEED is in fact the largest programme, in terms of building footprint and is the worlds' most popular green rating programme. LEED ratings are coveted in US since it would get the builders tax credits, attract tenants, charge premium rents and project an image of environmental stewardship. Most US multinational companies insist on LEED Rated buildings for purchase / lease in the locations that they operate.

Projections are increasingly pointing out that green buildings are expected to be environmentally sustainable and they do reduce energy and resource use significantly when compared to conventional buildings. But actual performance shows something else. In 2006 a study titled 'evaluating the energy performance of the first generation of LEED-certified commercial buildings' investigated 21 LEED rated buildings. Actual energy bills along with modelled energy data for the as-designed and baseline building was used for the analysis. The study stated that there was variability from the predicted performance. The number of LEED energy credits obtained in the certification did not correlate with the actual energy use per floor area.

The research project titled 'energy performance of LEED for new construction buildings' in 2008 reviewed 121 LEED buildings in North America. The results of the study showed that the program on average is delivering around 25 per cent energy savings compared to conventional buildings, but there was a large variation in the energy performance of the examined building stock. Another research project "Comparison of commercial LEED buildings and non-LEED buildings within the 2002-2204 Pacific Northwest commercial building stock.' in 2008 came out with interesting findings. The review



of LEED commercial buildings with non LEED buildings showed that mean energy use per floor area for the 12 LEED buildings was 10 per cent lower than the 39 similar non-LEED buildings in the same region. This relatively small improvement was attributed to the relatively high prevailing energy standards for all buildings in the region.

The larger point is that there are several research studies that point to the fact that there is fair amount of variation amongst the actual energy use and the predicted figure in context of green rated buildings. The studies point out that a number of factors could contribute towards that. The number of hours during which the building operated daily could vary. The final built form of the building may be different in certain aspects when compared to the design used for energy simulations. The technologies used in the buildings may also perform differently from their prescription. Also plug loads are often very different than assumed and finally, knowledge transfer gaps between designers and users may contribute to the varied performance.

Another problem associated with the programme is that it relies only on energy simulations and models to predict energy use in the proposed building. But these energy models have been proven to be inexact since the energy use could be way higher than the predictions once the buildings are inhabited.

Similar concerns have also arisen in Australia where the rated commercial and institutional buildings are under performing. The attention mounted on high end and complex technologies during the design and construction phase is not followed up by adequate aftercare when operational. Often to gain points in ratings developer's compromise on occupier's comfort, usability and productivity, which otherwise should be of priority. Increasingly experts are voicing that developers and builders should stay engaged for a significant period after occupation to fine tune and perform, monitor the energy use to optimum satisfaction. Often sustainable designs may not translate into sustainable buildings. It is also true as some would argue that the building as actually built can differ dramatically from the one modeled at the design stage. The nature of occupation and densities, number or type of equipment can be a challenge and make such comparisons difficult.

The focus is now shifting beyond specifying green buildings features at the design stage, to operating truly green buildings. There is a need for systems and institutions to verify that green buildings have met their design expectations for performance.

4. GLOBAL SHIFT TOWARDS ACCOUNTABILITY

Other governments are now putting systems in place that will compel more transparent data in the public domain for verification and monitoring.

Rating tools are also beginning to respond to this concern. Infact, LEED programme in the US marred by these concerns had announced in 2009 that it would begin collecting information about energy use from all the buildings it rates. The programme has been further reformed since it now requires all newly constructed buildings to provide energy and water bills for the first five years of operation as a condition for rating. If the building fails to provide the same the label would be withdrawn. The council has also made it very clear that their priority is building performance and reducing carbon emissions. It is not clear how LEED India has enabled implementation of this system in India.

Driven by the climate concern, energy sector is the immediate target of this initiative, Europe requires compulsory disclosure on energy performance certificates on sales, or lease. Building owners must obtain and disclose. This is very important as otherwise opaqueness can lead to serious market failure and seriously jeopardize green property market.



It is now being increasingly recognized that without transparent and open information on the green measures applied in buildings and also the actual resource use during the building operations can actually keep the uptake of green measures suboptimal and under utilized.

5. WHAT IS HAPPENING IN INDIA? CSE INVESTIGATES.

Incentives based rating requires scrutiny and monitoring: In view of the fact that the building and construction sector is set to grow phenomenally in the coming decades, understanding the role of the ratings in setting the pitch and the direction of the green building movement in India, is necessary.

India is also making the crucial transition from the market led rating to a government backed rating system. It is important to begin the conversation on rating at the early stages of its implementation in India. The primary objective of this analysis is not to compare the metrics of the two prominent rating systems in India – GRIHA and LEED (India) but to understand the systems that may or may not be in place as a pre-condition to giving policy back up to the voluntary rating systems as well as to the regulatory interventions for effective results. Green buildings related standards like the Energy Code for building construction are also expected to become mandatory soon. Systemic solution to their implementation and monitoring will become very critical. The experience with the rating so far offers us the lessons for the future.

As the government is incentivising developers with additional FAR for green rating there are some serious concerns.[reference to be added] Additional FAR for developers for a green rated building implies permitting and also encouraging more development which requires additional resources, building materials, transportation, embodied energy etc. This means the performance monitoring of this new development in the name of green buildings will assume great significance.

There is a possibility of developers promising a high green rating on paper for additional FAR but the end product falling short of the pledged performance. Therefore best is to avoid such traps of FAR gifts to developers. If it is still continued then the accountability of the green rating agencies and the developers should be far greater and stringent penalties should be imposed on defaulters. This is important since FAR in the form of additional built up area once given would be very difficult to annul and with irreversible environmental consequences.

It is time to ask – does India have the right policies and systems in place to make the rating systems deliver?

Centre for Science and Environment therefore, decided to check out the current level of transparency that allows people, the prospective buyers and users of buildings to access and understand the level and nature of application of green measures in the rated buildings.

It is clear that the green building movement has certainly made 'green' fashionable. If one keeps track of the projects being launched in the metros, the word 'green' would be part of half the project names; 'Capital Greens', 'Green Boulevard', 'Green Meadows', 'Golf Greens', 'Green City', 'Green Village'. But this sales binge happens in complete vacuum of information. When one inquires from the salespeople about green, they are clueless about what is 'green' about the project. There is need for greater transparency and public understanding.

There is mounting public curiosity. What are the green claims of the buildings rated under different rating systems? What are the differences between different ranks – gold, silver, platinum as the case may be -- in terms of green applications? How are the rated buildings performing in reality? Who is evaluating them and where are the records? How do their performing data look like compared to conventional buildings? What difference the rating has made to their actual performance? How are developers claiming incentives and how are they proving their green credentials to the financial institutions on an ongoing basis? There is plethora of questions today.



CSE team has therefore set out to check out if systems are in place to find answers to these crucial policy questions. To be able to carry out this rapid assessment the CSE team contacted the concerned regulatory bodies, and rating agencies to assess the accessibility of information and if available then the quality of information. It has also assessed the information that is publicly available in the website of the concerned agencies. The team has also resorted to obtaining information under the Right to Information Act.

This paper captures the lessons from this rapid investigation. This quick survey has raised some very basic questions that the public would ask related to the state of the information and application in green buildings. But tracking these simple questions have brought out the key reforms that are needed to improve the effectiveness of any system.

THE SUMMARY HIGHLIGHTS

■ **How many rated buildings are there on the ground?** As a first step CSE looked for the details on the buildings registered and rated under different rating systems. This information is available on the websites of the rating agencies. According to GRIHA's website till date, 8 buildings have been rated since 2007. IGBC has a majority stake in the green rated buildings with 223 buildings rated since its launch in 2001 which includes IGBC green factory, LEED-India and green homes projects. Of these 223 rated buildings, 187 buildings have been rated under the LEED/LEED-India programmes. Of these, 95 were rated by USGBC's LEED rating system. Overall IGBC claims to have rated 223 buildings.

As far as the projects registered for rating are concerned, both these agencies seem to be making great progress. GRIHA puts their number of registered projects at 179 while IGBC states that 1,505 are registered with them (as on 21 March 2012).

■ **What is the official database on GRIHA buildings?** The next step was to understand the official system of recording GRIHA rated and registered buildings as this is an officially declared national rating system. As MNRE has adopted GRIHA as a national rating system it was logical to check out the official record keeping system on the buildings slated for GRIHA rating.

The complete information is not readily available on the website of the MNRE. The CSE therefore requested detailed information on the buildings slated for GRIHA rating, through an RTI query (dated 27 January 2012). This requested MNRE for a list of all the projects rated by GRIHA- National Rating System including both provisional and final rating.

The Ministry's response bore out that the ministry keeps record of only government buildings that come for GRIHA rating. The reply stated -- "the Ministry is considering only government building projects. No government project has been given GRIHA rating, so far." The Ministry shared that 71 government buildings have registered with them. There is no record of the private buildings coming for the rating.

This defies logic as the GRIHA National Rating System enjoys incentives for any qualifying project, public or private. GRIHA is a government backed system which comes with incentives for the project proponent, the architect and the design team. This logically demands that the ministry should be tracking developments in this area more holistically. By that token the Ministry should have information about all projects seeking GRIHA. It is important to put out the complete information on GRIHA in the website.

The process of awarding a rating is not mentioned in the MNRE or the GRIHA Website. It is assumed that the National Advisory Committee of GRIHA shall award the rating to 'each' and every project. Minutes of such NAC meetings convened for awarding the rating to the projects are not available.



- **What are the green credentials of the rated buildings?** This aspect is the most opaque part of the rating system in India. Although there are rated buildings there is hardly any information available on their actual 'greenness' in terms of specific design measures taken to reduce energy consumption, water consumption, waste generation and recycling, renewable energy generation etc., The checklist of points awarded to the buildings in various criteria is not disclosed.

Both IGBC and GRIHA website claims that a rated building saves between 30-50% energy besides 20-30% water savings. The IGBC website mentions that the incremental cost of a green rated building could be 2-3 per cent more over a conventional building and the payback period could be on an average 5 years. But, both GRIHA and IGBC's websites stop short of displaying any substantial information about the buildings rated.

However GRIHA provides some though inadequate description of its rated projects. But the range of information provided for all the projects is not consistent. For example, on the GRIHA website of the 8 buildings has provided Energy Performance Index (EPI) for only one building. About 3 buildings have provided some quantitative assessment of their renewable energy use and resultant savings. In case of water efficiency and water reuse/recycle only 2 buildings have provided some tangible information.

But the real letdown is the industry supported IGBC's green rating programme. Of the 187 buildings that have received IGBC's LEED-India rating, there is absolutely no information on its intended performance and actual savings. The only information the site displays is the building's name, location, owner/developer and the rating awarded to the project. Despite several letters and phone calls, IGBC has not responded to the request for basic information like the actual resource savings and details about the points awarded to each rated project.

"We have no written proof or corroborating figures on exact resource savings in the operational phase for the buildings rated so far" admits Jain. "Rated buildings are only monitored for a year after they are rated, that too by a third party and thereafter IGBC has no control." Right now there are no checks one year down the line after the building gets final ratings. According to Jain IGBC has conducted no related surveys to check their status. He admits that "these reforms have to come from the side of the rating agencies and IGBC is contemplating initiating post operational monitoring of its rated buildings, once we reach a critical mass"

In contrast, the USGBC the main rating agency in the US and the creator of LEED rating provides the checklist for their projects on their website. Interestingly it also provides the checklist of points for building projects in India that were rated under the US LEED. But USGBC's Indian counterpart IGBC provides no such lists on their website. Further the USGBC provides case studies of rated projects with details about the building, resource savings, developers, architects, other team members etc. In addition to that USGBC provides the breakup of rated and registered projects as per their use like residential, commercial, neighborhood developments, etc. USGBC seems to have matured as a rating system over the years and has registered 31,035 projects till date. But despite this massive expansion it still maintains relevant documentation and basic details for public viewing about the rated projects.

An important and basic aspect of the green rating is the checklist of points that are awarded to the building projects that are rated. These carry the points that are awarded to the building projects under various categories. But these checklists for the rated projects are nowhere displayed on both GRIHA and IGBC website.

Therefore, it is important that the Indian rating systems operate transparently. The rating programmes seem to be content with increasing projects and not really looking at making impacts at the planning or policy level by showing 'real' results.



To have some sense of the sector's performance there is a need for a uniform and standard online directory of all the green rated and pre certified building projects. There is need for uniform reporting format for putting out information by the two agencies. In future this sector could see an influx of many more players. Therefore in order to regulate and monitor their operations and processes a central directory of green registered, rated and ratified projects is necessary.

There is a need for greater accountability and transparency amongst the building sector including the builders, developers, consultants, green rating agencies and government agencies etc. especially when public money and additional built up area in the form of FAR is involved. any form of financial incentives and other land based incentives should be used sparingly used or best avoided.

■ **How soon can the cost of green building recovered?** Green rating is meant to be a tool for deepening public understanding of the green credentials of buildings. This voluntary initiative is expected to disseminate information on the costs and benefits of green building to build public support. But instead of generating and disseminating information on key parameters the rating agencies hold back information in the name of confidential trade practices. People are not made aware of the incremental cost of investments and the pay back period to understand the economics of green buildings and facilitate and enable customer decisions.

Limited set of information is available that is more indicative than composite and educative (Table 3: Incremental initial cost for the first few green buildings in India). IGBC provides figures on incremental cost and payback years for a few green buildings in India. The average payback period for all the buildings is around 4.6 years, according to IGBC before market transformation. But it has been 5 years since then, during which green prices of products and services have become more competitive. There is also a growing level of awareness amongst the general public about growing resource scarcity and need for savings especially in energy and water. To reconfirm the claim CSE requested IGBC to share the information on whether these buildings have been able to recover their incremental cost after the completion of the payback period as stated by IGBC. The reply from IGBC is still awaited.

Table 3: Incremental initial cost for the first few green buildings in India

Building	Year awarded	Built-in Area (Sqft)	Rating Achieved	% increase in cost	Payback (Years)
CII-Godrej GBC, Hyderabad	2003	20,000	Platinum	18%	7 years
ITC Green Centre, Gurgaon	2004	1,70,000	Platinum	15%	6 years
Wipro, Gurgaon	2005	1,75,000	Platinum	8%	5 years
Technopolis, Kolkata	2006	72,000	Gold	6%	3 years
Spectral Services Consultants Office, Noida	2007	15,000	Platinum	8%	4 years
HITAM, Hyderabad	2007	78,000	Silver	2%	3 years

Source: FAQ section, Indian Green Building Council, 2012, <http://www.igbc.in/site/igbc/faq.js>

One would expect that the rating agencies will widely advertise this information especially based on real time information from the rated buildings. There is a vast array of strategies and measures that will have an attractive payback of 3-4 years at nominal incremental cost. This in fact could be an attractive business proposition in itself for the developers that can help them to capitalize on their investments.

Though the green building advocates state that green projects pay back their incremental cost in few years there are no comprehensive studies in India to corroborate that fact. Even the studies on Green Rated Buildings are contested in the US.

If these and other pioneering green rated buildings along with the rating agencies are able to substantiate their claims that the green buildings makes economic sense and payback their incremental cost, then this could provide major boost to green building sector and encourage more people to build green. But IGBC showed no interest in sharing this information and substantiating their claims on green buildings.

In fact, two of the buildings listed in the table are CII owned and owned by IGBC's present chairman namely CII's CII-Godrej GBC, Hyderabad and Spectral Services Consultants Office, Noida respectively. Infact, Technopolis, Kolkata has registered for CDM so they anyways have to quantify their energy savings. Therefore these buildings should at least confirm what year the buildings had paid back and breakup of what measures paid back as per the claims.

CSE would therefore propose that both IGBC and GRIHA in agreement with the rated projects to share information and substantiate claims on the payback period. This move would establish the credibility of the green building movement and have far reaching impacts. Most of the developers and builders have their apprehensions for constructing green buildings because they believe that green buildings are expensive, make no economic sense and they would not be able to recover their cost. Comments by renowned Architects like Hafeez Contractor that 'green rating systems are a joke', add to the confusion on green ratings amongst uninformed people. But if buildings that have set precedence by going for green and achieving green ratings, can share facts about their cost/benefit it would be a clear message for the common man that 'green makes business sense'.¹

■ **Proving green credentials:** In the absence of clear information in the public domain many of the visible features in green buildings have raised doubts. As a result, green buildings and the rated buildings often raise doubts and confusion about their green credentials.

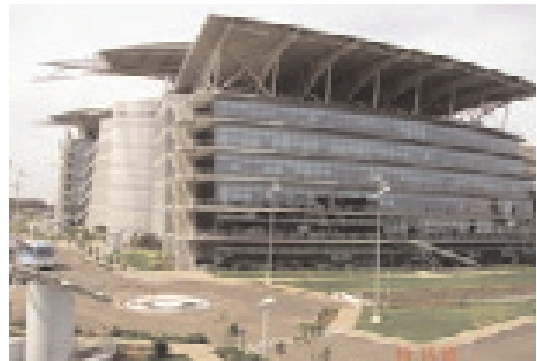
One of the most debated features for instance is the use of glass in rated buildings. IGBC has awarded high ratings to numerous buildings that have used extensive glass. These buildings have all received high ratings from LEED India even though they have extensive use of glass (see fig 1). In fact, Saint Gobain which is a founding member of IGBC runs a website called 'glass is green'. These buildings with high use of glass that have been awarded ratings by IGBC are spread across several cities like Mumbai, Chennai, Delhi, Ahmedabad, Hyderabad etc. Most of these cities fall in hot and dry and warm and humid climates with extremely high daytime temperatures and high humidity.

The demand for glass is increasing because it is considered fashionable and modern and ostensibly green by some. Advocates of glass state that it reduces the weight on the foundations and makes for a lighter building, creates a sense of space, is low on maintenance etc. they also claim that selecting the right kind of glazing can retain the energy performance of buildings.

Fig 1: Examples of a few IGBC rated buildings across India



Wadia International Centre, C II, Mumbai, LEED for Core & Shell (CS) GOLD Rating



TCS Technopark, Chennai LEED India New Construction GOLD Rating



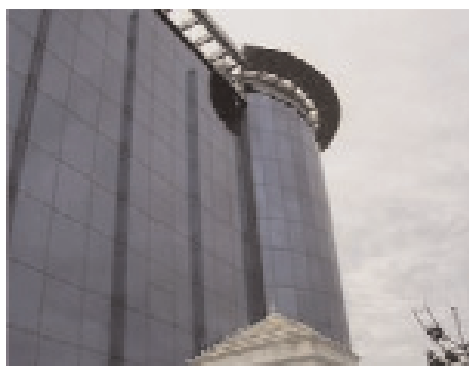
HSBC GSC, Hyderabad 1, LEED for Existing Building SILVER Rating



Logix Cyber Park, Noida LEED India for Core & Shell SILVER Rating



Wipro Technologies, Vizag LEED India for New Construction (NC) GOLD Rating



Ttepro Towers, Chennai LEED India for New Construction (NC) SILVER Rating

But serious doubts have been raised about the judiciousness of using extensive glass in buildings in hot weather – even if it is of required specification. What happens to a building which is more than 50 per cent glass? Heat is trapped inside the buildings which in turn requires intensive air-conditioning, raising the energy requirement of these glassed or glazed buildings. As a result, buildings with glass walls are becoming heat traps and also making the neighboring structures and environment hotter. While glass exteriors make sense in colder climates as they absorb heat and reduce the heating load, in Indian conditions with high temperatures, they act as green houses, in turn, increasing the cooling needs of the building.

NEERI's latest research reaffirms that there is an alarming rise in temperature in the cities due to the proliferation of these glassed buildings. The study states that the increase in the number of glass facade buildings in Mumbai has led to a rise in the temperature near the surface of the buildings as compared to the ambient temperature. The study has recorded a 17 degree celsius rise at the surface of the building compared to its surroundings.

Structural glazing and curtain walling started in US in the 40's and from there it traveled to Europe then making its way to Asia. In India cities like Bangalore, Chennai, Hyderabad and parts of Kerala, contributes to 30 percent of the glass consumption. Cities in western India like Mumbai, Pune, Ahmedabad are close at 29 percent, while NCR accounts for 20 percent of the total architectural glass and glazing market.

Clearly, some assessment is needed of both intended and unintended consequences of rating systems. The rated buildings are setting precedence for other buildings both small and large in the country. If these glass boxes could get away with gold and platinum green labels, then there is a danger that they would become the norm in the construction industry. Maybe these buildings are using high quality glass but the other smaller buildings or non rated buildings may go for single pane regular glass. People idealizing these glass buildings are beginning to perceive glass as a green material and with high aesthetic appeal. But for India which is only going to accelerate its building construction in the coming



decade and with its hot summers this certainly cannot be a sustainable option and therefore time to restrict extensive glass use in building facades.

It would be interesting to see what ratings these glass buildings would receive in BEE's energy star labeling scheme for buildings based on a proper energy audit. BEE star labeling scheme for office buildings whether green rated or not can throw light on the validity of 'glass is green' campaign.

All 'certified' buildings are expected to respect the local by-laws and to be located on appropriate sites. Therefore, green rating systems should be made accountable for awarding green rating to inappropriately sited projects. For example the Commonwealth (CWG) village is constructed on Yamuna flood plain and concerns were raised by several environmentalists about its siting. A year after the storm over the games (which left the village flooded in September 2010) has settled, the project was awarded a TERI GRIHA 2 Star Rating. "In spite of knowing the site was flood prone since it was located in Yamuna floodplain, why no alternative site was considered? There is no doubt that the games village is wrongly placed and in violation of the EAC recommendations. Infact, construction of CWG village further led to two more wrong constructions after that on river plain. And still it was awarded green rating," says Manoj Misra, Yamuna Jiye Abhiyaan.

- **Is there any official estimate of environmental benefits of the rating programme?** While incentives galore are being planned for green rating without any structured performance monitoring system, there is no official assessment of the intended and actualized benefits of the initiative to justify such interventions. If we must build then the greenest option would be to ensure that environmental impacts are reduced, resource use optimised, least amount of waste and pollution generated amongst others.

When the real goal of the green building movement should be resource saving and impact reduction, the green rating agencies are merely tracking their success by the increase in the green but unverified footprint. IGBC claims its green building footprint is 1.09 billion sq.ft on account of its green rating programmes. Although these figures provide some sense of the extent of coverage, this presents only a partial picture. The real impact of these rating systems should be measured in terms of resources savings and the target of coverage. Otherwise it will get reduced to a green fad.

A building cannot be designated green only by mere intent. The data on actual savings could only come from effective monitoring and record keeping during the operational phase especially in case of energy and water. Therefore, the green rating agencies along with developers and occupiers should work out a workable strategy to ensure that savings are documented regularly. But as of today there is no post project monitoring and is hardly talked about by the rating agencies.

CSE requested both GRIHA-NRS through MNRE and IGBC to share information on the measured savings for the rated projects that have been operational. MNRE which has adopted GRIHA as the national rating system keeps track of Government Buildings only. As any government building is yet to be rated under GRIHA - National Rating System, no such information was available. On the other hand IGBC did not respond to this vital query about resource savings by the green rated buildings. Therefore, monitoring for generating data about the savings by the green buildings both during construction and operations has become absolutely vital. CSE would therefore propose that the green rating agencies in consultation with the project developers should initiate the process of recording the savings and sharing it with the public at large to showcase that the green rated projects are actually delivering on what they promised.

- **Is there a legal requirement for performance monitoring of buildings?** India has not developed any composite legal framework for post construction performance monitoring. This is already happening in other countries. For instance, the Seattle Building Energy Benchmarking and Reporting legislation requires commercial and multifamily building owners to conduct annual energy performance tracking. The ordinance includes three components: Benchmarking, Disclosure, and Reporting.



Although some corrective steps are underway. The Noida Authority has mandated that green rated buildings claiming extra floor area in Noida have to submit maintenance certificate from GRIHA/LEED-India as the case may be, every five years to the Authority. Otherwise the Authority would issue notice and levy a penalty of 200 per cent of purchasable extra built up area on the respective builder/developer. But this draft gazette notification yet to be notified has already diluted the provision by extending the reporting time for submission from 3 to 5 years.

“The onus lies on the rating agencies, since they claim to be the experts and propagating green buildings and their ratings. We have tried to build in post construction monitoring mechanism. The entire green rating system is at an experimental stage and we are still not sure of the results. If it is worth, we may make it mandatory in the future”, says Rajpal Kaushik, Chief Architect Planner of Noida Authority.

Such supportive regulatory measures are needed to allow an informed market to drive energy efficiency improvements. India should also develop such measures to set the terms of action for monitoring of rated buildings.

6. THE WAY AHEAD

The overall assessment brings out that currently, the system is extremely opaque that makes any evaluation of its application and performance of the rated buildings almost next to impossible. There is also very poor level of information on the green measures, costs and pay backs in the public domain. As a result, public understanding of the green rated buildings and their benefits remains poor. This does not help to build strong public awareness and consumer interest in green buildings.

Even though the Government of India as well as the state governments are beginning to consider incentives for rated buildings no official system has been created to require regular reporting of information on actual performance of buildings as a precondition to obtaining those incentives.

As long as the rating systems remain voluntary and market driven and without government patronage and support, it works on the principle of reputation and corporate aims to be socially and environmentally responsible. This works well in moderating in-market competition for green credentials and influence property market.

But, at a much larger scale and especially with government support this will work better and effectively on delivery only if performance based monitoring and benchmarking are established. Some basic accountability, transparency and checks and balances would only improve the sector’s image and effectiveness. Green rating systems should be made more intelligible to people.

- Establish regulatory framework to mandate performance monitoring, reporting and disclosure of resource use buildings especially for rated and green rules compliant buildings.
- Mandate transparent sharing of information on green features, costs and pay-back, and performance data of the rated buildings. This information should be made available in the public domain in standardized uniform format. The green rating agencies could come out with white paper on actual numbers on savings, cost, payback, emission reductions and benefits of building that have been rated so far. The green rating agencies need to announce measures to improve transparency and verify their claims.
- Fiscal measures should be linked with post construction performance monitoring
- Strengthen technical preparedness for bridging the gap between modeled and actual performance of buildings.
- Rating agencies should initiate public awareness campaign based on the validated performance information.



REFERENCES

1. Navar Mireya, 2009, Some Buildings Not Living Up to Green Label, The New York Times, August 31, <http://buildinginformationmanagement.wordpress.com/2009/09/08/leed-certified-buildings-not-performing/>
2. Birt and Newsham, 2009, Post-occupancy evaluation of energy and indoor environment quality in green buildings: a review, 3rd International Conference on Smart and Sustainable Built Environments, Delft, the Netherlands, June 15-19, 2009), pp. 1-7
3. Hopkins Philip, 2010, Green buildings failed by follow-up, The Sydney Morning Herald, December 8, <http://www.smh.com.au/business/property/green-buildings-failed-by-followup-20101207-18oeq.html>
4. Navar Mireya, 2009, Some Buildings Not Living Up to Green Label, The New York Times, August 31, <http://buildinginformationmanagement.wordpress.com/2009/09/08/leed-certified-buildings-not-performing/>
5. Anon, 2012, Glass facade buildings lead to temperature rise, says NEERI study, Hindustan Times, January 12, <http://www.hindustantimes.com/India-news/Mumbai/Glass-facade-buildings-lead-to-temperature-rise-says-NEERI-study/Article1-798228.aspx>
6. http://articles.timesofindia.indiatimes.com/2011-09-14/chennai/30153762_1_green-buildings-rating-system-rating-agencies