MAKING SENSE OF GREEN BUILDING RATING

Centre for Science and Environment
41, Tughlakabad Institutional Area, New Delhi 110 062, INDIA
Ph: +91-11-29956110 - 5124 - 6394- 6399 Fax: +91-11-29955879
E-mail: cse@cseindia.org Website: www.cseindia.org

The building sector in India is set to grow exponentially. It already has a huge environmental footprint, with the domestic and commercial sectors consuming some 30 per cent of India's electricity. The imperative to go green, therefore, is clear. The question is where, and how.

The Bureau of Energy Efficiency (BEE) has issued the Energy Conservation Building Code (ECBC) to improve energy performance of buildings by 40-60 per cent. But the use of the code in design is not linked to the actual performance of a building after it has been commissioned.

What the BEE has in addition is a voluntary star-rating scheme for operational buildings which sets the energy performance index (EPI) of four categories of buildings: day use office, IT/BPO, hospital and retail malls. EPI is calculated differently for different building typologies and the benchmark varies as per climatic zones. But the rating programme has no direct link to ECBC. As a result, there is no data to show what the design has achieved and no feedback that could lead to improvement in the design based on operational experience.

There are two other green building certifying agencies in the country. The Indian Green Building Council (IGBC) started out as a US initiative but is now wholly Indian and is promoted by the CII-Sohrabji Godrej Green Business Centre. It runs a certification programme that rates buildings platinum, gold or silver, based on different criteria. New Delhi-based The Energy and Resources Institute (TERI) has its Green Rating for Integrated Habitat Assessment (GRIHA). Many state governments provide fiscal incentives and even bonus floor area ratio (FAR) to builders who produce green certificates from these agencies.

The actual proof, however, lies in the real use of energy and water in a commissioned building. But there is little data on this. In other words, governments are giving away largesse without any verification. A few months ago, the IGBC put on its website information on the actual energy and water consumption of 50 of the buildings it had rated out of some 450. Centre for Science and Environment (CSE) analysed this data to assess the performance of these buildings. (See table: CSE Analysis of LEED-IGBC performance monitoring data accessed on Janurary 2014)

Methodology

The IGBC has provided both built-up area and annual electricity consumption information for almost all the 50 buildings in its performance monitoring system. The EPI of these buildings has been computed as per the BEE methodology. Annual energy consumption reported by IGBC does not indicate if it is inclusive of the energy consumed by on-site captive generation via diesel generator-sets, which is to be included in the annual energy consumption as per the BEE standard. CSE has given the benefit of doubt to the buildings by assuming this information is included in the reported data.

Day use office buildings

The BEE star label for day use office buildings has a further sub-categorisation based on percentage of air-conditioned area in the building. The IGBC disclosure does not include information on the percentage of air-conditioned area in each building. Therefore, for ease of comparison, CSE assumes that more than 50 per cent of built-up areas of all buildings are air-conditioned. This is a generous assumption favouring the building, as the BEE star rating benchmarks for buildings with less than 50 per cent air-conditioned areas are more stringent.

What CSE found: When compared with the BEE benchmark for day use commercial offices as per their climatic zone, about two out of nine buildings were found to be not qualifying for the BEE star rating.

BPO/IT offices

The BEE defines BPO as a building "which primarily focuses on providing service to IT-related activities such as application management and application development, data center operations of testing and quality assurance which may have varied hours of operations". BPO and IT offices are a sector with

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extended and varying working hours — 24x7, 24x5, 18x7, 16x7 or 16x5. The BEE's energy efficiency standard for this sector is computed on an hourly energy performance basis instead of the usual annual EPI. Therefore, BEE divides the basic EPI of the building with the total number of working hours in the year to arrive at an annual average hourly energy performance index or AAhEPI (Wh/sq m/hour) for rating purposes. As the IGBC has labelled all (except two) IT buildings as having a 24x7 working hour, CSE has computed each building's AAhEPI assuming they function 24 hours of the day and 365 days a year. This gives huge benefit to this category, as in the real world no building performs 24x7 throughout the year.

What CSE found: Almost 47 per cent do not qualify for the BEE star rating.

Other day use buildings

The BEE has been rating various buildings under its rating system for day use office buildings, which are strictly not offices as far as their functionality is concerned. These include buildings such as the State Bank Academy, the National Archives of India, Centre for Environment Education, NSIC Services Technical Centre etc. Building on this, CSE assessed the IGBC data labelled as day time use for commercial buildings, against the BEE benchmark for day use office buildings. This included buildings from typologies defined as educational, research and factory.

Factory buildings were included because IGBC's factory rating document clearly states that the goal of this rating is to optimise energy efficiency for non-process use in the factory. The datasheet put out by IGBC also states that factories were for 'day time' use. It is clear, therefore, that the rating of a factory has not been done for the manufacturing or factory process, but for its building, used during day time. This makes it no different from the 'office' category.

What CSE found: Two out of five buildings in this segment did not qualify for the BEE star rating.

The way forward

The CSE analysis also finds that there are IGBC-rated buildings that match or are below the minimum benchmark set for their category and climatic zone. This means something is working and we hope CII and its partners will learn from the best examples so that expensive green features pay off in terms of performance.

CSE's effort is to push towards better operational effectiveness of green buildings and much better, transparent and verifiable systems for measurement of this performance. We believe this is needed so that building owners as well as regulators have greater confidence in the efforts that have been made to 'green' buildings. It is for this reason that we have openly and repeatedly congratulated IGBC for putting out the first set of data on its website on the actual performance of some buildings that it has rated. We would encourage IGBC to publish the data on the remaining buildings as well. We also hope that IGBC will ensure that the data is updated regularly. This will then allow for greater understanding of the performance of individual buildings.

More importantly, regulators need to get their act together on this issue. The CSE analysis is based on self-disclosure by companies; this is neither verified nor audited. The government needs to build a credible system of assurance so that it can really push what is green in performance. It is time, as we say, to go beyond the green façade.

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CSE Analysis of LEED-IGBC performance monitoring data accessed on Janurary 2014

Type of building		Location	Year of rating	Built up area(sq ft)	Rating achieved	Performance data for last year	Day time/ 24 Hr building	EPI (kWh/ sq m/year)#	AAHEPI (Wh/sq m/h)*	BEE cut off for 1star for day use office##	BEE cut off for 1star for BPO**	Percentage by which the building exceeds the BEE cut-off	Climatic zone	CSE Comment
Code name	Actual name					Actual energy consumption (kWh)								
CORPORATE OFFICES														
Corp Office 01	CII-Green Business Centre, Hyderabad	Hyderabad	2003	19,906	Platinum	160,000	Day Time	87		190EPI		-	Composite Climate	
Corp Office 02	Suzlon One Earth, Pune	Pune	2010	762,785	Platinum	4,955,941	Day Time	70		200EPI		-	Warm & Humid Climate	
Corp Office 04	Spectral Services Consultants Office, Noida	Noida	2007	15,000	Platinum	195,224	Day Time	140		190EPI		-	Composite Climate	
Corp Office 05	ITC Green Centre, Gurgaon	Gurgaon	2004	169,938	Platinum	1,931,600	Day Time	122		190EPI		-	Composite Climate	
Corp Office 06	CII Suresh Neotia Centre of Excellence for Leadership, Kolkata	Kolkatta	2009	33,390	Silver	206,965	Day Time	67		200EPI		-	Warm & Humid Climate	
Corp Office 07	Enercon India Pvt Ltd, Mumbai	Mumbai	2008	37,391	Gold	711,504	Day Time	205		200EPI		2.50%	Warm & Humid Climate	
Corp Office 08	Thermax, Pune	Pune	2009	79,355	Silver	559,504	Day Time	76		200EPI		-	Warm & Humid Climate	
Corp Office 09	FL Smidth House, Chennai	Chennai	2009	277,703	Gold	5,169,919	Day Time	200		200EPI		0%	Warm & Humid Climate	
Corp Office 10	CRISIL House, Mumbai	Mumbai	2011	4,021,908	Platinum	4,021,908	Day Time	11		200EPI		-	Warm & Humid Climate	Building has reported same number for built-up area and annual energy consumption, which is highly likely to be a error of copy-paste than actual figures.
TECH PARKS														
IT Office 01	TCS Technopark Phase I, Chennai	Chennai	2009	1,922,909	Gold	25,708,426	24 Hours		16		50 AAhEPI	-	Warm & Humid Climate	
IT Office 02	TCS Technopark Phase II, Chennai	Chennai	2011	1,416,576	Platinum	14,128,206	24 Hours		12		50 AAhEPI	-	Warm & Humid Climate	
IT Office 03	GE India Technology Centre 'Phase V', Bangalore	Bangalore	2009	329,318	Gold	4,464,700	24 Hours		17		40 AAhEPI	-	Temperate Climate	
IT Office 04	Olympia Tech Park, Chennai	Chennai	2007	1,799,345	Gold	31,714,354	Part building operated at nights		22		50 AAhEPI	-	Warm & Humid Climate	
IT Office 05	Wipro Technologies, Gurgaon	Gurgaon	2005	175,000	Platinum	3,734,568	Day Time	230	110		45 AAhEPI	144%	Composite Climate	Compared in both day use office and IT building catagories as it is reported as day use IT building. For AAhEPI calculation 8hrs operation for 260 days in an year is assumed
IT Office 06	Wipro S1, Kochi	Kochi	2007	100,000	Gold	10,308,074	24 Hours		127		50 AAhEPI	154%	Warm & Humid Climate	
IT Office 07	Fast Track Building 1&2, Wipro Technologies, Greater Noida	Greater Noida	2009	199,325	Gold	13,158,527	24 Hours		81		45 AAhEPI	80%	Composite Climate	

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Code name	Actual name					Actual energy consumption (kWh)								
IT Office 08	Software Development Block 3,Wipro Ltd, Phase II, Hinjewadi, Pune	Pune	2009	443,373	Gold	24,233,554	24 Hours		67		50 AAhEPI	34%	Warm & Humid Climate	
IT Office 09	Wipro Limited, Special Economic Zone PDC-2 S2, Pune	Pune	2010	443,373	Gold	24,233,554	24 Hours		67		50 AAhEPI	34%	Warm & Humid Climate	
IT Office 10	Wipro special economic zone, Blocks S1 & S2, Gopanpally, Hyderabad	Hyderabad	2009	149,239	Gold	2,994,576	24 Hours		25		45 AAhEPI	-	Composite Climate	
IT Office 11	Wipro Chennai Development Center- SEZ, Chennai	Chennai	2009	505,000	Silver	33,157,032	24 Hours		81		50 AAhEPI	62%	Warm & Humid Climate	
IT Office 12	Chennai Development Center, S3 & S4 blocks, Wipro Technologies, Chennai	Chennai	2010	240,538	Gold	33,157,032	24 Hours		170		50 AAhEPI	240%	Warm & Humid Climate	
IT Office 13	Wipro Special Economic Zone - S2, Bangalore	Bangalore	2010	452,201	Silver	20,308,998	24 Hours		55		40 AAhEPI	38%	Temperate Climate	
IT Office 14	Wipro Special Economic Zone (SR) - Tower S3, Bangalore	Bangalore	2010	601,300	Silver	20,548,827	24 Hours		42		40 AAhEPI	0.50%	Temperate Climate	
IT Office 15	Wipro Technologies, BHDC, Bhubaneswar	Bhubaneswar	2010	48,875	Silver	717,213	24 Hours		18		50 AAhEPI	-	Warm & Humid Climate	
IT Office 16	Wipro Technologies KDC Tower - 4, Kolkata	Kolkata	2010	157,088	Gold	14,879,204	Day Time	1020	490		50 AAhEPI	880%	Warm & Humid Climate	Compared in both day use office and IT building catagories as it is reported as day use IT building. For AAhEPI calculation 8hrs operation for 260 days in an year is assumed
IT Office 17	Wipro Ltd. (Infotech), Kotdwar	Kotdwar	2010	71,687	Silver	1,546,685	24 Hours		27		45 AAhEPI	-	Composite Climate	
IT Office 18	BPO-1, Infosys BPO Limited, Jaipur	Jaipur	2010	277,433	Platinum	3,290,000	24 Hours		15		35 AAhEPI	-	Hot & Dry Climate	
IT Office 19	Software Development Block 1, Infosys Technologies Ltd, Thiruvananthapuram	Thiruvana-nthapuram	2011	161,312	Platinum	1,000,000	24 Hours		8		50 AAhEPI	-	Warm & Humid Climate	
IT Office 20	Infosys - SDB 2, Thiruvananthapuram	Thiruvana-nthapuram	2012	260,000	Platinum	1,000,000	24 Hours		5		50 AAhEPI	-	Warm & Humid Climate	

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Code name	Actual name					Actual energy consumption (kWh)								
IT Office 21	Infosys - SDB 1, Pocharam Campus, Hyderabad	Hyderabad	2012	255,095	Platinum	2,000,000	Part building operated at nights		10		45 AAhEPI	-	Composite Climate	
Additional indicative comparision for day use buildings other than corporate officies @														
EDUCATIONAL INSTITUTIONS														
Edu 01	Birla International School, Jaipur	Jaipur	2009	227432	Platinum	476,367	Day time	23		180 EPI		-	Hot & Dry Climate	
Edu 02	Great Lakes Institute of Management, Chennai	Chennai	2010	201543	Platinum	2,094,477	Day time	112		200 EPI		-	Warm & humid Climate	
Rsrch 01	Du Pont Knowledge Centre, Hyderabad	Hyderabad	2010	248459	Silver	6,754,923	Day Time	293		190 EPI		54%	Composite Climate	
FACTORY BUILDINGS														
Fact 01	ITC Ltd., Saharanpur	Saharanpur	2011	436,396	Platinum	15,359,557	Day Time	379		190 EPI		99%	Composite Climate	
Fact 03	Grundfos Pumps, Chennai	Chennai	2011	111,310	Gold	952,629	Day Time	92		200 EPI		-	Warm & humid Climate	

Note: #Energy performance index or EPI = annual energy consumed / total built up area in square metre

##As per the bandwidth set for the star rating for day use office building developed by Bureau of Energy Efficiency (BEE) (Refer: http://www.beeindia.in)

*Average Annual hourly Energy performance index or AAhEPI = annual energy consumed / total built up area in square metre/ (24*365), unless specified

**As per the bandwidth set for the star rating for BPO building developed by Bureau of Energy Efficiency (BEE) (Refer: http://www.beeindia.in)

@these particular buildings were included in the analysis in view of the fact that BEE in the past has rated educational and research facilities under office category. These include State Bank Academy, National Archives of India, Centre for Environment Education, NSIC Services Technical centre etc. CSE has assessed this building in a similar fashion.

First eight column (title highighted in orange) are sourced from IGBC performance monitoring data as accessed from their website on Janurary 2014

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Annexure 1: Table Benchmark for BEE Star Rating Programme for day use office buildings

Less than 50 % air conditioned built up area		More than 50 % air conditioned built up area	
EPI (Kwh/sqm/year)	**Star label**	**EPI (Kwh/sqm/year)**	**Star label**
Climatic Zone- Composite			
80-70	1 Star	190-165	1 Star
70-60	2 Star	165-140	2 Star
60-50	3 Star	140-115	3 Star
50-40	4 Star	115-90	4 Star
Below 40	5 Star	Below 90	5 Star
Climatic Zone - Warm and Humid			
85-75	1 Star	200-175	1 Star
75-65	2 Star	175-150	2 Star
65-55	3 Star	150-125	3 Star
55-45	4 Star	125-100	4 Star
Below 45	5 Star	Below 100	5 Star
Climatic Zone - Hot and Dry			
75-65	1 Star	180-155	1 Star
65-55	2 Star	155-130	2 Star
55-45	3 Star	130-105	3 Star
45-35	4 Star	105-80	4 Star
Below 35	5 Star	Below 80	5 Star

Source: Bureau of Energy Efficiency

Annexure 2: Table Benchmark for BEE Star Rating Programme for BPO/IT office buildings

Average Annual hourly EPI (wh/h/sqm)	Star label	Average Annual hourly EPI (wh/h/sqm)	Star label
Climatic Zone- Composite		**Climatic Zone - Hot and Dry**	
45-40	1 Star	35-30	1 Star
40-35	2 Star	30-25	2 Star
35-30	3 Star	25-20	3 Star
30-25	4 Star	20-15	4 Star
Below 25	5 Star	Below 15	5 Star
Climatic Zone - Warm and Humid		**Climatic Zone - Temperate**	
50-45	1 Star	40-35	1 Star
45-40	2 Star	35-30	2 Star
40-35	3 Star	30-25	3 Star
35-30	4 Star	25-20	4 Star
Below 30	5 Star	Below 20	5 Star

Source: Bureau of Energy Efficiency