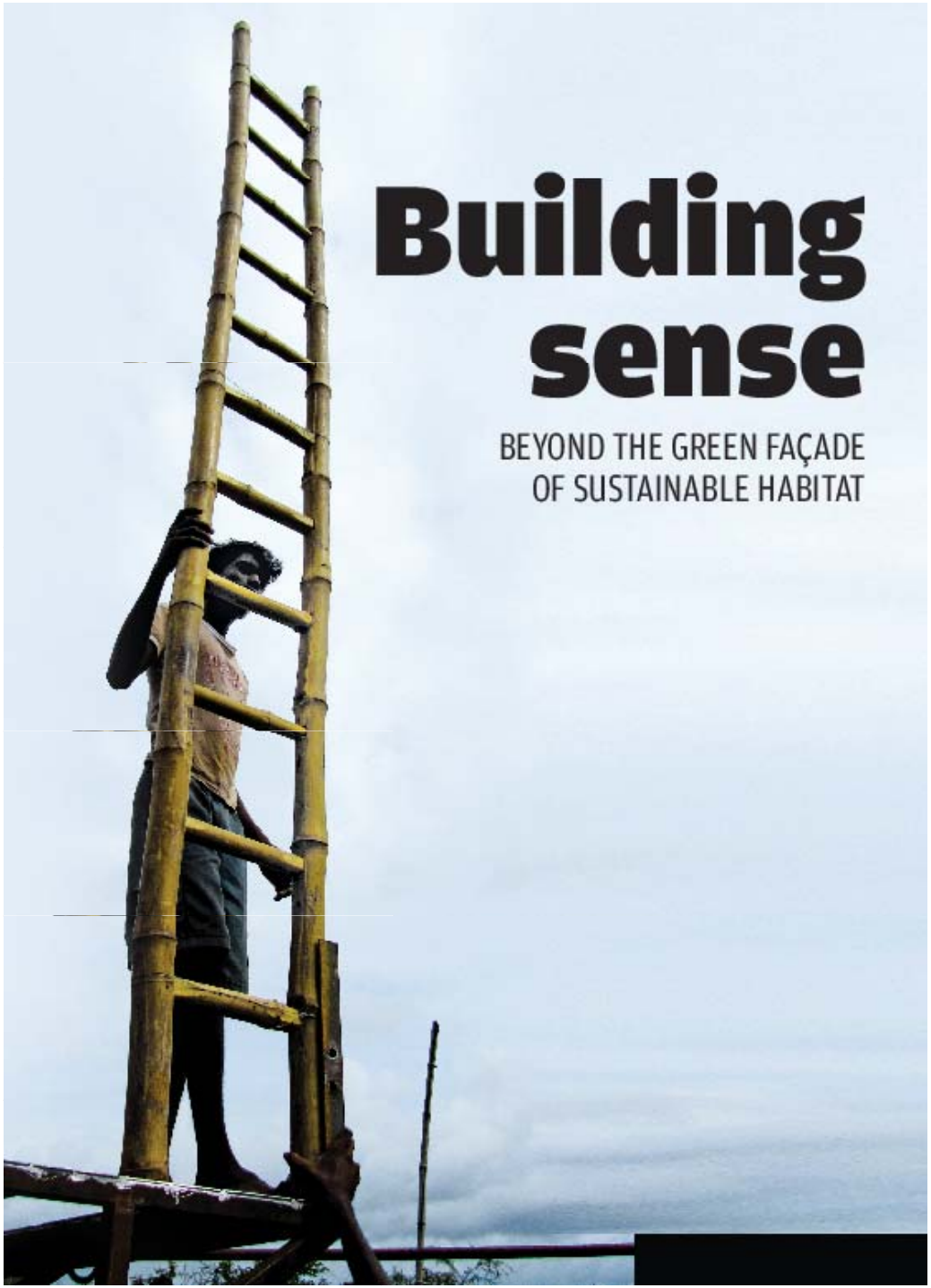
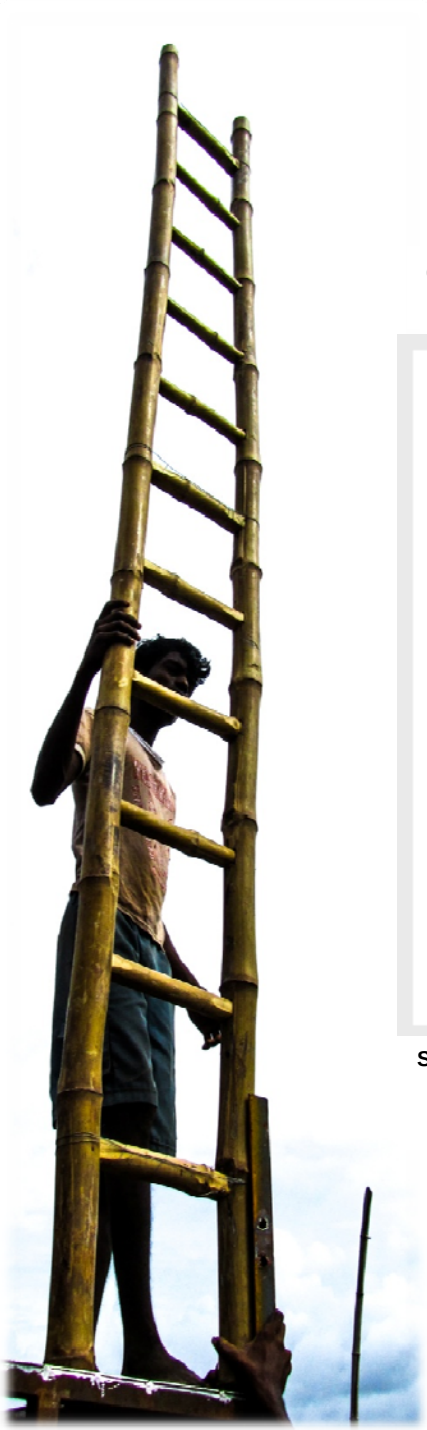


Why green buildings?

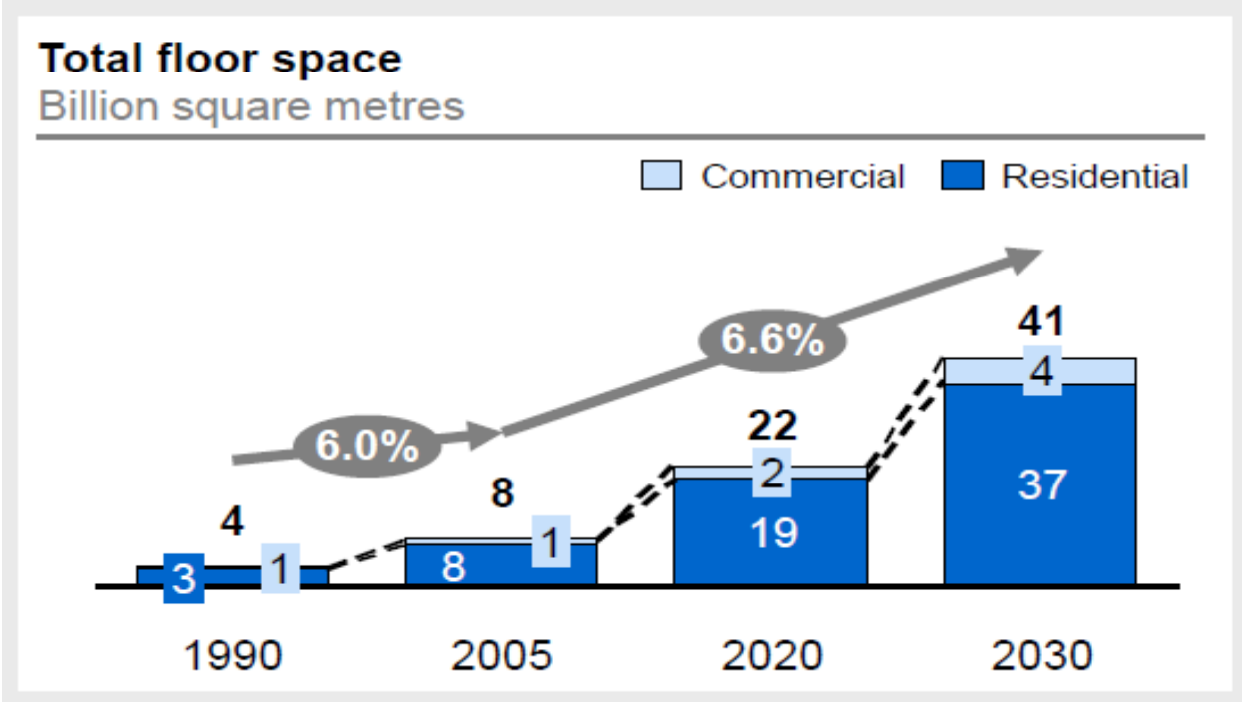
Conclave of Green Architecture
Centre for Science and Environment

New Delhi, September 22-23, 2014,



Building construction: explosive

Graph 5: Explosive growth of building stock in India



Source: Environment and energy sustainability: An approach for India, McKinsey & Company

Explosive trend-- About 60% of building stock of 2030 yet to be built. In contrast, 70-80 per cent of the future stock in the US and UK already built. In France, buildings constructed before 1975 thermal regulations will represent over 50% of the building stock in 2050

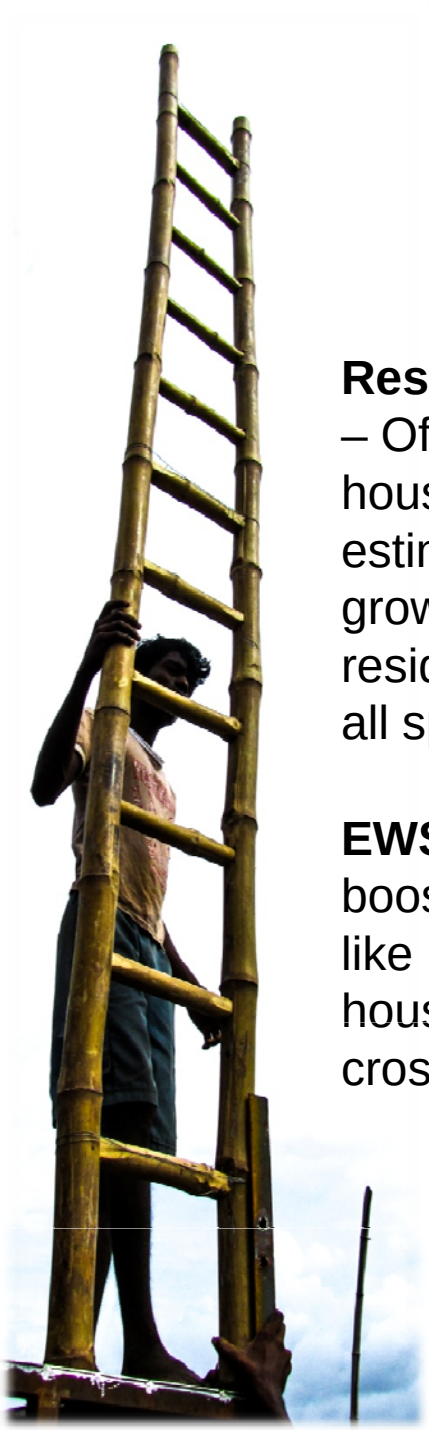
Lifestyle pressure amidst poverty

Middle class growing rapidly:

- The 2010 McKinsey study: the seeker class (with household income of 200,000 – 500,000 per annum) is expected to be half of all urban households by 2025. About 16% households fall in mid-high to rich income class. (Jones Lange 2010)

- Cities will see more concentrated buying power, transformation of lifestyle and aspiration for high end resource intensive comfort level.

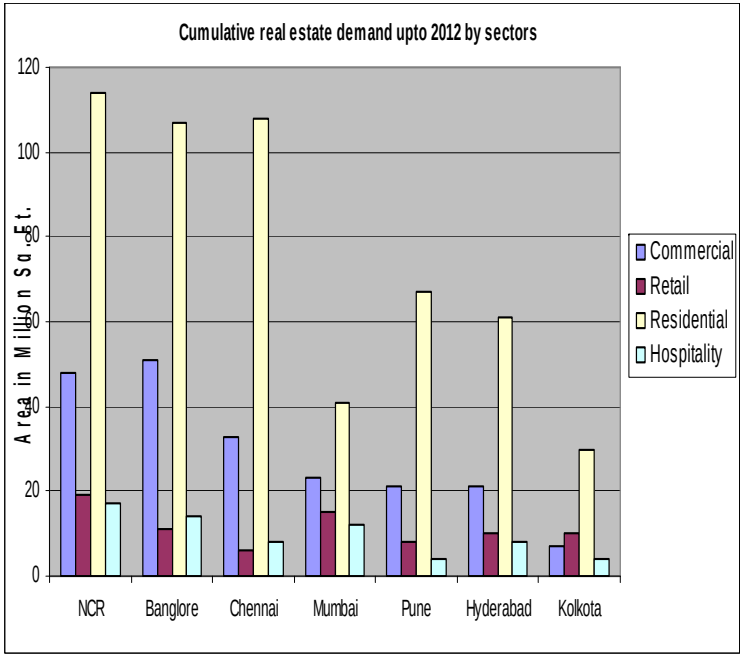
- **Urban poverty remains high:**
- Nearly 21% of urban population -- but 40% to half in Delhi and Mumbai in slums…... All low income groups are not necessarily in the slums.
- 75% of the urban population in the bottom rung of income level – Rs 80/day (USD 1.8). (Mckinsey 2010)
- 19% households cannot afford any housing (Jones Lange 2010)



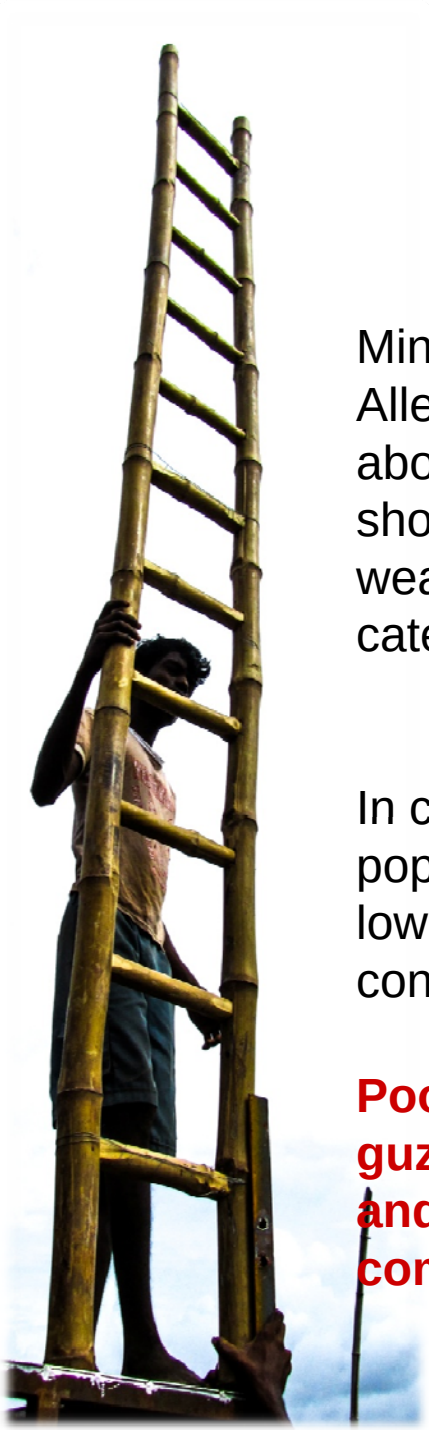
Clamour for homes

Residential space: Enormous deficit – Official estimate for affordable housing 18.6 million units; Unofficial estimate – 40 million! Demand growing at 10% annually. Demand for residential space dominate at 63% of all spaces

EWS and LIG: RAY – policies to boost affordable housing – mandate like 15-25% of developed land in all housing projects for EWS/LIG with cross-subsidization or extra FSI etc.



Source Anon, 2008, The metamorphosis, changing dynamics of Indian realty sector,
Cushman & Wakefield, May

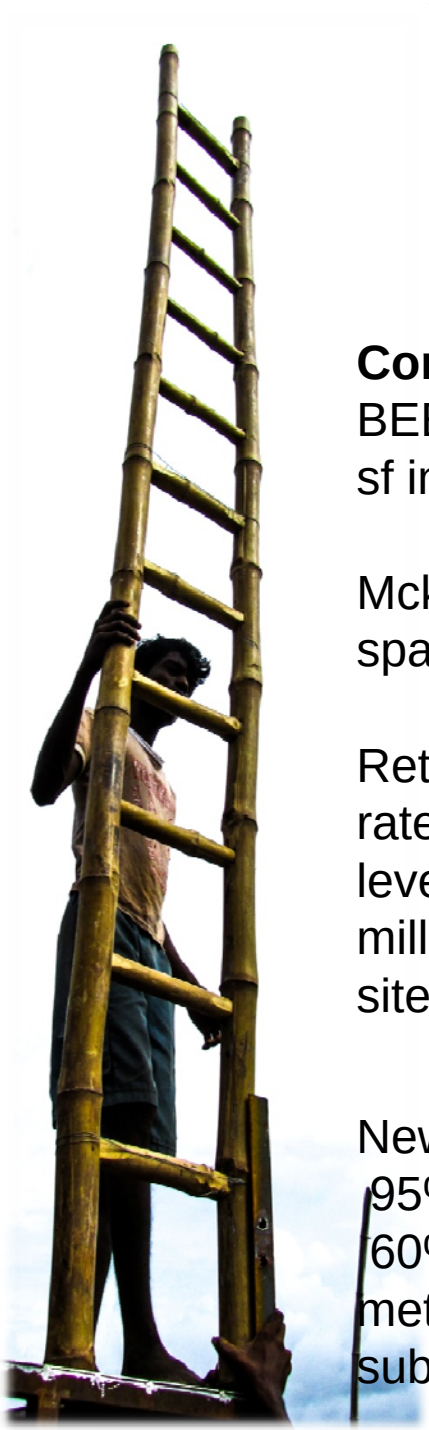


Homes for poor

Ministry of Housing and Urban Poverty Alleviation (MoHUPA) estimates that about 95 per cent of the housing shortage is relates to economically weaker sections and low income category.

In cities with more than a million population more than 40 per cent of the low income groups live in self constructed homes

Poor persons home are not energy guzzlers. But need design innovation and habitat management to improve comfort and liveability……



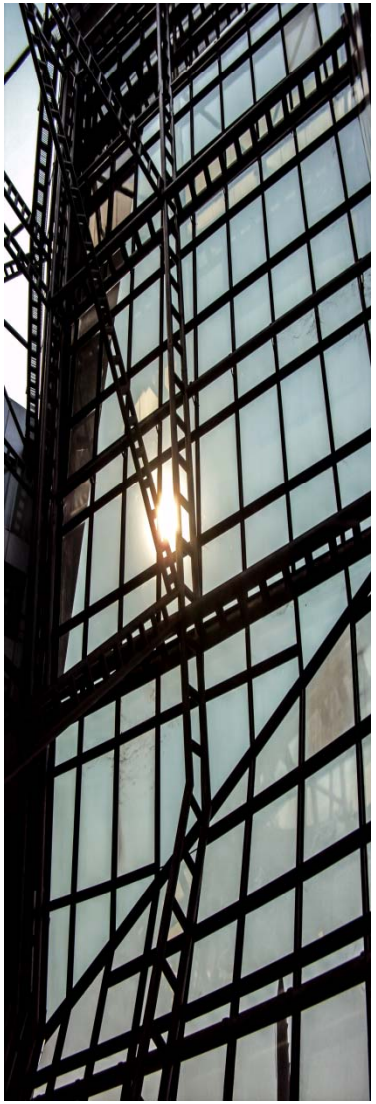
Offices and retail

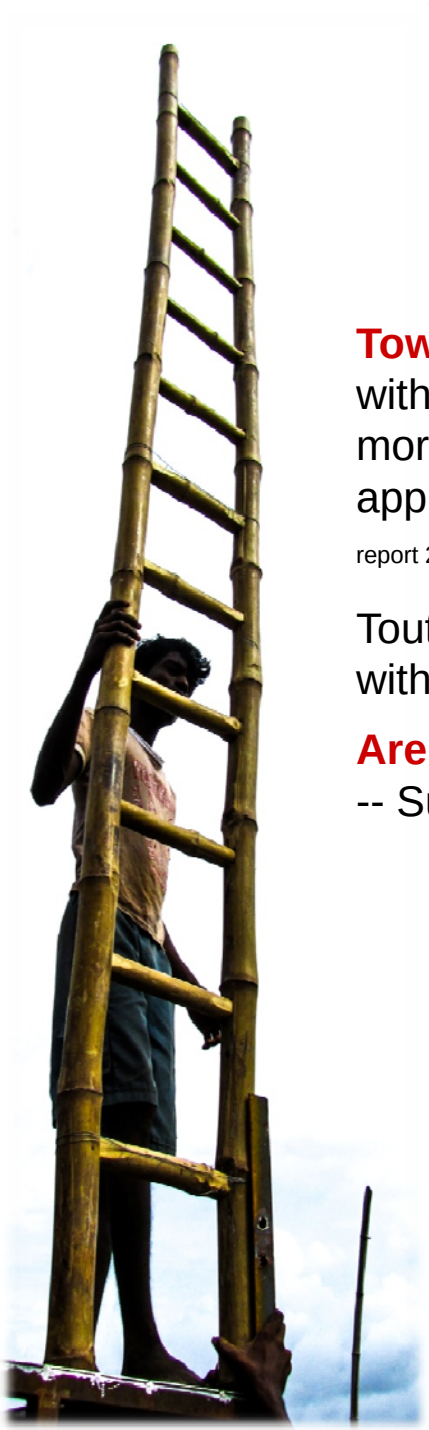
Commercial floor space to increase 5-6% a year: BEE estimates apace of shopping malls at 79 million sf in 257 urban centers in 15 largest cities of India

Mckinsey estimates four fold increase in commercial space between 2009 and 2030

Retail and hospitality sector to see very rapid growth rate – CAGR 8-9%. By 2030 it will be 7-11 times the level of 2009. In the 15 largest cities of India 7.3 million sq m of space is expected to come up as sites for shopping mall.

New growth in suburbs -- resource conflict areas
95% of new residential projects in suburbs
60% of operational office spaces in suburbs around metro cities. More than half of retail spaces in suburbs (J Lange)





Town building mania

Town boom: Private integrated townships with area of 40 ha to 400 ha each and more than 200 townships planned, under approval and construction. (IDFC's India Infrastructure report 2009) -- especially around the metros.

Touted as Walk to Work Green Towns – without green benchmark

Are there smart guidelines for them to

-- Support sustainable infrastructure

- -- Public transport connectivity
- -- Metered water and electricity supply
- -- Decentralized waste water management
- -- Decentralized, sustainable energy management
- -- Increase permissible density especially in areas with infrastructure.
- -- Higher density along transport corridors

Who will build and share responsibility?

Government to focus on EWS and LIG

Middle and high income housing: More private players. Eg. CREDAI - association cover 80% of the real estate development in 13 states.

Real estate industry will have significant influence on the technology trajectory and building design

Self constructed housing for the poor: Institute of Urbanology estimates -- between 1997 and 2002 – the government and builders built 500,000 houses in urban India but people built 8.5 million units in informal settlement

Green worries?.....

Cities face challenge of providing higher levels of comforts to people in resource efficient ways.

Buildings are responsible for 40 per cent of energy use; 30 per cent of raw material use; 20 per cent water use; and 20 per cent land use.

But they cause 40 per cent of carbon emissions, 30 per cent of solid waste generation; and 20 per cent of water effluents. Their repairs and demolition also cause enormous debris

Regulations taking shape to lower the threshold level of water and energy requirements and minimize waste while improving comfort levels.

This is new area of governance… there are many challenges…

Green norms – if not crafted well – can lead to unintended consequences…..

Emerging policy opportunities…..

Integrated Energy Policy 2006: Demand side management in buildings. NBC should be amended to facilitate efficient buildings Publicise innovative approaches. Make energy audits compulsory for all load above 1 MW. Initiate benchmarking; Amend building byelaws to enable solar water heaters

ECBC: Sets minimum energy performance standards. Has legal back up from the Energy Conservation Act; Voluntary, to become mandatory

Star rating of buildings and appliances

National Habitat Standard Mission: Acknowledges Building energy consumption increasing from a low of 14% in 1970 to 33% in 2004-05. That mandatory ECBC can save 1.7 billion units of electricity per year….

National Habitat Standards: In the making to guide action in cities

National building code adding a chapter on sustainability

Environment Impact Assessment (EIA)……

Nascent first steps in cities….
Eg. First generation action in Delhi

Initiated and proposed

-- Cool roof programme initiated

-- Implementation of ECBC in government buildings

-- Revision of master plan to include green measures

-- Enhanced Energy Efficiency Mission to retrofit 100 existing buildings with area above 10,000 sq ft

-- Delhi secretariat to be converted into a green building. About 15 more government buildings identified

-- Solar water heater system mandatory in industries, hotels, hospitals, nursing homes, and residential buildings with 500 sq meter area. Subsidy for purchase of solar water heater etc

-- Proposal for a solar city in the NDMC area etc

Change the practice……

-- Scalability: Not to have a small number of high performance sustainable buildings, but to raise the sustainability of the entire stock of buildings in active use.

-- Effective reduction in new stock: Ensure much larger aggregate savings. Need low cost energy saving measures. Do not lock-in resource guzzling by design

-- **Retrofit change -- existing stock**

-- Improve performance of appliances to maximise savings.

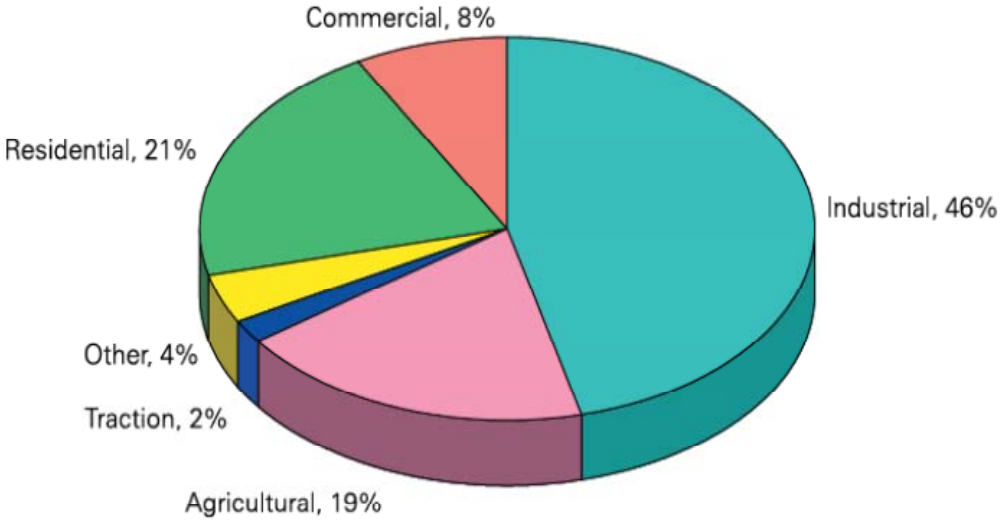
-- India has a large stock of very low-energy homes: Leverage this for better energy targets.

Challenge of bringing all interventions under one unified regulations. This requires more harmonized action

Energy prudence….

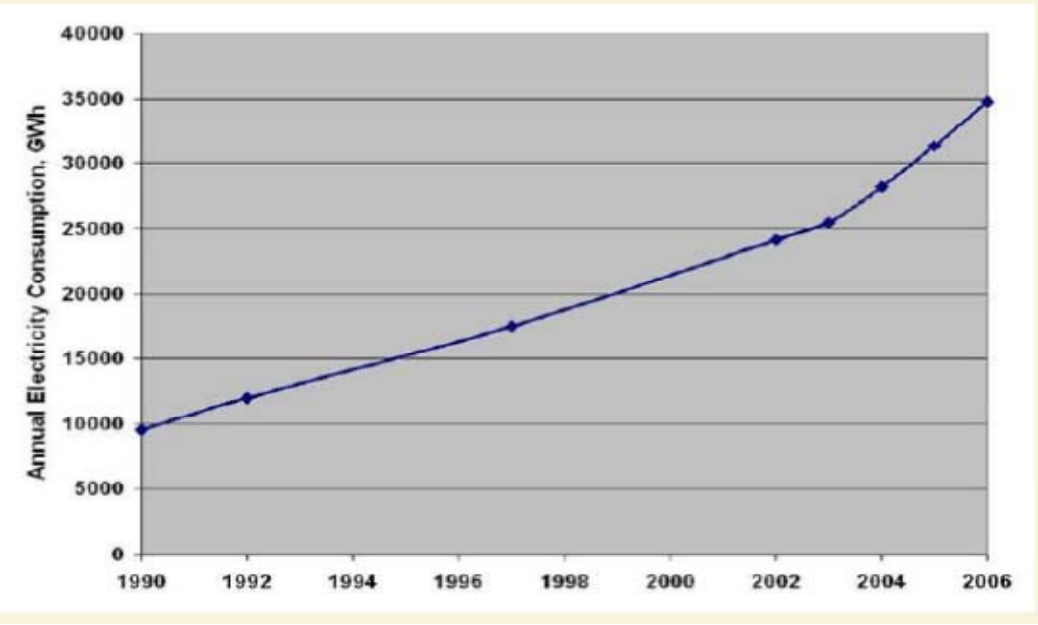
Expectation of personal comfort to change significantly….

Notion of comfort to alter design and use buildings.
NBC defines thermal comfort in tropical India – as somewhere between 25 degree C and 30 degree C with the optimum condition at 27 degree C.
Mechanical cooling and heating technologies that artificially control temperature and humidity inside buildings will change this significantly.
Energy budget is already upset with only three percent air conditioner penetration in urban households.
In air conditioned building operation and use of buildings use up maximum energy – as much as 84% of total energy use in buildings. (2010 World Business Council for Sustainable development estimates) In non-air conditioned buildings material take the largest share.
Regulations focus on electricity efficiency and not energy efficiency.



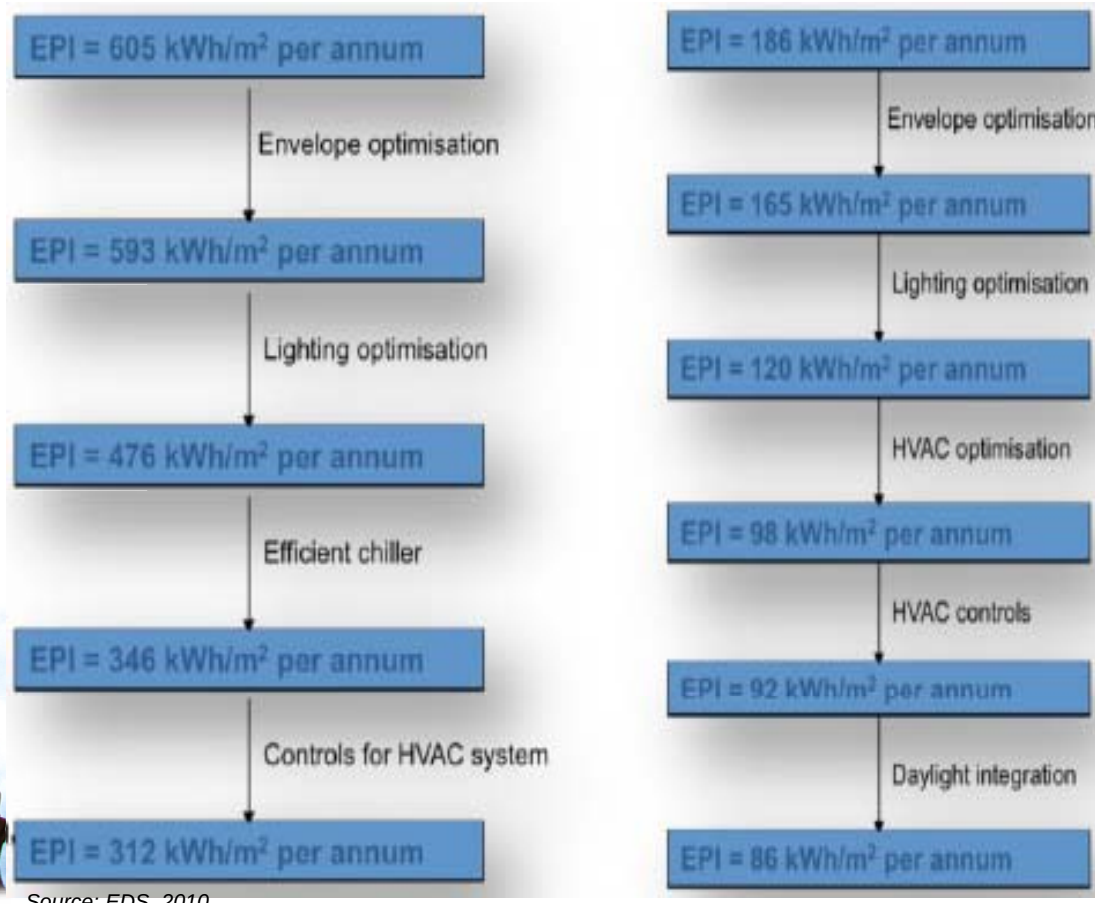
Residential sector consume nearly the highest

Electricity Use in the Commercial Sector is exploding. climatic zone-wise and building-use-wise



Building code: A beginning

Impact of energy efficiency measures on the EPI of commercial buildings (office and hospital buildings)



Source: EDS, 2010

Energy Conservation Building Code – for five climatic zones

The energy audits of buildings by the BEE shows that existing buildings have 30 to 50 percent energy savings potential.

A shot in the dark…….
What is ECBC targeting to achieve?

According to BEE:

An average commercial building in India has electricity consumption of 180-200 EPI. ECBC compliance can bring this down by 20 to 25 per cent. An ECBC compliant building will be 3-star on BEE's building star rating scale.

But not supported by survey or monitoring. There is no data on record of number of buildings that have voluntarily implemented ECBC.

Buildings rated by IGBC and GRIHA green building rating systems claim to comply with ECBC but neither of the agencies have shared performance data with BEE.

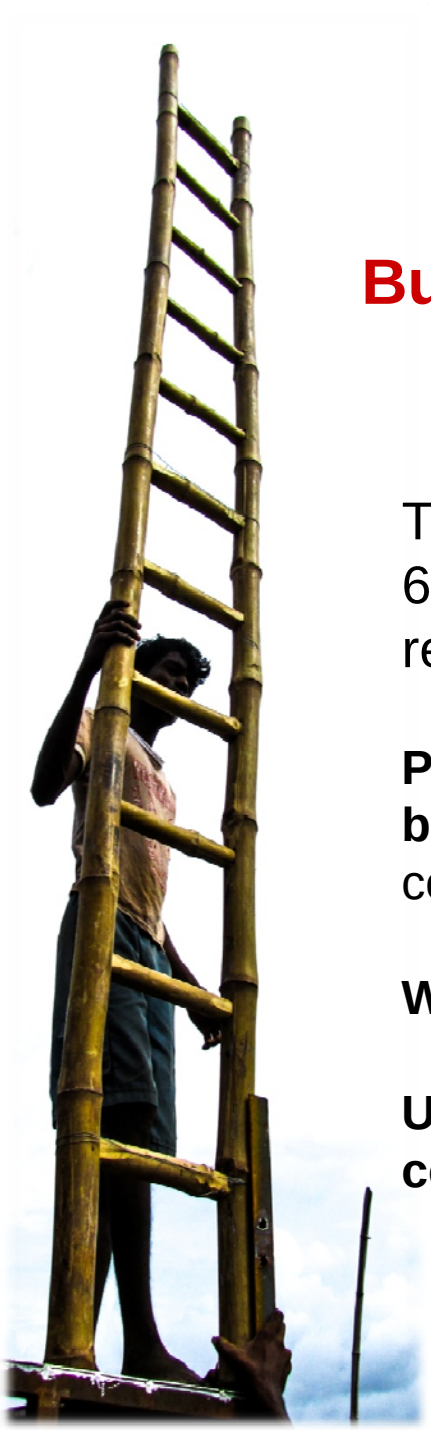
Challenge of the AC paradigm…..

ECBC standards are designed assuming that 100% of India's commercial building stock will be fully air conditioned requiring both cooling and heating.

Code sets norms for level of heat transfer through the building envelop; Sets energy performance standards for heating, cooling etc

High performance buildings will require good insulation. Poorly insulated buildings severely affect the efficiency of air conditioning units, cause high energy losses.

Needs high performance insulation products: Code has fixed high insulating capability norm to ensure rapid uptake of high performance insulating material in air conditioned buildings.



But why should we assume 100% AC?

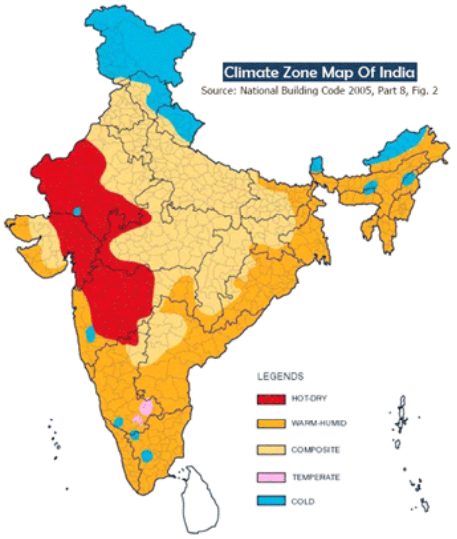
The commercial floor space is forecasted to become only 60% air conditioned by 2030 (McKinsey). Most of our residential buildings are not air conditioned.

Prescriptive requirements are relevant only for air conditioned building. Therefore, mandates performance of individual components

Whole building performance method allows flexibility. **But….**

Under ECBC it is not possible to simulate partially or completely unconditioned spaces in buildings or buildings

What is this paradigm? Five climatic zone and yet climate insensitive…..



Chandigarh

Mumbai

Kolkatta

Gurgaon

Noida

Chennai

Bangalore

Where does this belong?

Where does this belong?

Shillong

Gauhwati

Gauhwati

Agartala

Northeast!!!!…

Dazzled by Glass .....

Uses.... sense of open space. Allows natural light. Keeps dust away…Reduces the need for artificial light; aesthetics etc

But…… Traps heat… the principle of greenhouse. Increase energy use for cooling.

Why so much glass in tropical climate of India that needs to control heat gain and high glare.
Eg. Delhi receives 2,688 hours of sunlight annually London only 1,480 hours.

Glass environmentally harmful. Unsafe, fire hazard

Yet… legal sanction for very high usage of glass……..

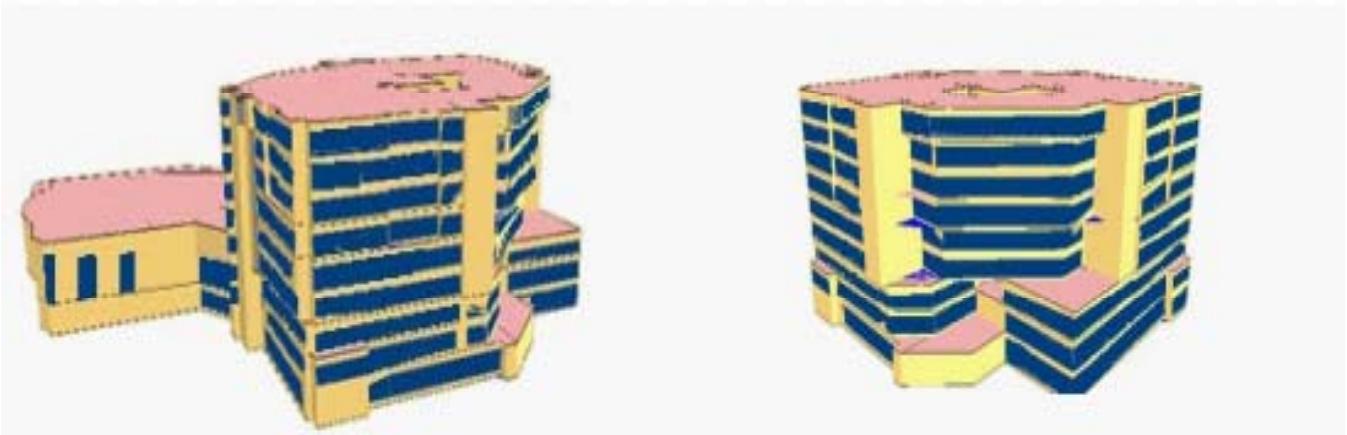
Ask why?

Anna Centenary Library Building

Air tight glass building in hot and humid climate of Chennai

Why?.....?

Ask why?



Electrical Use Summary

Alternative	Lights	Equipment	Cooling	Tower/Heat Reject.	Pumps/Aux.	Fans	Total
Electrical End-use Totals (kWh)							
Base Case	2,243,820	132,491	1,401,766	471,594	45,991	315,098	4,610,760
Proposed Case	1,141,850	132,491	1,801,046	0	26,631	201,021	3,303,039
Incremental Electrical Savings (kWh)			(compared with previous alternative, negative savings represent increases)				
Proposed Case	1,101,970	0	-399,280	471,594	19,360	114,077	1,307,721

-399,280 kWh

Source: LEAD Consultancy & Engineering Services (India) Private Limited (LCES)

Even the consultant point out in their report the power consumed for cooling the building is more than a conventional building.

Why so much glass?

Ignoring local wisdom


Dakshinachitra

Chettinad Houses of Tamil Nadu

For hot-humid climate

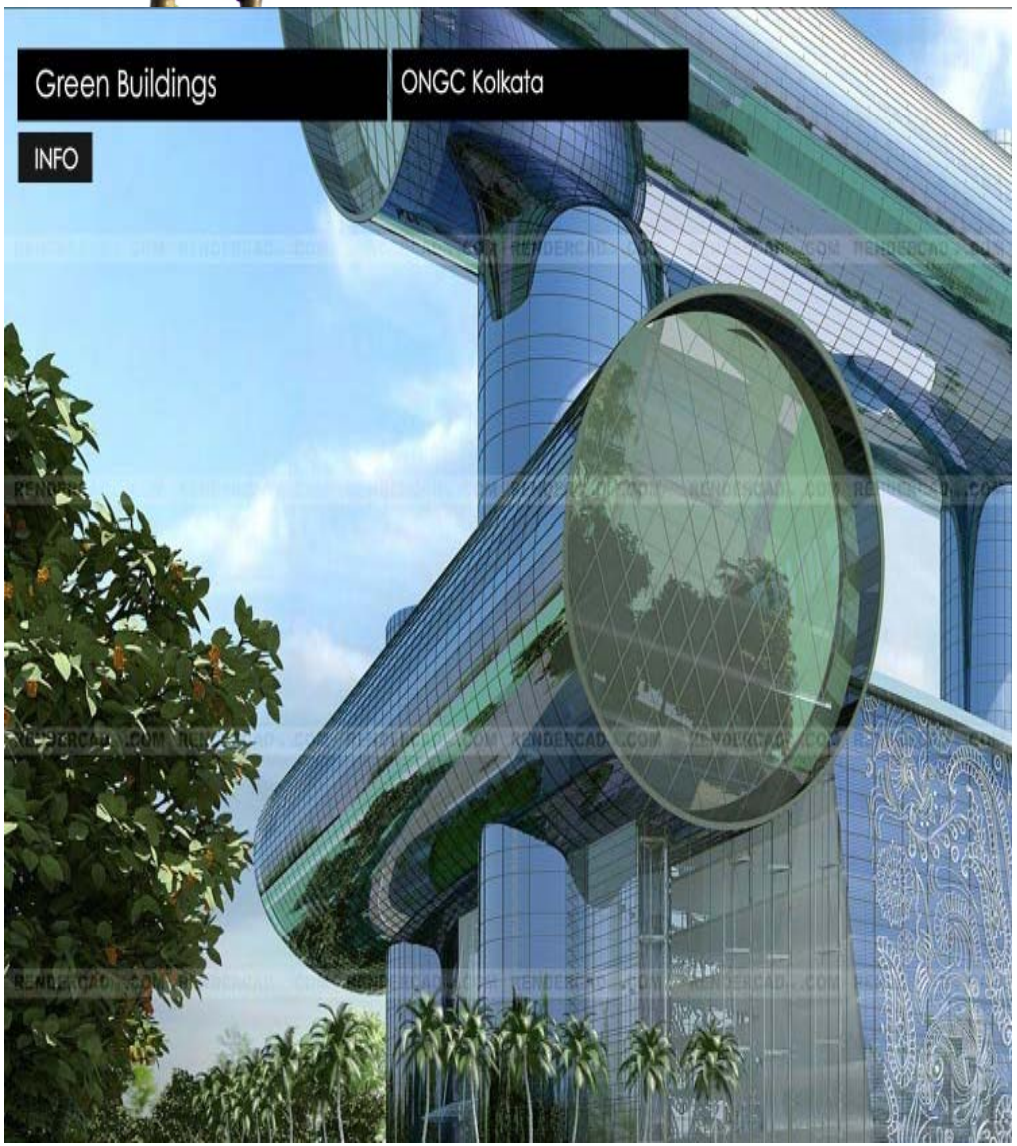
SOLAR ACCESS: Solar radiation is helpful in January and February. Other months -- only wind can give comfort.

VENTILATION -- A deep arcaded area is a transition space ….Provide shade and also ventilation

Allow summer breezes to ventilate and cool…... Windows designed to provide shade from south sun but allow southern breezes.

Need local science for strong modern identity

Ask why?



Air tight glass building in hot and humid climate

Why?.....?

ONGC Green Building
AA II, New Town Kolkata

Eastern region's own wisdom

Courtyard Houses in East

For hot-humid climate of the region

SOLAR ACCESS: Solar radiation is helpful in January and February. Other months -- only wind can give comfort.

VENTILATION -- A deep arcaded area is a transition space ….Provide shade and also ventilation

Allow summer breezes to ventilate and cool…... Windows designed to provide shade from south sun but allow southern breezes. (Source N Das)

Need local science for strong modern identity

Tell why?

Kolkata Museum of Modern Art
(Herzog & de Meuron)

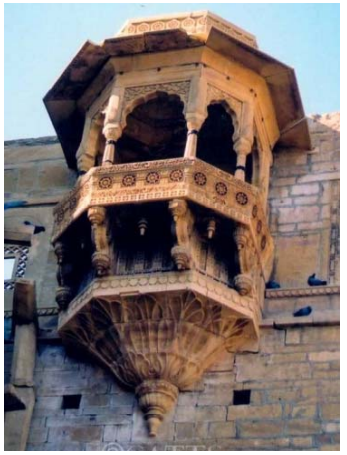
It provides the logic……..

"-- Kolkata has a tropical wet and dry climate, experiencing hot and humid summers and high levels of precipitation……

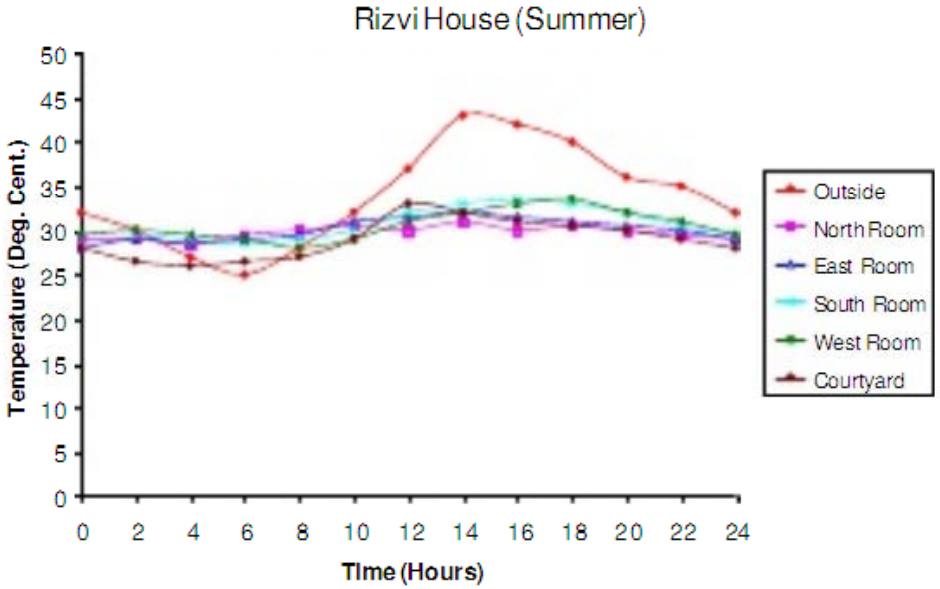
-- This uses **passive methods** where feasible **to control the climate in and around the building**,

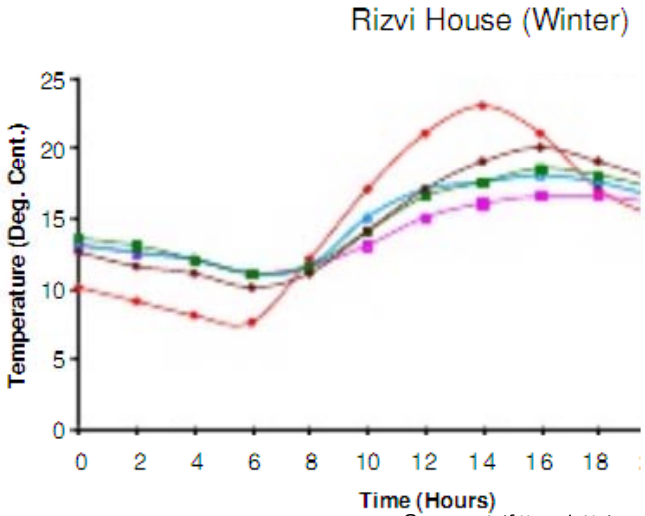
-- The urban scale spaces are shaded and **offer natural cross ventilation through careful planning**….
etc……"

Rizvi house Lucknow



-NE-SW orientation. -Openings and the entrance windward side-Absence of the openings on exterior surfaces facing southeast and southwest.-Main entrance opens into the narrow shaded street inducing cool air from the street.
-Courtyard with shaded spaces and ventilation. -Projection of the courtyard provides shade -The *jharokhas* catch wind and allow air circulation. -Massive walls and heavy roofs offer greater thermal resistance and increase the time lag. Etc etc





Source: Arif Kamal, Najamuddin. 2011

Need focus on total energy performance ….

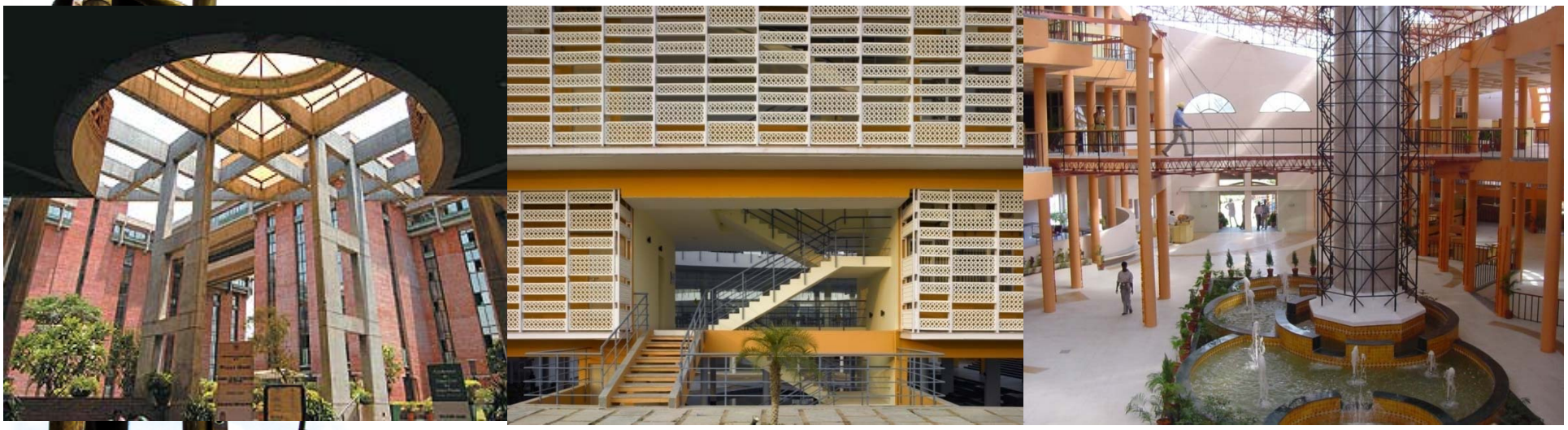
System approach for thermal comfort -- using natural and passive cooling methods. – orientation, sun shades, ventilation, insulation for cool and comfortable structures. Ceiling fans for low energy cooling

Creative passive cooling designs and methods. to reduce to solar heat gain. Innovative/alternative designs -- filler slabs, double roofs, cavity/filler walls, composite walls, shading and many others.

Let many methods and material bloom: autoclaved aerated concrete (AAC) blocks, hollow blocks, thermocrete or other building materials with inherent higher R-values can also improve buildings' insulation….. etc

Balance high cost with low cost technology

Drawing lessons from our local wisdom



Create opportunities for – more creative use of building orientation, positioning of interior spaces according to direction, variation in glazed area according to orientation of façade, combination of appropriate building material etc

Model building design that helps save energy and money by leveraging Sun's movement

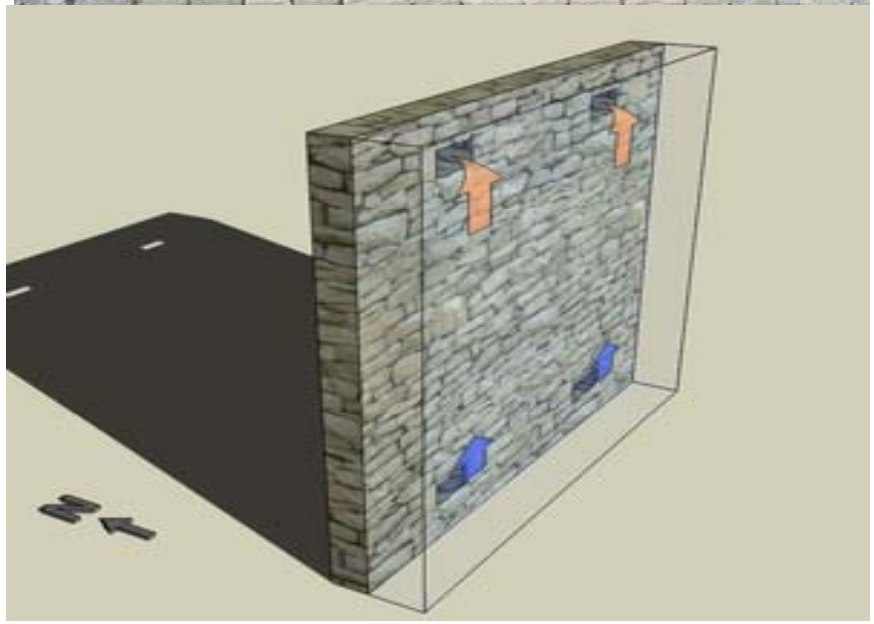
Shell roof and the 25 kWp solar photovoltaic plant

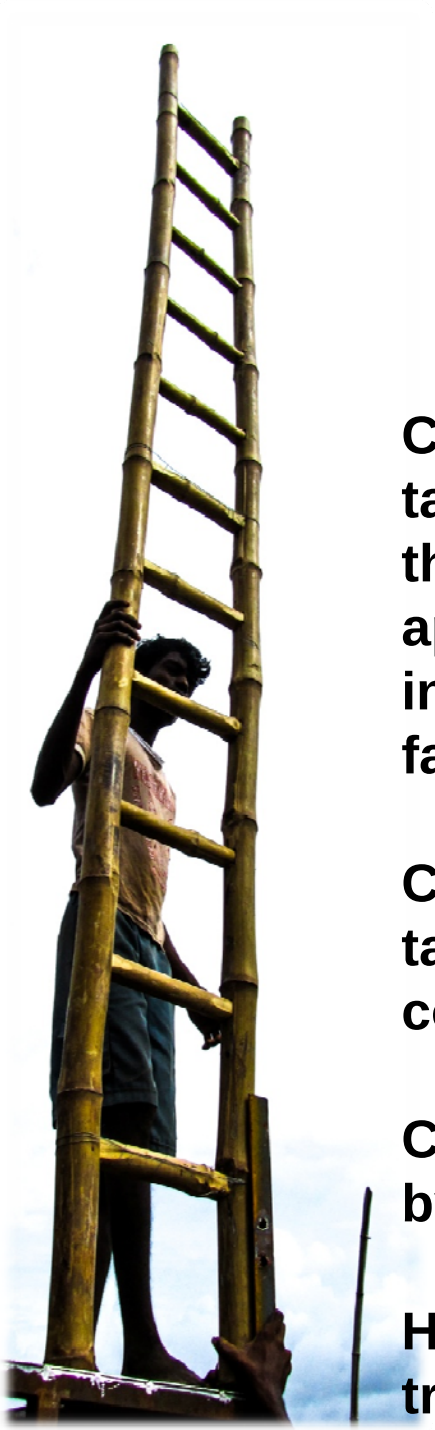
Solutions for cold desert

LE DeG Trainees' Hostel: Architect: Sanjay Prakash and Associates

Traditional materials and methods modified and adapted for energy efficiency.
South exposure with no overhangs for maximum winter gains. Entrance lobby designed as solarium on south side. Bedrooms with Trombe walls for direct heat gain and for passive heating. **Result: Temp inside sleeping room above 8 degree C when outside temp was - 17 degree C in moderate winter**

The south façade with Trombe walls caters to heating needs of the rooms





ECBC cannot work in isolation. Policy question -- Can we have energy performance targets?

Can all/large new buildings have energy performance targets? Otherwise ECBC approach of "design better than the unique base model which is worse" approach can shift market towards higher energy intensities. It is possible to be compliant at a level far worse than the national average EPI…….

Can targeted buildings be energy positive by a targeted date, -- generate more energy than they consume?

Can existing buildings reduce energy consumption by certain percentage by a targeted date?

How will ECBC help to make the second phase of transition?

TABLE 1: ELECTRICITY CONSUMPTION INTENSITIES BY END USE FOR COMMERCIAL BUILDINGS IN USA, 2003

The US is setting holistic targets for overall energy reduction from the sector

Building type	National average EPI (kWh/sq m/year)
Office	186
Public assembly	134
Public order and safety	165
Religious worship	52
Service	118
Warehouse and storage	82
Other	242
Vacant	26
Education	119
Food sales	532
Food service	413
Health care	247
Inpatient	296
Outpatient	174
Lodging	145
Mercantile	207
Retail (other than malls)	154
Enclosed and strip malls	240

Note: 1,000 Btu / square foot = 3.1546 kWh / sq m
Source: Energy Information Administration 2003, *Commercial Buildings Energy Consumption Survey: Energy End-Use Consumption Tables,* released in September 2008

Global learning curve…..

Other governments are working with clear targets for the sector to guide action.

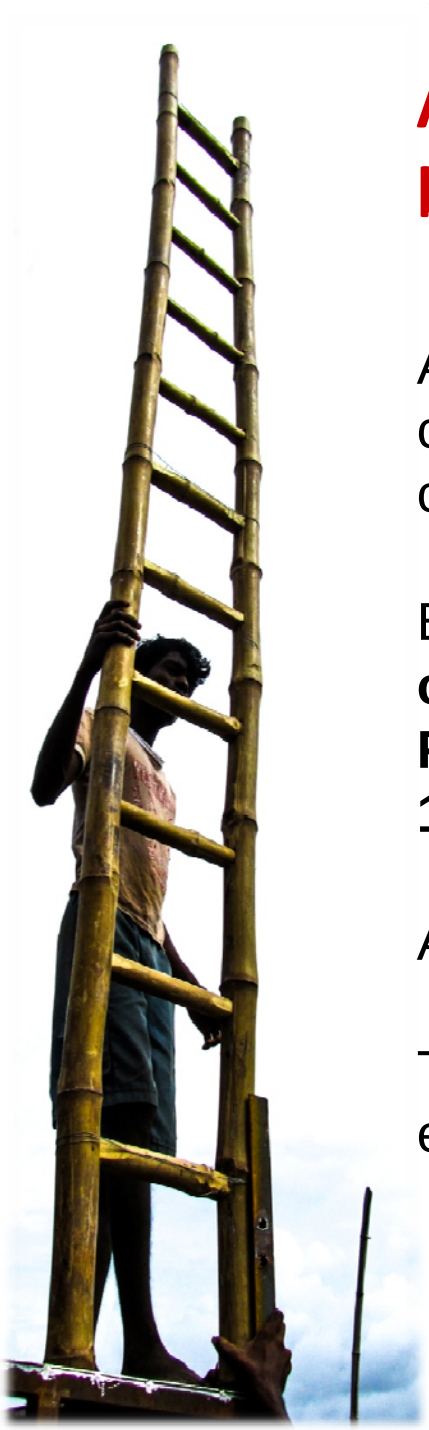
The US: Energy Independence and Security Act requires all new and renovated buildings to reduce energy consumption by 55 per cent from 2005 baseline. All new commercial buildings to be zero net energy by 2025 and existing by 2050.

Legally binding benchmarking and discloser of annual enegy and water consumption data to public (Austin, Washington, San Francisco, Boston)

Average level of electricity consumption has been developed for different building typologies. Without it the average baseline for the nation will continue to worsen overtime.

Several European cities and the state of Massachusettes Green Communties Act in the US – **Require communities to establish their benchmarking baseline and use it as a starting point for a five year plan to reduce energy use by 20 per cent by 2020 to qualify for state funding for energy projects.**

Appliances and behaviour ……..



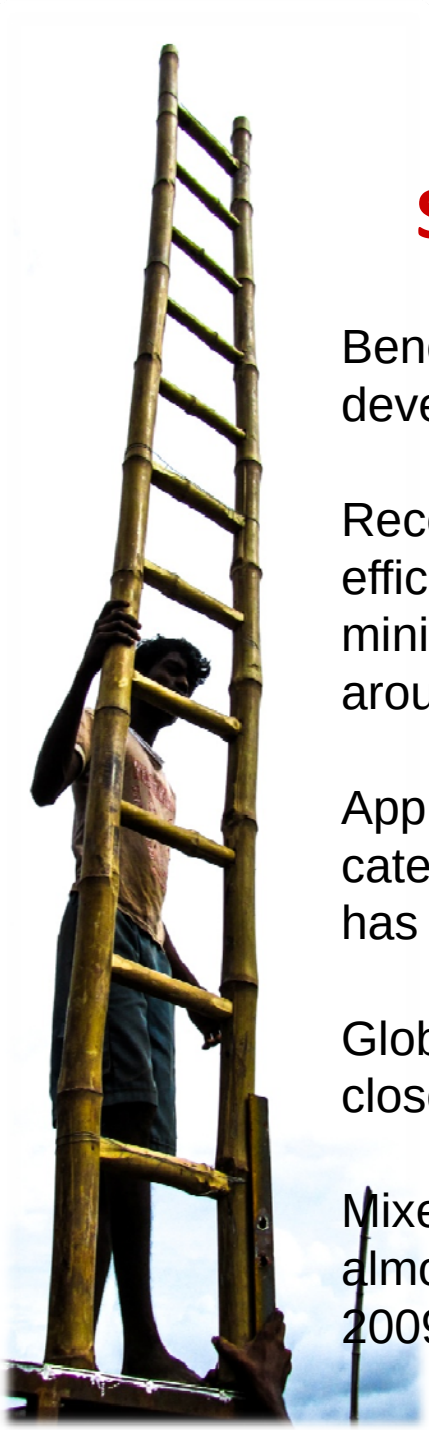
Appliance will drive energy budget of households

Appliance penetration in Indian households is comparatively lower than the global scale. This will change dramatically.

BEE – **Lighting and AC use up 80% of the energy in a commercial building.**
Fans use up 34%, lighting 28%, and refrigerators 13%of the total electricity in a typical household.

AC market is still small but growing at 20 per cent a year.

The challenge is to push appliance market towards super efficient technologies.



Star labelling: Weak benchmark

Benchmark not stringent enough to accelerate technology development.

Recent revision of AC star rating in 2014 has brought the minimum efficiency standard for AC in India almost at par with the international minimum standards. With the national average efficiency ratio of around 2.9 our overall efficiency is among the lowest

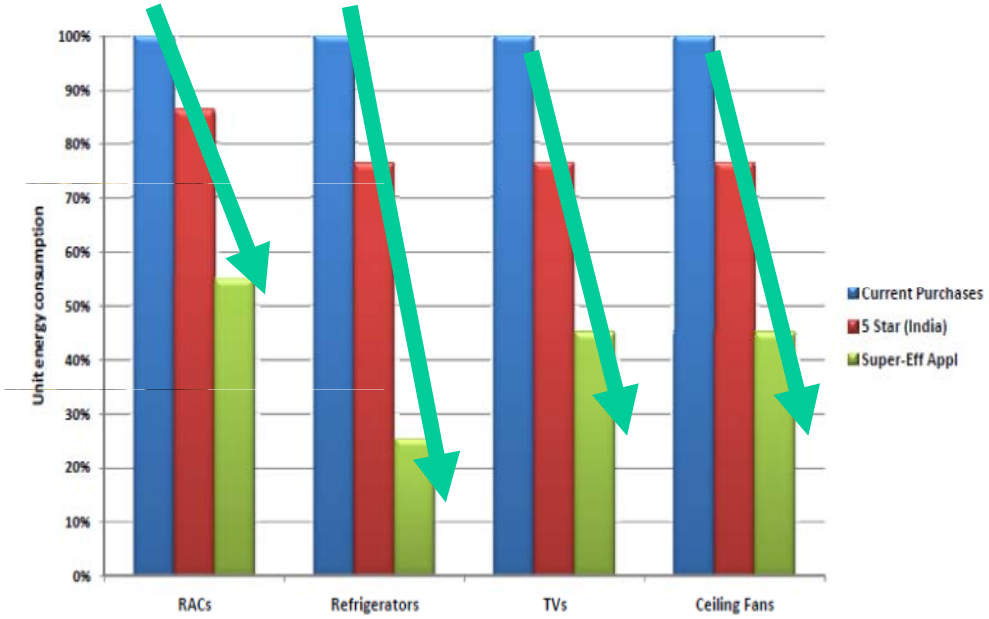
Appliance maker are mostly global players and have the technology to cater to markets with higher benchmark. Costs of appliances in India has reduced.

Global level better testing methods to bring energy efficiency values closer to real world performance in the world.

Mixed trend in the market: National Productivity Council 2010 report -- almost 90 per cent of purchases of labeled frost free refrigerators in 2009-10 were 4-5 star. But only 14% of room ACs 4-5 star.

Improve benchmark to super efficiency level

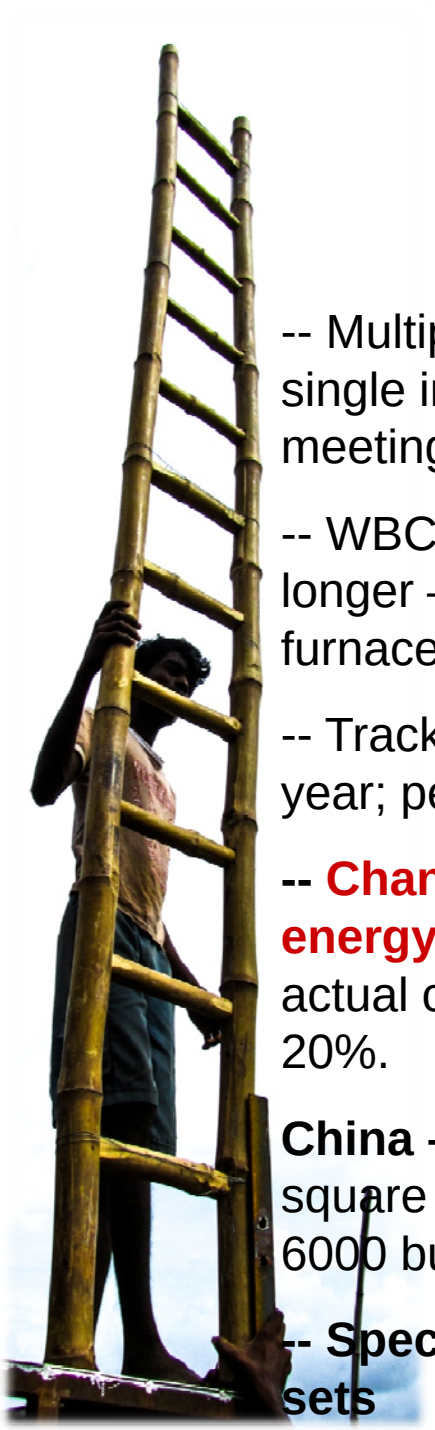
Comparison of Consumption of Current Purchases and Highest Rated in India with Best World-Wide



Large gap between average current purchase and highest rated model (5-Star), and even larger gap between highest rated and best commercially available world-wide.

BEE needs to expand its super efficient equipment programme (SEEP) to all products…..

Now applied only to fans.



But….. Energy losses from rebound effect. **Need policies to influence behaviour –**

-- Multiple ownership of efficient appliances use more energy than a single inefficient one ; -- Retailers increase lighting use even after meeting specifications -- total energy use increases

-- WBCD Study – If use of efficient lights increase by leaving them on longer – may lose up to 12% of the expected energy savings. Efficient furnace lose up to 30% because people raise the thermostat.

-- Track consumption through absolute total usage; per person per year; per square meter per year etc.

-- Change billing practices to make users pay specifically for the energy used. --- Global studies show that when tenants are billed for actual consumption, energy use for heating typically drops by 10 to 20%.

China – Consumption based pricing and billing covers 317 million square of built up area; Public disclosure of energy consumption in 6000 buildings; energy database for 33,000 buildings… etc

-- Special challenge of captive power generation – Solar and gen sets

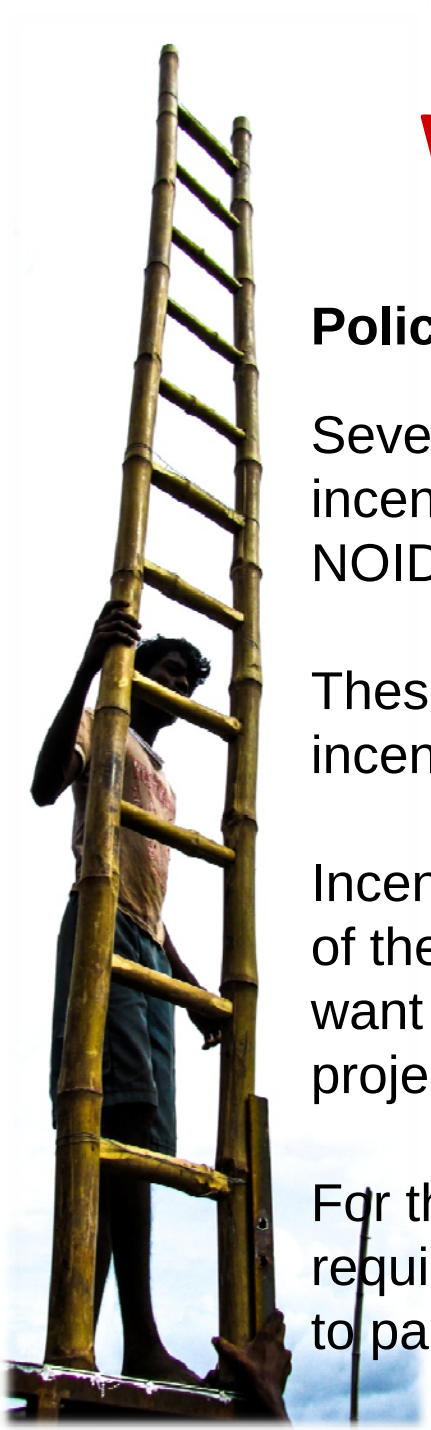
Green rating…….

Green rating of buildings

Voluntary green rating disseminates green building practices outside the realm of regulations. A quicker way of increasing market outreach and build consumer support and awareness

Developers see ‘reputation’ advantage. This can influence property market. This can mainstream large number of green measures……

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 (CASBEE)	Comprehensive Assessment System for Building Environment Efficiency
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
	Indian Green Building Council



Why are we looking at rating?

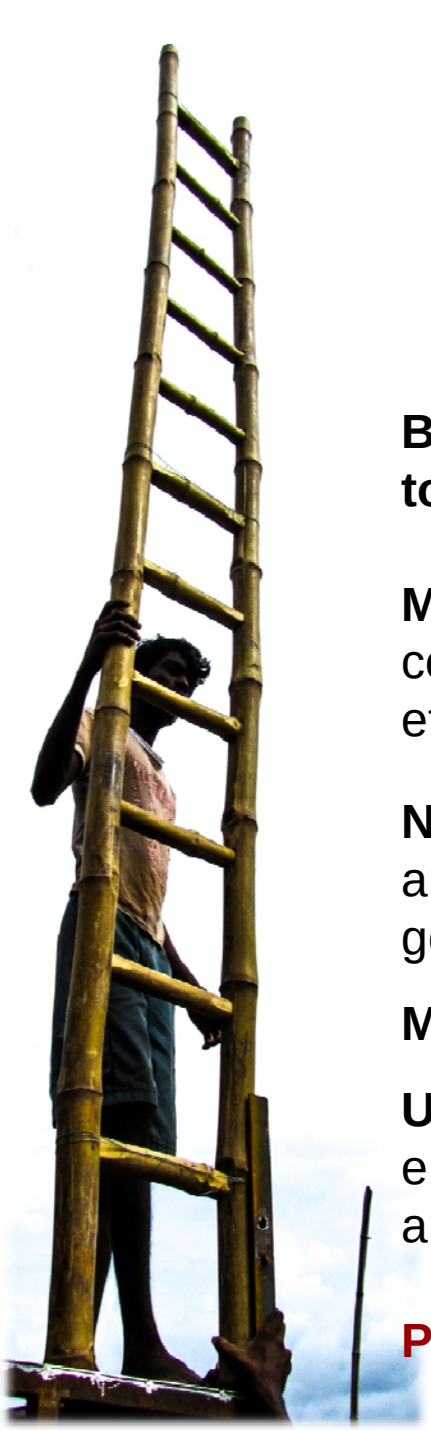
Policy interest in green rating as a regulatory tool

Several state governments have are now announcing incentive programmes to promote LEED and GRIHA rating – NOIDA, Pimpri Chinchwad, Delhi, Rajasthan, Punjab etc.

These include bonus of extra built up area, and fiscal incentives

Incentives work because developers resent that the pay offs of the green buildings go to occupiers and not to them. They want to be assured of a premium over conventional projects…

For the governments this is convenient as green building requires complex set of sustainability criteria that is difficult to package in a single regulatory instrument.



Incentive galore

Bhubaneswar grants extra 0.25 floor area ratio as an incentive to developers for ECBC compliance

Maharashtra government: Increased floor space index; reduced consent fee; rationalisation of property tax; reduction in state taxes etc. Pimpri Chinchwad.

NOIDA, UP: NOIDA authority awards 15 per cent extra FAR (floor area ratio – extra built up area) to projects which commits for LEED gold rating.

Ministry of Renewal Energy incentives for on-site renewal system

Union Environment Ministry allows separate queues for environmental clearance for fast track clearance to buildings that are pre-certified for GRIHA and LEED.

Policy interest in green rating has made the review necessary

Small scale so far…

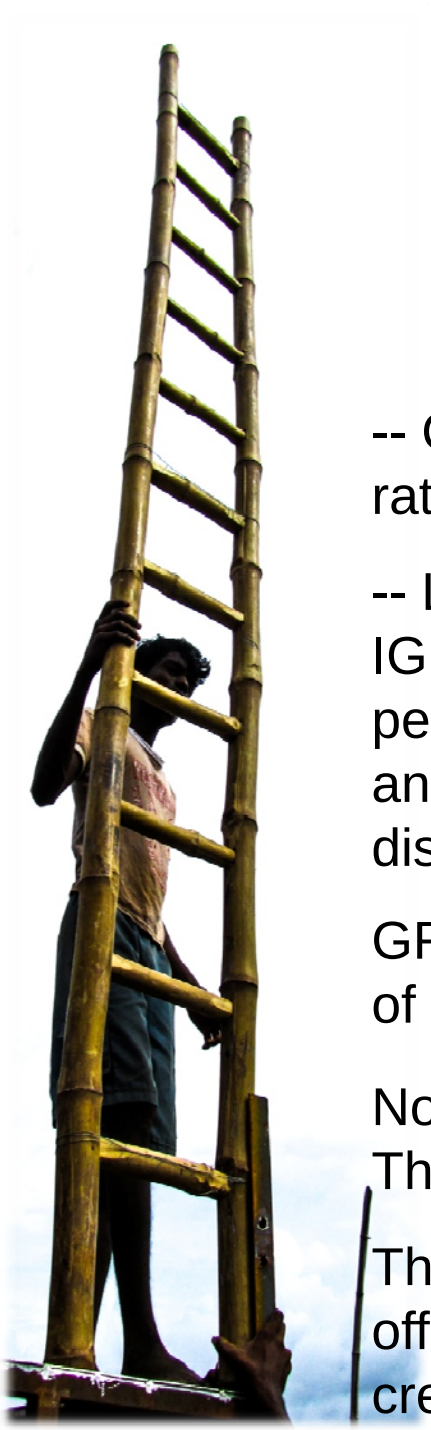
Only 447 buildings fully rated by LEED and 2 by GRIHA. Most buildings are registered and in the process of rating.

TABLE 2: STATUS OF IGBC AND GRIHA RATING SYSTEMS

The number of buildings that have actually been rated remains miniscule

	LEED and LEED-India	GRIHA
Inception year	2001	2007
Total buildings registered	2,362	425
Total buildings rated	447	2
Sq ft registered	1,831 million sq ft	135 million sq ft (12.5 million sq m)
Sq ft rated	Not provided	Not provided
Accredited professionals	1,163	372 evaluators + 329 trainers

Source: GRIHA and IGBC websites (January 2014)



Opaque system. Difficult to assess impact

-- CSE has done review of publicly available information on rated buildings

-- Limited data on the performance of rated buildings. IGBC has started to address this concern: Started performance monitoring section on their website – provides annual electricity and eater consumption detail voluntarily disclosed by 50 rated buildings

GRIHA provides design description and projected savings of rated buildings. But not performance detail

None of the websites show the check list of points awarded. This is considered proprietory..

There is no official data base on rated buildings that get officials incentives. MNRE or state governments have not created data bases

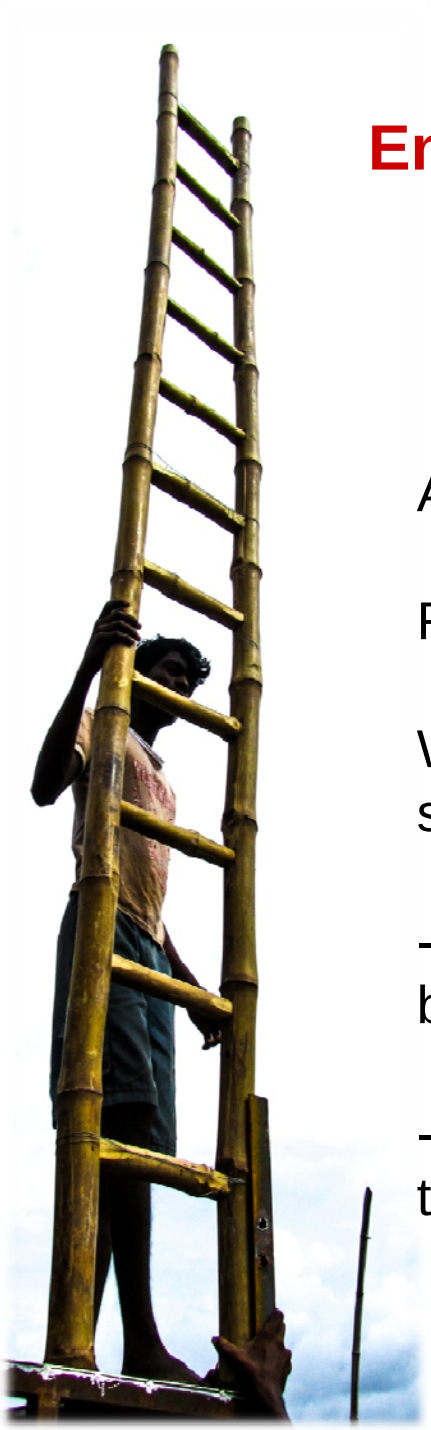
Worries over use/abuse of rating for environmental clearances

Ministry of Environment and Forests allows special considerations for pre-rated LEED and GRIHA buildings to have separate queue to fast track environmental clearance.

Pre-rating is a promise to go for full rating. There is no legal system to hold developer accountable completing rating or for performance for environmental clearance.

Such moves can work if there is transparency and accountability

State governments are trying to implement post-construction and monitoring system with provision of penalty. Its effectiveness will be know only with time



Environmental performance: Do they make a difference?

Appreciate that LEED has started putting out data

Review of LEED rated buildings

What if we compare the energy performance with BEE's star rating for building performance…..

-- About 59% of the day time buildings do not meet the benchmark

-- About 52% of BPO buildings not performing according to LEED rating and 47% do not qualify for BEE star rating

Different method. Different results

Regulations require comparable energy performance benchmarks. But method varies across rating agencies and are different from BEE star rating……..

EPI: Energy Conservation Act says energy consumption to be measured as energy consumption per square meter of area and the location of building – all energy consumed/generated to be accounted for in EPI.

BEE star rating: all energy (purchased/generated) – but excludes basement used for parking.

GRIHA EPI – All but excludes internal equipment loads and includes basement area for parking in the total built up area….

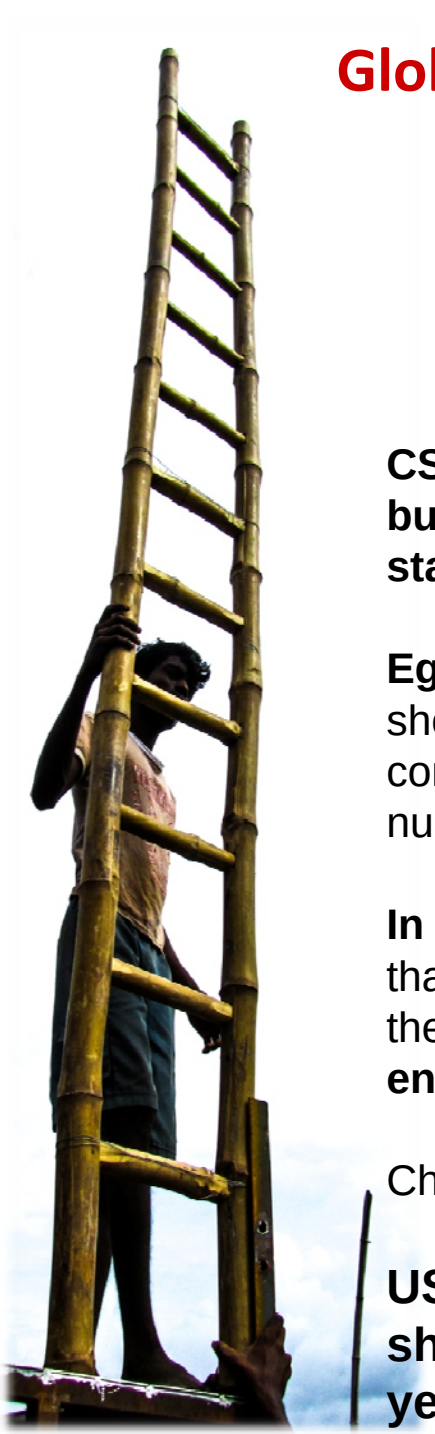
TABLE: COMPARISON OF MINIMUM ENERGY PERFORMANCE INDEX (EPI) FOR BUILDINGS

Climate classification	EPI (kWh/sq m/year)				
	Day-time occupancy			24-hours occupancy	
Commercial buildings	GRIHA minimum benchmark	BEE star label minimum benchmark (less than 50% AC)	BEE star label minimum benchmark (more than 50% AC)	GRIHA minimum benchmark	BEE star label minimum benchmark*
Moderate	120	NA	NA	350	306.6
Composite	140	80	190	450	394.2
Warm and humid	140	85	200	450	438.0
Hot and dry	140	75	180	450	262.8

Note: *BEE for 24-hours building measures EPI as Annual Average Hourly Energy Performance Index (AAhEPI) which is EPI divided by number of operational hours in an year. EPI = AAhEPI x 365 x 24 /1000.

EPI formula is annual energy consumption in kWh divided by built-up area of the building. EPI of GRIHA and BEE are based on different formula:
GRIHA: EPI calculation excludes internal loads from annual energy consumption and includes basement area in built-up area.
BEE star label: EPI calculation includes all electricity generated and/or purchased in the annual energy consumption and excludes basement area from total built-up area.

Source: GRIHA manual and Bureau of Energy Efficiency



Global evidence …. Rated buildings may under perform. Global shift towards accountability….

CSE review: without proper performance monitoring green rated buildings perform sub-optimally and sometimes worse than the standard buildings.

Eg. The US Green Building Council -New Buildings Institute study of 2008 showed wide variability in LEED energy performance which was a cause for concern. **Of 121 buildings rated 53% did not qualify for star label**. A good number did not track energy consumption.

In Canada study by the National Research Council Canada, in 2009 shows that on average, LEED buildings used 18-39% less energy per floor area than their conventional counterparts. **But, 28-35% of LEED buildings used more energy than their conventional counterparts**.

Challenge of relating predicted and actual performance

US LEED has further reformed in 2013 mandates disclosure and sharing of water and energy use every year and for at least five years. Otherwise label will be withdrawn.

Why sops for a few when all should implement green measures?

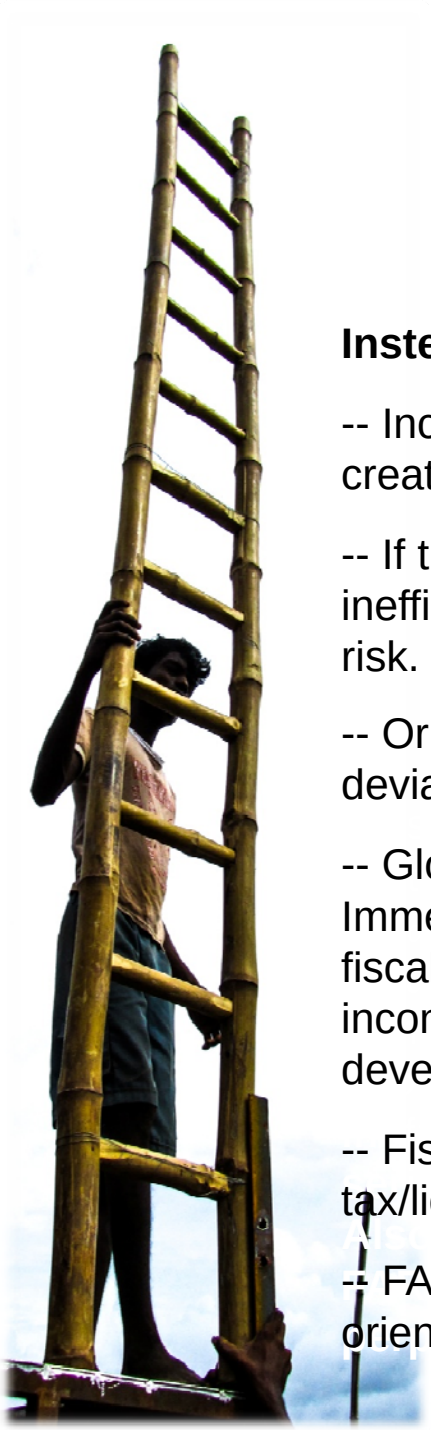
The larger concern:

Rating should be used to push market towards super efficiency --- push the top line of performance

Not to push minimum standards that all should follow. For example -- ECBC is a minimum requirement; rain water harvesting and in-situ waste management and treatment should be done by all…

Mainstream resource saving regulations….

Link incentive with super efficient benchmark, regular public disclosure on actual performance and annual audits……



Do it differently.....

Instead of FAR bonus grant fiscal incentives:

-- Incentive in the form of additional space allowance has the potential to create substantially more additional built up area.

-- If the developers are non-compliant, it will lock up enormous resource inefficiency in the new structures that cannot be reversed. This is a serious risk.

-- Or a post facto penalty at the market rate of FAR will only legalise the deviation and non-compliance and perpetuate business as usual practices.

-- Global best practices indicate that fiscal incentives can work more efficiently. Immediate tax benefits can encourage the developers to build green. Grant fiscal incentives in the form of concessions in corporate tax, license fee or income tax levied on corporations etc. This can go as direct benefit to the developer.

-- Fiscal penalty in case of non compliance can be three to four times the tax/license fee concession thus granted.

-- FAR bonuses should be conjoined with other habitat development and transit oriented development norms to minimise negative impact on environment

Need discussion on energy performance….

-- How do we set energy performance target to reduce overall energy intensity and consumption?
-- Agenda for reform of ECBC
-- Improve building star rating programme
-- Make appliance rating more stringent
-- Introduce mandatory energy audit and consumption based energy billing
-- Create capacity for implementation in cities
-- Awareness campaign to inform people
Rating should push the top line

Deepen public and policy understanding for the big change

Need people as partners

Tell people what “works” and what “doesn’t work” in terms of energy-saving strategies for homes.

Tell them about the rate of return on costs for energy-efficiency and products and appliances. People must know where to find information on options, prices and suppliers

Deepen understanding -- how individual decisions to conserve energy add up to overall savings that benefit the community.

Resource efficient city development without compromising economic growth

•Chitra Vishwanath's house is made of compressed stabilised earth blocks excavated from the site itself (Photo: Chitra Vishwanath)

Let’s begin the discussions…