



Green Buildings, GRIHA, SVAGRIHA...

Innovations in Sustainable Habitats – the GRIHA approach

Bengaluru

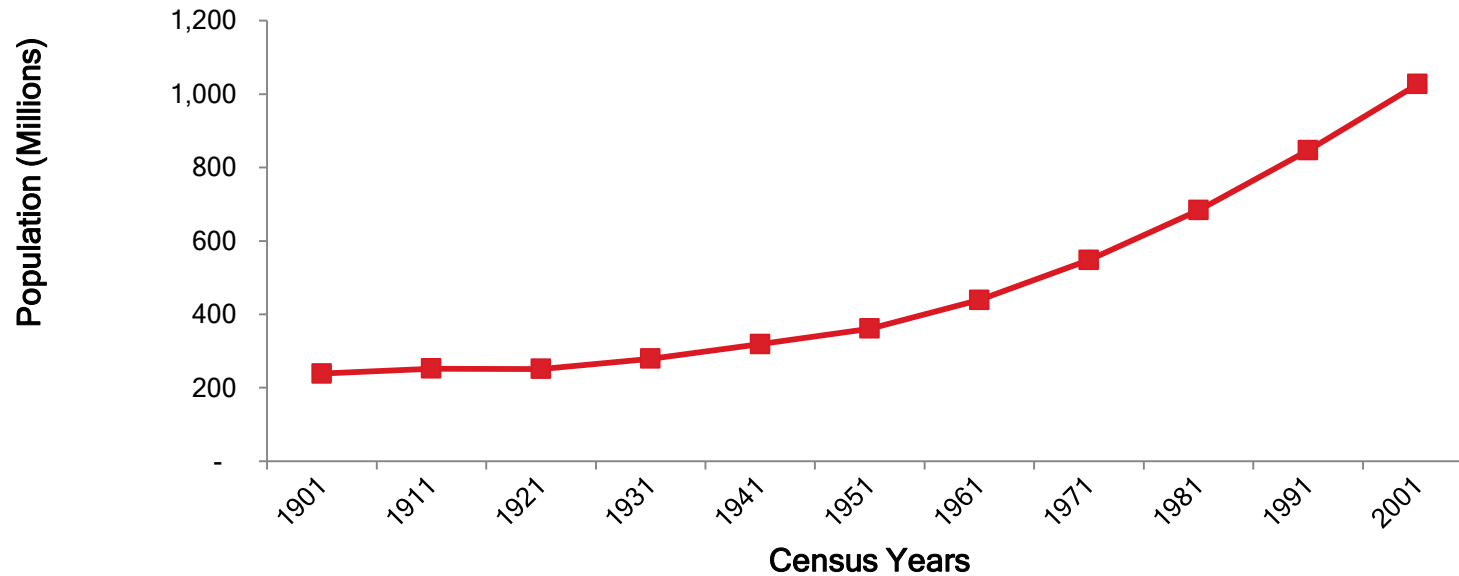
7th December 2012

Need

India's Urbanization

- Population of India will reach from current 1.2bn to **1.4bn by 2025**
- By 2030, **40.8% (600mn)** of India's population will be living in urban areas compared to current 28.4%

India's Population Growth



**The current development model being
adopted.....Gurgaon – The Millennium City!**



Source: http://www.skittsal.com/bilder/home03_hotel_big.jpg

Millennium City 's Power Bill To Go UP

By **ugesh sarkar**, Section **Electricity**

Posted on Tue Jun 15, 2010 at 10:01:18 PM EST

TARIFF HIKE

Up to 40 units: 9 paisa per unit

41-300 units: 20 paisa per unit

>301 units: 27 paisa per unit

Bulk consumers

(Hi-rise condominiums):

21 paisa per unit

Power bills in Gurgaon -- which already pays the high-hest tariffs in the country, yet faces 8-10 hours of power cuts every day -- will go up further.

A hike of 20-27 paisa per unit of electricity, effective from July, has been finalised, in the guise of 'fuel surcharge arrears'.

Haryana Electricity Regul-atory Commission (HERC) has okayed the surcharge, paving the way for distribution com-panies to collect a whopping Rs 1,705 crore in the next 48 months from

consumers, who -- because of the power cuts -- already pay a hefty bill for back up power.

"Fuel surcharge is due to the increase in cost of power pro-duction. The government is not counting it as a power tariff hike," M.B. Vashisth, director, Dakshin Haryana Bijli Vitaran Nigam, said. "We had sought the HERC's permission to collect the same from consumers."

Source: Hindustan Times By Sanjeev K. Ahuja *Millennium City 's Power Bill To Go UP*

[Win A Jeans](#)

[Win A Kurta](#)

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EPI

kWh/sq.m./annum

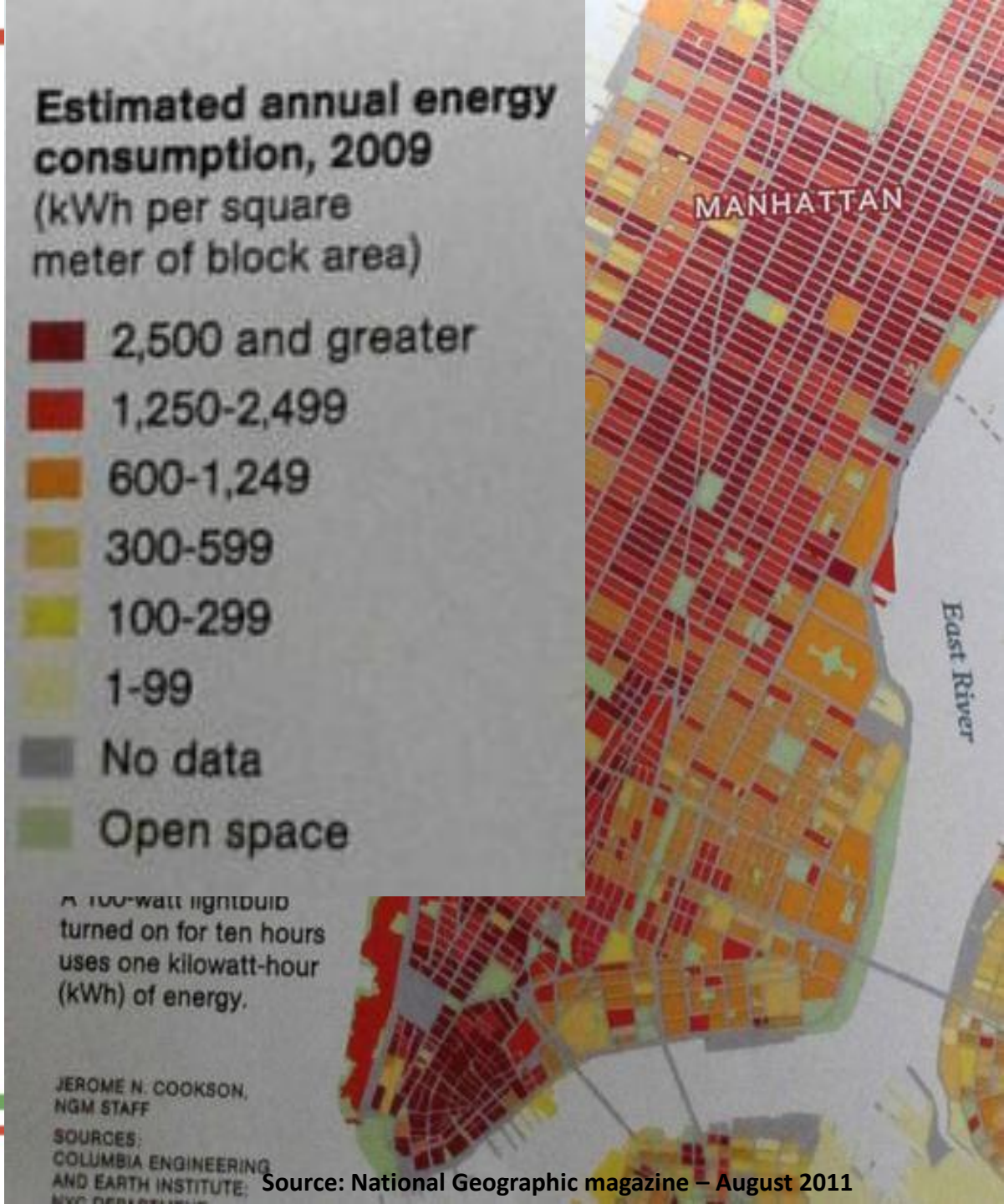


BEE Star rating for Existing Offices

Air conditioned buildings:

The lowest benchmark is

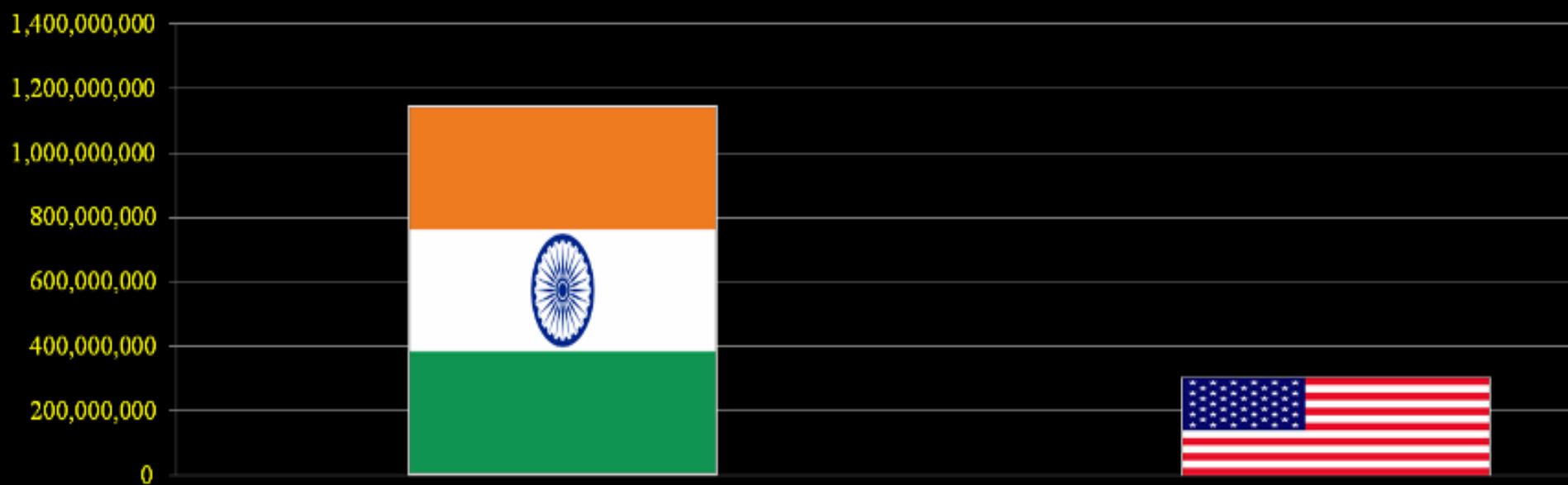
200 kWh/sqm/annum –
1 star



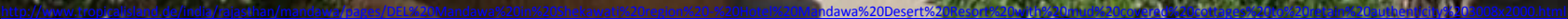
Land Area



Population



We have always been sustainable in our construction since the beginning of time....







<http://www.tropicalisland.de/india/rajasthan/mandawa/images/DEL%20Mandawa%20in%20Shekawati%20region%20-%20Hotel%20Mandawa%20Haveli%20outer%20courtyard%20with%20beautifully%20painted%20main%20facade%203008x2000.jpg>

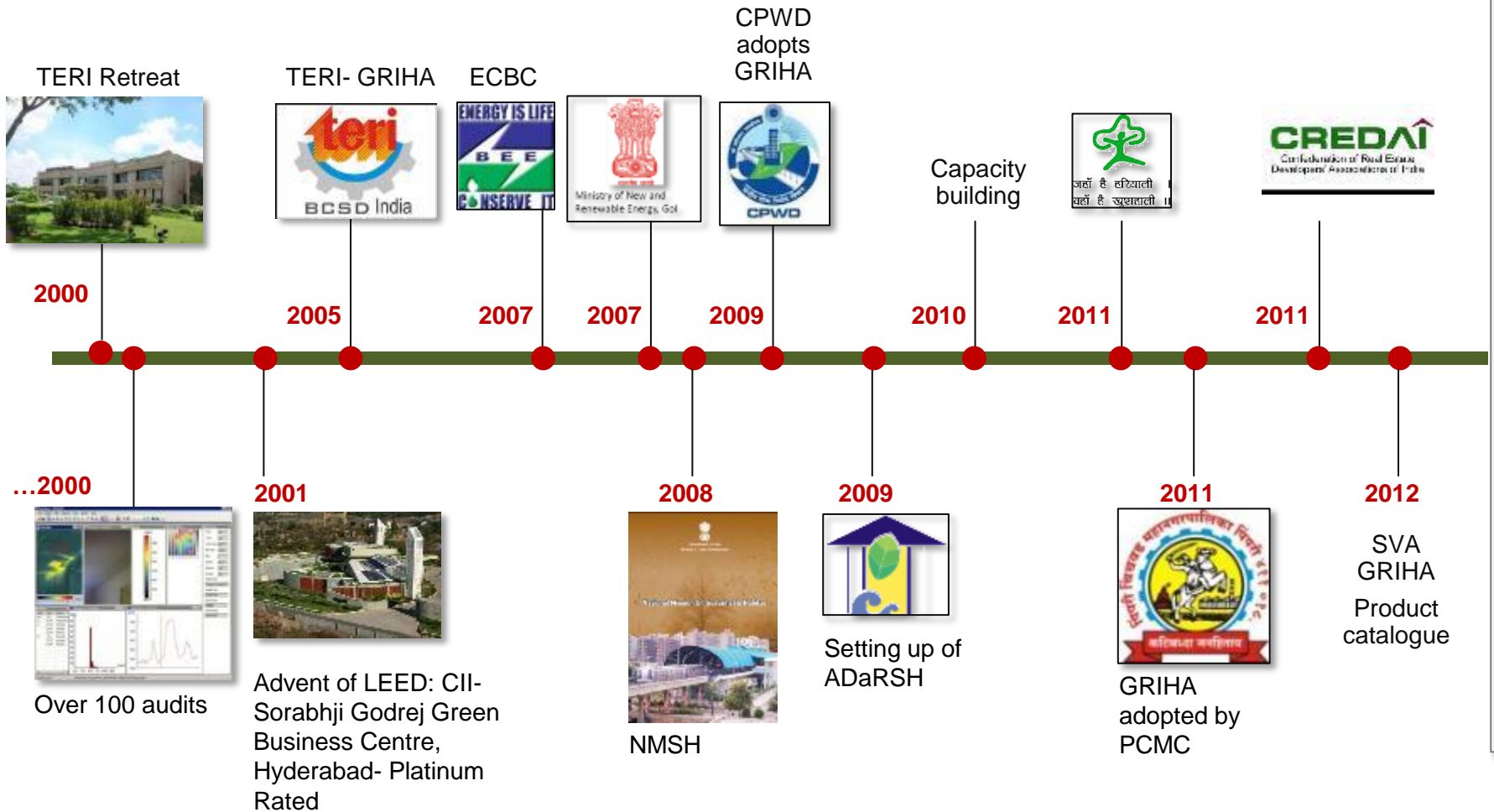
Learn from the Past, create the Future.....



Green Rating for Integrated Habitat Assessment

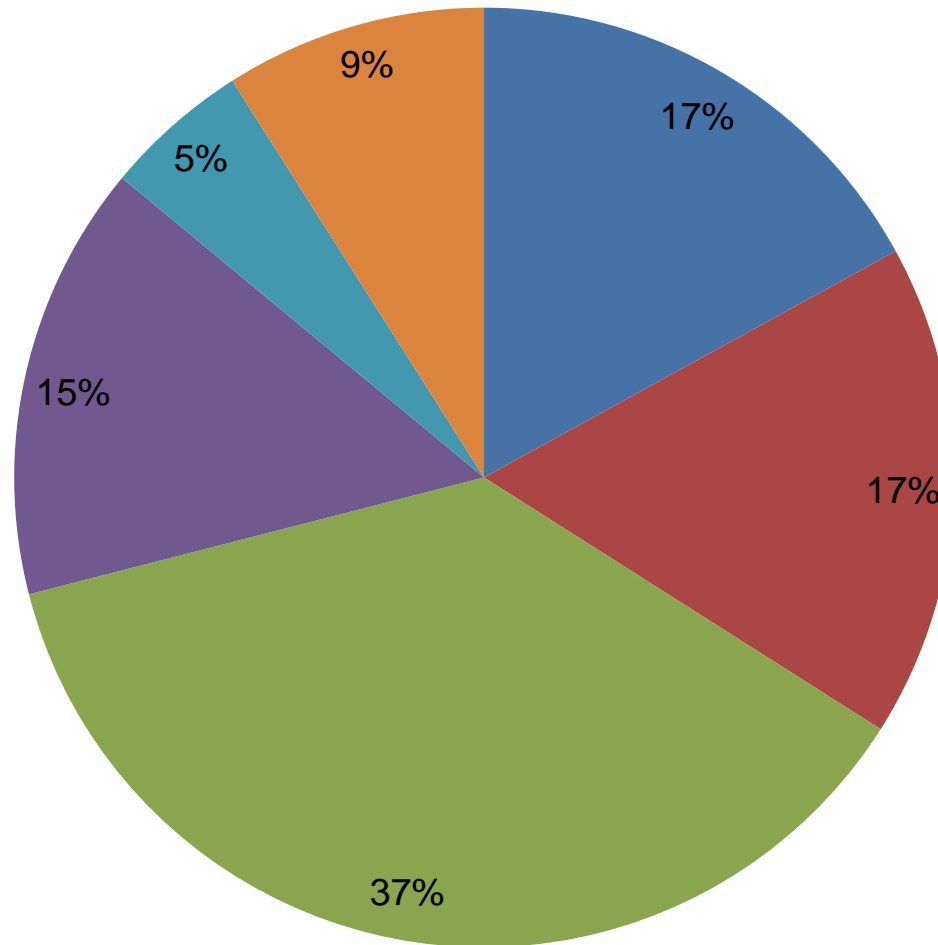


Genesis



Towards market transformation

- Materials and construction technology
- Site Planning
- Energy (end use) and Renewable Energy
- Water
- Waste Management
- Health and well being



Set of 34 criteria focusing on:

- **Site Planning**
- **Building Design**
- **Energy Efficiency**
- **Water and waste management**
- **Sustainable Building Materials**
- **Occupant Health and comfort**

100 (+4 innovation points) point system with differential weightage on various criteria



Fast gaining acceptance across the industry

- Over **279** registered projects across India – **203** under **GRIHA**

(KEY PROJECT: ITC, GMR, All upcoming AIIMS, All upcoming IITs, HIRCO, upcoming Airports, All upcoming IISERs, Goel Ganga etc.)

- **48** projects under **Pre-certification**
- **About 30** registered pilot projects under SVAGRIHA
- **2** pilot projects registered under Large Development Guidelines
- **More than 100 mn sq ft** of built-up registered under GRIHA

Ministry of New and Renewable Energy

- Solar buildings program for energy efficient buildings
- GRIHA- national building rating system (partly mandatory)
- Solar cities programme
- Incentives for integration of renewable energy & GRIHA

Bureau of Energy Efficiency, Ministry of Power

- Energy Conservation Building Code (voluntary)
- Appliance labelling (partly mandatory)
- Star rating programme for existing buildings (rates commercial buildings on energy performance)

Ministry of Environment & Forests

- Environmental Clearance (Mandatory)
- Resource (energy, water) efficiency integral part of clearance
- ECBC mandatory

Ministry of Urban Development

- National Mission on Sustainable Habitats
 - energy efficiency in buildings
 - management of solid waste
 - accelerating modal shift to mass transport

Central Public Works Department/ Thiruvananthapuram PWD

- Mandatory to comply with GRIHA
- Revised specification, schedules and plinth area rates

Fast track clearance for GRIHA pre-certified projects

No. 19-58/2011-IA.III
Government of India
Ministry of Environment & Forests

Paryavaran Bhavan,
C.G.O. Complex, Lodi Road,
New Delhi-110003.
Telefax. 2436 2434

Dated the 27th June, 2011

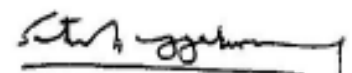
OFFICE MEMORANDUM

Sub: Out of turn consideration for environmental clearance in respect of Building and Construction Sector Projects having green rating – Regarding.

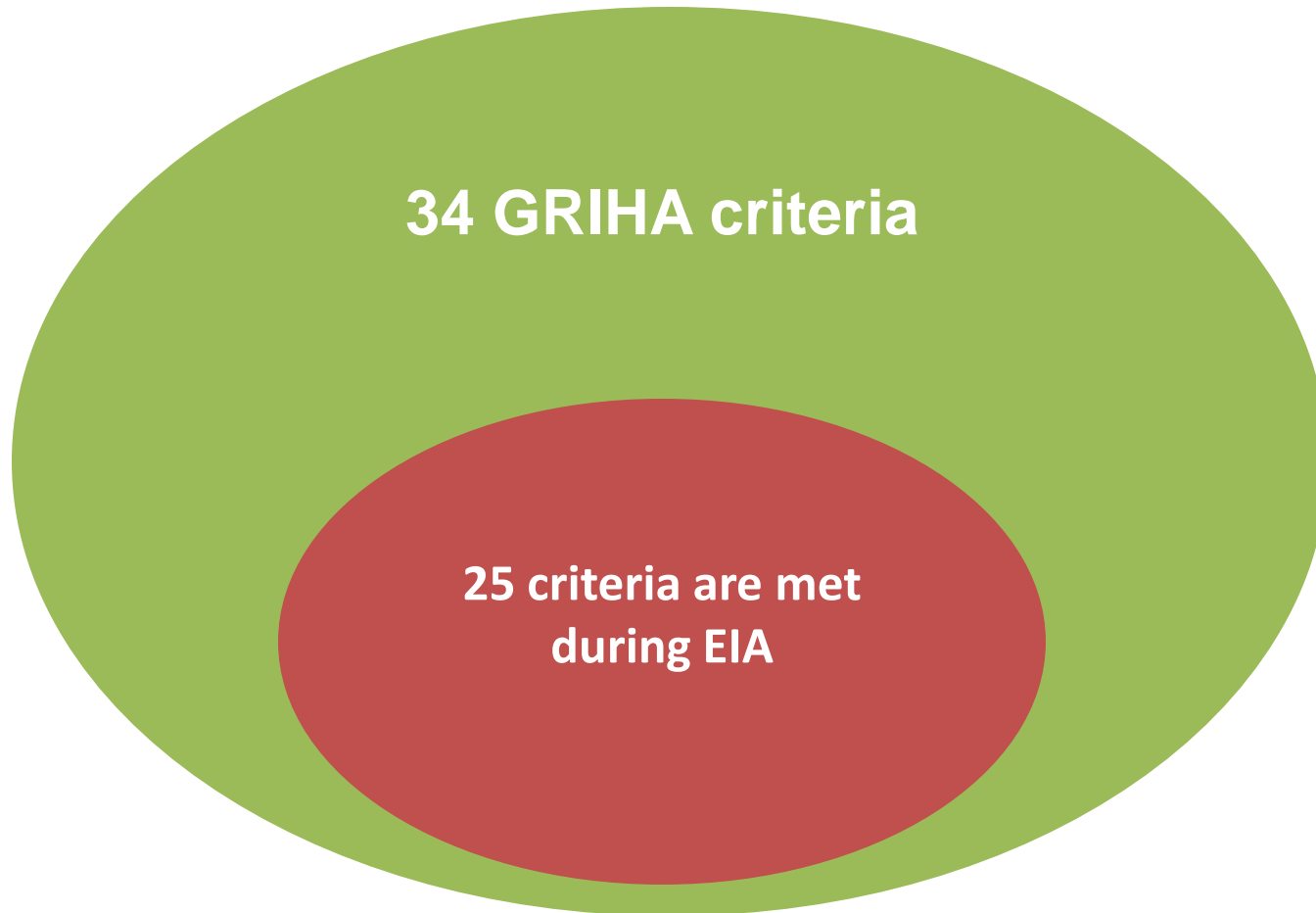
Ref: Office Memorandum no. 19-58/2011-IA.III dated 10.5.2011 issued by Ministry of Environment & Forests

In continuation to this Ministry's earlier Office Memorandum of even no. dated 10.5.2011 regarding the subject mentioned above, it has been decided that the proposals for obtaining environmental clearance in respect of Building and Construction Projects which have obtained Green Building rating (Pre-Certification or Provisional Certification) under the rating programmes of GRIHA, IGBC including LEED India etc by integrating high level of environmental norms into their building plans, shall get priority for their consideration, out of turn, by the Expert Appraisal Committee / State Level Expert Appraisal Committee, as the case may be. A copy of this certificate along with the details of examination done by above agencies shall be submitted along with the project. Therefore, such projects will be listed for their consideration by the EAC / SEAC concerned, out of turn, as compared to other cases.

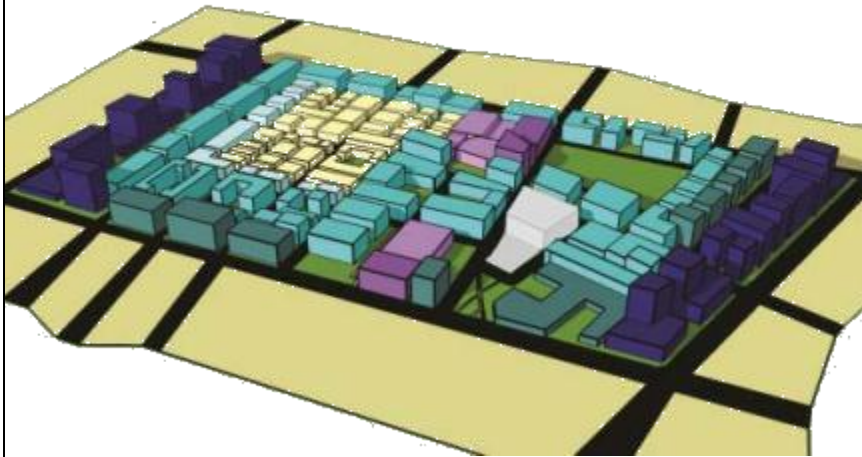
This issues with the approval of the Competent Authority.


(Dr. S.K. Aggarwal)
Director

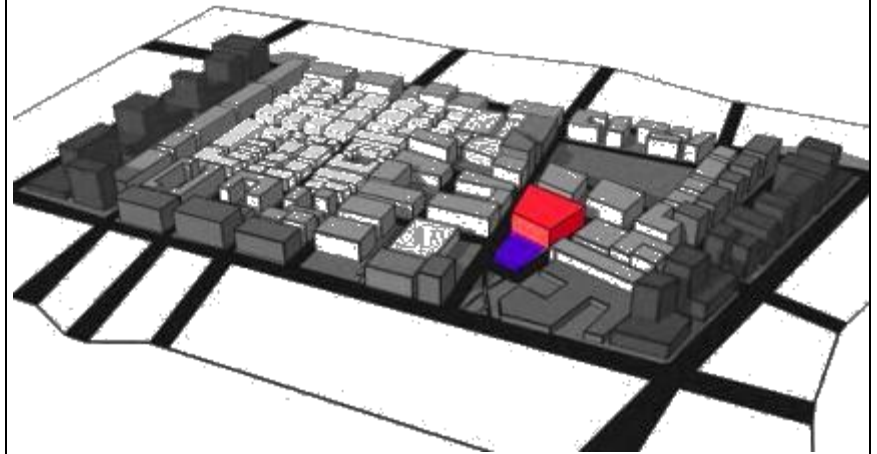
GRIHA positioned to give EIA compliance feedback to State



Environmental clearance looks at the impact of the building on its surroundings



GRIHA looks at the construction activities inside the site



PCMC launches green building initiative

EXPRESS NEWS SERVICE
JULY 30

THE Pimpri-Chinchwad Municipal Corporation (PCMC) has become the first municipal corporation in the country to introduce energy efficient buildings by giving incentives to builders and property tax sops to residents. Officials of the Union Ministry of New and Renewable Energy made this announcement at the launch of PCMC's 'Green building initiative' at Auto-cluster in Chinchwad on Saturday.

Municipal Commissioner Asheesh Sharma said the concept was started last week but was formally launched in the presence of ministry officials. "Through this initiative, there will be saving in potable water usage, waste water treatment and solid waste management. The developer will get a discount in premium



Mayor Yogesh Behl inaugurates the scheme. PCMC Commissioner Asheesh Sharma, Dr Arunkumar Tripathi, Dr Rajshekhar Iyer and Priyanka Kochar are also seen.

for building permission charges as per GRIHA ratings. Also there will be a discount of 10 per cent in property tax for end users after possession from the developer. If the project is interested in seeking fast-track environmental clearance through GRIHA pre-certification, they can avail of this facility," he said. The property owners of green buildings will be benefited by reduction in pollution related to air, noise, soil and water, and solid waste, Sharma said so far seven

developers have submitted their projects. "The maximum discount a builder will get for a green building is 50 per cent which he will get on the premium amount. But that depends on the GRIHA rating. If the project gets, five star rating, then the builder will get a maximum discount on premium. Similarly, residents will also get discount in property tax.

The 'Green building initiative' was launched by Mayor Yogesh Behl. Officials said PCMC is

making a conscious effort towards its responsibility towards natural resources and the impact on society by incentivizing GRIHA (Green Rating for Integrated Habitat Assessment) Rating System in their jurisdiction.

The Energy & Resources Institute, TERI has conceived and developed jointly GRIHA with the Ministry of New and Renewable Energy, Government of India, which is suitable for all types of buildings in different climatic zones in India. This rating system not only take care of energy conservation but also look into water and waste management, minimum destruction of natural resources and various other aspects in an integrated way. ADaRSH, Association for Development and Research of Sustainable Habitats, is mandated to promote development of buildings and habitats in India through GRIHA, officials said.

PCMC endorses GRIHA



Govt. of India, Ministry of Urban Development Central Public Works Department



157th "CPWD-Day"

Tuesday, 12th July 2011



सत्यमेव जयते
सत्यमेव जयते
राष्ट्रीय विकास मंत्री
भारत
MINISTER OF URBAN DEVELOPMENT
INDIA

MESSAGE

The Central Public Works Department (CPWD) is completing its 157th year of existence on 12th July, 2011. The CPWD today has emerged as a premier Government construction agency and is providing yeoman's service in construction activities for Central & State Governments and other Public bodies.

In keeping up with its fine tradition, CPWD is creating modern buildings with adaptive architectural design having state of the art facilities. It has also ventured into new areas such as the Tsunami Reconstruction Project for the Andaman & Nicobar Islands and Construction of State highways in Bihar, etc.

While congratulating the staff and officers of CPWD on this occasion, I exhort them to continue working with commitment and dedication.

(Kamla Nath)

नवीन कुमार
NAVIN KUMAR



राष्ट्रीय विकास मंत्रालय
मिनिस्टर ऑफ़ यूरबन डेवलपमेंट
MINISTRY OF URBAN DEVELOPMENT
NIRMAN BHAWAN, NEW DELHI-110018
Tel : 23061977 Fax : 23061499
E-mail : secretary@cpwd.in

सचिव, भारत सरकार
Secretary to the Government
of India

MESSAGE

It gives me a great pleasure to note that CPWD is celebrating its 157th Annual Day on July 12th, 2011. CPWD is the prime construction Department of Government of India with a proven track record of 157 years and is dedicated to the service of Nation even in difficult and odd circumstances. There have been great achievements by CPWD in building infrastructure of various departments and organizations far and wide in the country. Some important works executed by it pertain to Roads under RSIY & PMGSY in Bihar Jetties for IWA, CPMF works for BSF, CRPF, ITBP, SSB, Health Projects under PMSSY and Border fencing, Roads and Flood- Lighting in Pakistan and Bangladesh Borders.

I have been informed that CPWD is executing works for 323 Departments under 40 Ministries. Its work portfolio consists of over 4000 projects of different magnitude costing over Rs. 22000 crores and in the last six months alone, 48 major works costing over Rs. 2750 crores have been entrusted to CPWD. This is a testimony of the confidence reposed in CPWD by various Ministries and Departments. CPWD's pioneering steps in Construction of Green building is laudable.

I wish all success to Central Public Works Department in its efforts.

(Navin Kumar)

On its 157th Year CPWD dedicates itself to the cause of reducing Carbon foot prints by promoting construction of Green-Buildings

Steps taken for promoting Green Buildings

- All CPWD Constructions shall be essentially Green.
- CPWD provides mandatory internal certification based on GRIHA rating system of TERI.
- CPWD Training Institute Ghaziabad has been recognized as "Centre of Excellence" for Green Building by MNRE.
- Schedule of rates containing Green Building items under finalization.

CPWD - Dedicated to Nation Building



Indira Prayavaran Bhawan, Jor Bagh, New Delhi - Green Building with Platinum rating of LEED & 5 Star GRIHA Rating (under construction)



General Pool Office Complex, INA, New Delhi (at finishing stage)

सौगता राय
Saugata Roy



राज्य मंत्री
MINISTER OF STATE
राष्ट्रीय विकास मंत्रालय
MINISTRY OF URBAN DEVELOPMENT
भारत सरकार
GOVERNMENT OF INDIA
मिनिस्टर ऑफ़ यूरबन डेवलपमेंट
NIRMAN BHAWAN, NEW DELHI-110011

MESSAGE

I congratulate CPWD on completing 157th years of service to the Nation on 12th July 2011. This is an occasion for which any organization could be proud of. CPWD at present is a total service provider capable of giving single window service for all facets of Green-Built environment. CPWD has an enormous capacity to take up works in various fields like Sport, Education, Tourism, National Security etc. Fencing the entire international border along Rajasthan, Punjab, West Bengal including making roads in remote areas of Sikkim and Uttarakhand is a testimony to their commitment to provide service to the Nation. I wish to see a re-emerging CPWD with benchmarked operations and organized human resources offering unparalleled services to its stakeholders.

I convey my best wishes to all the Members of the CPWD family on this occasion and urge them to strive even harder in their endeavours.

(Saugata Roy)

Phone : 011-23063898 / 23061999 Fax : 011-23061103



सचिव, भारत सरकार
GOVERNMENT OF INDIA
DIRECTORATE GENERAL
CENTRAL PUBLIC WORKS DEPARTMENT
NIRMAN BHAWAN, NEW DELHI

MESSAGE

CPWD in a span of 157 years has grown into a large professional organization which has developed expertise in all facets of built environment. My Department has been able to maintain itself in a robust state of health and continue to contribute to the development of the Nation in a very significant manner. The stupendous growth achieved by the Department and the modern marvels that have been created and are being created all across the length and breadth of the country are the standing proof of our technical excellence, dedication and high calibre of our officers and staff.

The CPWD has contributed with dedication by creating infrastructure for Agriculture, Textile, Shelter, Education & Health Sectors at various locations in the country. CPWD is going Green by its construction in a big way. All clients vying for Green Construction have facility for single window service in CPWD.

On 157th Anniversary, I on behalf of entire CPWD fraternity reaffirm our commitment towards building Green habitat for India befitting the aspirations of every single Indian.

(Chandra Shekhar Prasad)

157th "CPWD-Day" function shall be held on 12.7.2011 at 1000 hrs at Vigyan Bhawan, New Delhi

Advantages of GRIHA



**Lays emphasis on “cost-effective” strategies
for making green buildings –
through INTEGRATED DESIGN APPROACH**



Are green buildings more expensive?

Green Buildings

3000~4000 Rs/sqft



350 kWh/sqm/annum



4000~4500 Rs/sqft



210 kWh/sqm/annum

40% reduction



200 kWh/sqm/annum

GRIHA



2000 Rs/sqft



120 kWh/sqm/annum

40% reduction

2500 Rs/sqft

For conserving energy – in a cost-effective manner

Cheapest Solution

Most Expensive Solution

Passive
design of
building

Use of
Efficient
Systems

Use of
Renewable
Energy

For conserving water – in a cost effective manner

Cheapest Solution

Most Expensive Solution

Optimization
of water
demand

Use of
water
efficient
Systems

Use of
recycled
water and
rainwater
harvesting

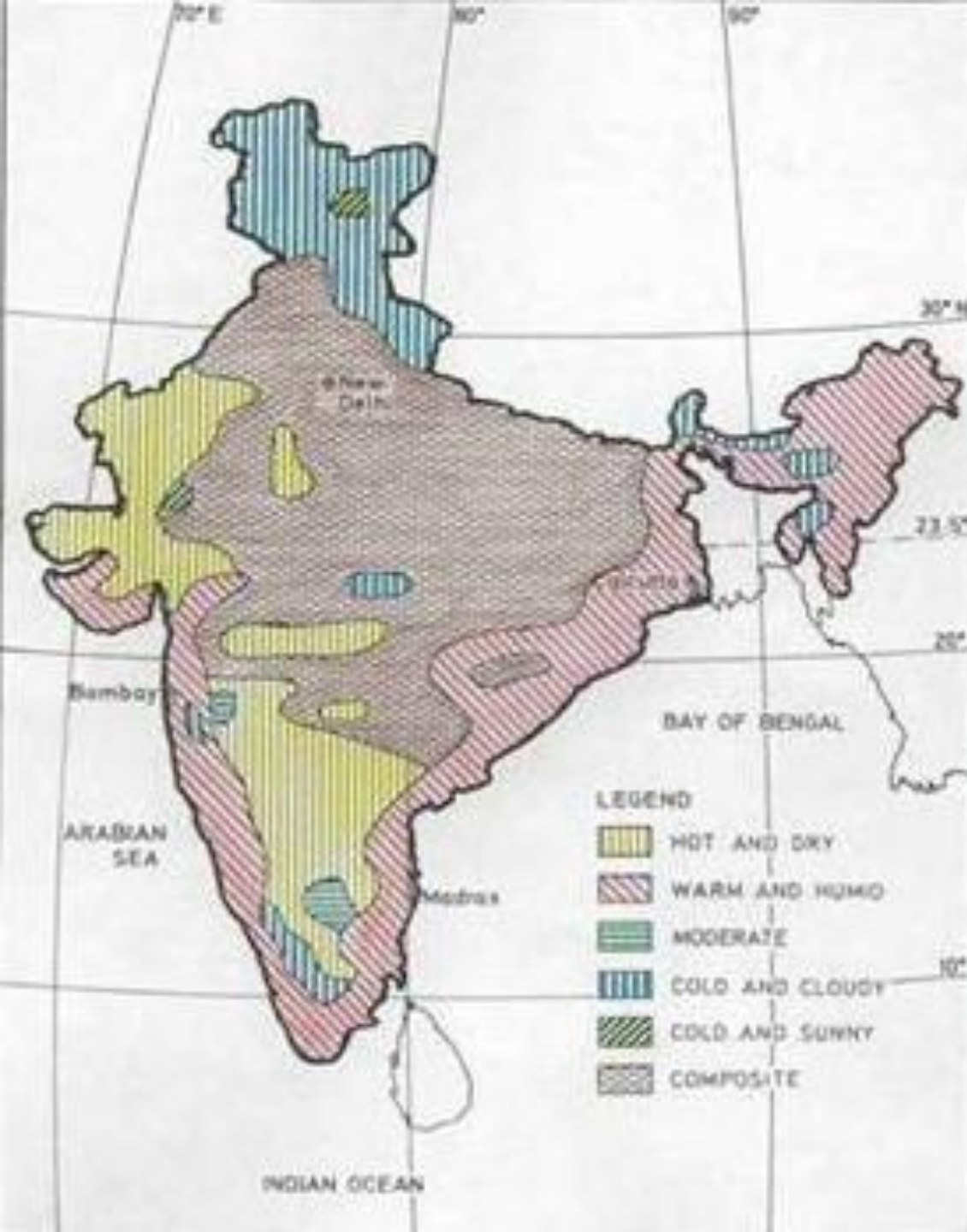
HAREDA, Panchkula



INFOSYS, Hyderabad



Versatile rating system



❑ Building types

- ❑ Commercial
- ❑ Residential
- ❑ Institutional
- ❑ Hospitals
- ❑ Hotels
- ❑ Any building as long as its not a factory building

❑ 5 climatic zones

- ❑ Hot – Dry
- ❑ Warm – Humid
- ❑ Composite
- ❑ Temperate
- ❑ Cold

HIRCO, Panvel Residential project



Suzlon OneEarth, Pune – 5 star GRIHA rated



Police Training School, Sangli – 4 star GRIHA rated



CESE, IIT Kanpur – 5 star TERI-GRIHA



GYS Vision, Gurgaon



Source: Morphogenesis

PCNTDA Headquarters, Pimpri-Chinhwad



Source: Landmark Design

Non-applicability clauses

incorporating COMMON SENSE in the rating...



Puts emphasis on Human Comfort

- since that's what buildings are designed for!









CESE building, IIT Kanpur



Suzlon OneEarth, Pune



INFOSYS, Hyderabad



**Evaluates against established energy efficiency
benchmarks for evaluating Air-Conditioned, Non Air-
Conditioned buildings as well as Hybrid buildings**

Climate Classification	Daytime occupancy EPI (kWh/m ² /annum) 5 days a week	24-hour occupancy EPI (kWh/m ² /annum) 7 days a week
Moderate	120	350
Composite/Warm & Humid/Hot & Dry	140	450
EPI for Residential Buildings		
Residential Buildings	200 (kWh/m ² /annum)	



Extensive hand holding during site visits



Conditions on site before GRIHA







EARTH
STOCK YARD







Conditions on site **after GRIHA**





















what about small scale construction?







And the cumulative impacts....



Source: <http://v23.lscache1.c.bigcache.googleapis.com/static.panoramio.com/photos/original/16384620.jpg>

SVAGRIHA

Simple

Versatile

Affordable



- Dedicated **design-cum-rating tool** designed for buildings with built-up area less than 2500 sqm.
- **14** criteria covering categories: landscape, energy, water & waste, materials and lifestyle

Sub-Group	Maximum points	Minimum points to be achieved
Landscape	6	3
Energy	21	11
Water & waste	11	6
Materials	8	4
Others	4	1

Points achieved	SVAGRIHA Rating
25-30	
31-35	
36-40	
41-45	
45-50	

Designed for architects



>> Rainwater Harvesting <<

Points Attempted Maximum Points

Calculate

3

4

1. *Rainwater Capturing*

Location	<input type="text" value="Bhopal"/>	Average Daily Rainfall (mm)	<div style="background-color: #ccc; padding: 5px; width: 100px;">21.9</div>
Building Type	<div style="border: 1px solid #ccc; padding: 2px;">Commercial</div> <div style="border: 1px solid #ccc; padding: 2px; background-color: #003366; color: white;">Residences</div> <div style="border: 1px solid #ccc; padding: 2px; background-color: #003366; color: white;">Commercial</div> <div style="border: 1px solid #ccc; padding: 2px;">Hostels</div> <div style="border: 1px solid #ccc; padding: 2px;">Hotels (upto 4 stars)</div> <div style="border: 1px solid #ccc; padding: 2px;">Hospitals (beds less than 100)</div> <div style="border: 1px solid #ccc; padding: 2px;">Restaurants</div>		
Total population size			
Total building water requirement over 2 days (litre)			
Surface Finish			
Conventional Roof	<input type="text" value="20"/>	Effective Rainfall (mm)	<div style="background-color: #ccc; padding: 5px; width: 100px;">416.1</div>
Roof Garden (200-500 mm thick)	<input type="text" value="2"/>		<div style="background-color: #ccc; padding: 5px; width: 100px;">8.76</div>
Concrete / Kota paving	<input type="text" value="1"/>		<div style="background-color: #ccc; padding: 5px; width: 100px;">20.805</div>
Gravel	<input type="text" value="2"/>		<div style="background-color: #ccc; padding: 5px; width: 100px;">32.85</div>
Brick Paving	<input type="text" value="10"/>		<div style="background-color: #ccc; padding: 5px; width: 100px;">186.15</div>
Total water collected from roof in 2 days (litre)			<div style="background-color: #ccc; padding: 5px; width: 100px;">664.665</div>
Size of the rainwater harvesting tank (litre)	<input type="text" value="550"/>		

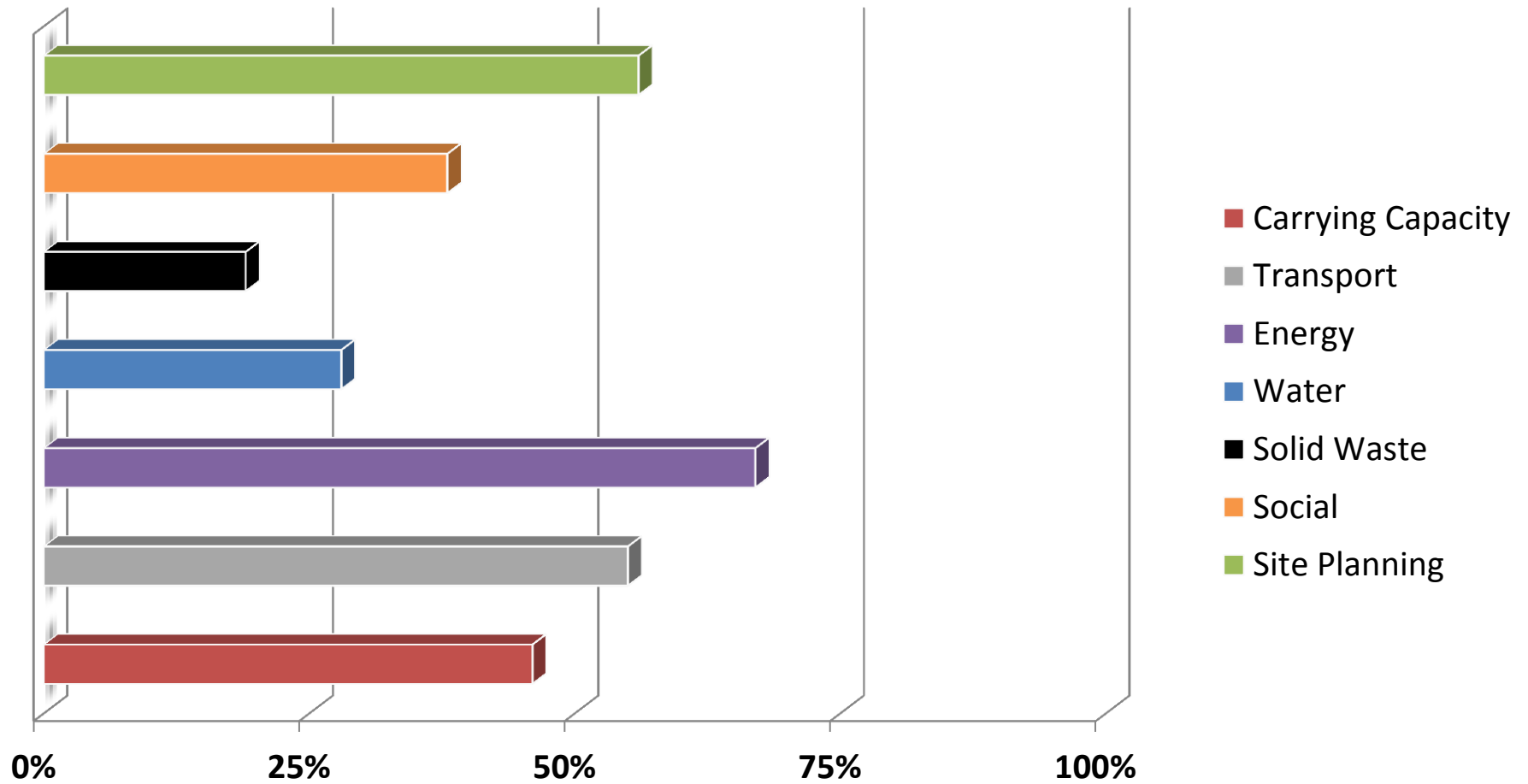


ZED Earth Villa, Bengaluru – 5 star SVAGRIHA

GRIHA LD

- Launching February 2013

Impact



Online portals and services



GRIHA website





Green Rating for Integrated Habitat Assessment

Bridging the gap between demand and supply of non-renewable and scarce resources through cost-effective interventions



GRIHA Version 3 announced for projects registering after 10 August 2012.

Welcome to GRIHA

GRIHA, an acronym for Green Rating for Integrated Habitat Assessment, is the National Rating System of India. GRIHA has been conceived by TERI and developed jointly with the Ministry of New and Renewable Energy, Government of India. It is a green building 'design evaluation system', and is suitable for all kinds of buildings in different climatic zones of the country.

ADaRSH, Association for Development and Research of Sustainable Habitats, is mandated to promote development of buildings and habitats in India through GRIHA. ADaRSH an independent platform for the interaction on scientific and administrative issues related to sustainable habitats in the Indian subcontinent. It was founded jointly by TERI (The Energy and Resources Institute, New Delhi) and MNRE (Ministry of New and Renewable Energy, Government of India) along with a handful of experts in the sustainability of built environment from across the country.

[Know more >>](#)

Member Zone

Already a member, please login

Username

Password

Sign In

[Forgot Password?](#)

[GRIHA feasibility tool for Self Assessment](#)

Interested in getting your building evaluated under GRIHA, [register](#) your expression of interest online or [download](#) the form.

National Conference on Green Design

Venue: Stein Auditorium, India Habitat Centre, New Delhi
Date: 14-15 February 2013

ADaRSH along with TERI and MNRE is organizing its flagship event the National Conference on Green Design 4th edition in New Delhi on 14-15 February 2013.

Photography and Documentary Competition

Last date of submission:
7 January 2013

Photography and Documentary Competition for undergraduate students of architecture, civil/mechanical/ electrical/ environmental engineering and film-making on the theme Sustainability in Lifestyle

Committed to Green Competition

Last date of submission:
7 January 2013

Committed to 'Green' - Competition for Green Developers of India. Open for Real Estate Developers, Builders, and Promoters of buildings and construction.

GRIHA Product Catalogue



Green Rating for Integrated Habitat Assessment

Bridging the gap between demand and supply of non-renewable and scarce resources through cost-effective interventions



- Home
- The Basics
- Rating System
- Registered Projects
- News and Events
- Resource Library

Product Catalogue

Criterion 17

Select a Typology

Criterion 17: ☐ Internal Partitions ☐ False Ceiling ☐ Flooring ☐ Inbuilt Furniture ☐ Panelling ☐ Doors & window: panels and frames ☐ Low-energy glass for interior applications



3 product(s)



AGV - 1150 S/D,
1050 S/D,
1137 SW/DW,
3083 SW/DW

Criteria Applicable:
GRIHA: 17
SVAGRIHA: 12

Product Topology:
Doors & window:
panels and frames



AGV - 1150 S/D,
1050 S/D,
1137 SW/DW,
3083 SW/DW

Criteria Applicable:
GRIHA: 17
SVAGRIHA: 12

Product Topology:
Doors & window:
panels and frames



AGV- 2100 S/D,
2065, 2101,
4083 SW/DW

Criteria Applicable:
GRIHA: 17
SVAGRIHA: 12

Product Topology:
Doors & window:
panels and frames

Address

VILLAGE RAMPUR JATTAN, BEHIND KALA
AMB, INDUSTRIAL AREA P.O, KALA AMB,
Dist. Sirmour – 173030 (HP)

Contact Number(s)

9310068401

Email-ID(s)

_____.@gmail.com

GRIHA documentation portal



GRIHA Evaluation Tool

Using the Tool | Ask Us



Welcome GRCL0034(Project Code: 11GR0034)

Logout

GRIHA Home



Home



Project Details



Add Consultants



Document
Manager



Project
Document



Project
Feedback

Project Name: Dummy test
Project Code: 11GR0034
Status: Pending at Client's level

[Home](#) » Project Details

Site specific criterias

Criteria Status

Action

Saved : 1

Pending : 8

[View Summary](#)

[View Criteria](#)

Building(s) specific criterias

Building no

Building name

Building Type

Area (Sq. m.)

Criteria Status

Action

1

Fghfgh

Commercial

60000

Pending : 6

[View Summary](#)

[View Criteria](#)

[Submit Project to GRIHA](#)

Last Activity In Your Project(s)

Dummy test (11GR0034)

Criteria Attempted

by Dummy client (grcl0034).

06:12:2012

Criteria Saved

by Dummy client (grcl0034).

06:12:2012

Next online tools

- **SVAGRIHA online tool**
- **GRIHA LD online tool**

Individual choices, social impacts



Eagle



Thank You

Apoorv Vij

Programme Officer & Associate Fellow

Association for Development and Research of Sustainable Habitats

apoorv.vij@grihaindia.org

