COUNTRY REPORT
INDIA

PRESENTED BY:
AR. TUSHAR SOGANI
INDIAN INSTITUTE OF ARCHITECTS
WHY GO GREEN?
We are a country of
1.2 Billion
People and counting ...
32% of Indian population lives in Urban Areas
gross built-up area grew by 10% annually last decade
700% increase in commercial energy consumption in the last four decades and growing ....
Energy consumption in India will grow up to **3 times** of current consumption by 2030.
There is a shortage of average 225 million liter water per day in major Indian Cities.
Green Building Construction presents a solution for sustainable growth
GREEN BUILDING INDUSTRY IN INDIA
GROWTH IN INDIAN BUILDING SECTOR
(66 % new buildings yet to come)

As per a report of the Royal Institution of Chartered Surveyors (RICS), 4127 million m² of real estate is expected to be built between 2012 and 2020.

Source: Estimated demand for real estate space for various sectors (2012-20), RICS (2011)
Green Building Industry in India to grow by more than 20% in 2018 than previous years.

The industry is expected to grow to more than 10 billion sq. ft. by 2022.

Exponential green building growth in India driven by awareness, governments support, subsidies and sanctions/compulsions

4,300 projects with about 4.7 billion sq. ft. of built-up area registered for green technology as of September 2017.
KEY GREEN BUILDING FEATURES

Energy Efficient Lighting

Day lighting

Rain Water Harvesting

Water Recycling

Right Building Orientation

Using Renewable Energy
KEY GREEN BUILDING FEATURES

Efficient Water Fixtures

Efficient HVAC System

Build Green Roof

Green Construction Materials
LET'S GET TO THE FACTS....

ITC saves 45% energy worth 90 Lac rupees on a 1,70,000 sq. feet building every year.

Wipro saves 40% energy worth 1 Carore rupees on a 1,75,000 sq. feet building every year.

Godrej saves 63% energy worth 9 Lac rupees on a 20,000 sq. feet building every year.

Kalpataru Square in Mumbai is set to reduce it’s water consumption by 30%.

Park Hotel, Hyderabad reduced it’s water consumption by 40%.
GREEN BUILDINGS RATINGS IN INDIA

Green building rating systems are developed to measure the “Greenness” of the buildings based on various criteria and principles.

The top rating systems in India are:

LEED  IGBC  GRIHA  GEM
GREEN BUILDING RATING TOOL
1 Billion square footage building area has been certified as green by leading green building rating system LEED-India
U.S. Green Building Council has developed LEED Zero, a complement to LEED that verifies the achievement of net zero goals and signals market leadership in the built environment.

- **LEED Zero Carbon** recognizes buildings or spaces operating with net zero carbon emissions from energy consumption and occupant transportation to carbon emissions avoided or offset over a period of 12 months.

- **LEED Zero resources**
  - **Energy** - energy use balance of zero over a period of 12 months.
  - **Water** - potable water use balance of zero over a period of 12 months.
  - **Waste** - GBCI’s TRUE Zero Waste certification at the Platinum level.

LEED Zero represents a new level of achievement in green building that is not just attainable but is the goal of LEED certified projects around the world.
India achieves 5 Billion Sq. ft. Green Building footprint
CII - IGBC spearheading green building movement in India, since 2001
Snapshots of Key Achievements*

- **Projects**: 4,500*
- **Certified Products**: 350*
- **IGBC Members**: 1,871*
- **Facilitated Introduction of over**: 150 product & technologies
- **IGBC Accredited**: 2,893*
- **Student Chapters**: 150
- **Trained over**: 30,000 Professionals
- **IGBC Green Rating Systems**: 22
- **Local Chapters**: 23

*Billion sq. ft.*

*As on March 2018*
IGBC Green Cities (Existing Cities) rating system is a voluntary and consensus-based programme. The rating system has been developed with the support of IGBC Green Cities Committee.

IGBC Green Cities rating system is the first of its kind rating in India to address environmental sustainability in existing cities. The rating system shall enable the municipalities, municipal corporations, development authorities and developers to formulate green policy interventions and implement green initiatives at the city scale, so as to reduce environmental impacts that are measurable and improve the overall quality of life.
BENEFITS OF GREEN CITIES (EXISTING CITIES)

There are tremendous benefits in greening existing cities in the country, particularly in the context of several cities going smart:

- 10-12% reduction in power demand due to higher share of solar thermal, solar photovoltaic and wind energy
- 25-30% reduction in the lighting consumption of the city
- 15-20% reduction in water consumption due to better metering and monitoring
- Increased segregation in municipal waste leading to better handling
- Increase in use of public transport to the extent of 8-10%
- 8-10% increase in use of treated wastewater for city application
BENEFITS OF GREEN CITIES

- Better land use
- Preparedness for climate disasters
- Increase in ground water table
- Increase in the city landscape cover
- Provision for more public conveniences
- Citizen engagement through the city e-portals
- Better parking management strategies
### Benefits of adopting IGBC green building rating systems:

- Demonstrated and proven savings of 30 to 40% on energy cost and 20 to 30% on water
- Fully indigenized and designed to address National priorities
- Incorporates National Standards and Codes including National Building Code (NBC), Energy Conservation Building Code (ECBC), Ministry of Environment & Forests (MoEF) and Central Pollution Control Board (CPCB) guidelines
- Faster environmental clearance by Ministry of Environment, Forest and Climate Change (MoEFCC) for IGBC rated projects
GREEN BUILDING RATING TOOL
MARKET OVERVIEW FOR GREEN BUILDINGS

GREEN BUILDING FOOTPRINT IN INDIA

1. Both IGBC and GRIHA provide green building certification in India.

2. The total registered green footprint of India (4.5 billion sq.ft) is the second largest in the world after USA which is 13.8 billion sq.ft. of LEED certification spaces.

3. The market size of green building in India is expected to grow to 10 billion sq.ft in 2022 from the current 4.5 billion sq.ft.

4. Only 7.1% of the projects registered are certified.
CITY WISE DISTRIBUTION OF CERTIFIED GREEN BUILDINGS

- In terms of city level distribution, Mumbai has the maximum number of green buildings registered followed by Pune and Bangalore.

- Green rating is not just restricted to projects in Tier I and II cities, there are certified buildings in Tier III cities like Indore, Nagpur and Coimbatore as well.
PERCEIVED BUSINESS BENEFITS TO GREEN

- 8-9% Operating cost decreases
- 7.5% Building value increases
- 6.6% Return on Investment
- 3.5% Occupancy ratio increases
- 3% Rent ratio increases
OTHER INTANGIBLE BENEFITS

REDUCED COSTS
- Fewer Call backs
- Increased customer satisfaction
- Increased referral rate

INCREASED REVENUE
- Higher close rates
- More sales

HIGHER PROFITS

CONSUMER BENEFITS
- Healthier indoor Benefits
- More comfortable
- More durable
- 30-60% more energy efficient
- More environmental responsible
COSTS
- 2-12% Construction Cost Premium
- 25-30% Savings in Energy Consumption

BENEFITS
- 20-30% Savings in Water Consumption
- 50% Less Waste Generation
- 35% Reduce Carbon Emission
- 1.9-2% Rental Premiums Achieved in Commercial Buildings
- 30% Reduction in building’s Operating expenses
- 40% Increase in office space utilization
In order to complement in India’s Sustainability Movement and take it to the next level, ASSOCHAM has launched the “GEM Sustainability (Green) Certification Program” with the objective to promote environment friendly green building design and construction.

GEM Sustainability Certification Rating Program is based upon BEE ECBC 2017 and NBC 2016.
RECOGNITION OF 100 HOMES AS ECO-AAWAS BY ASSOCHAM
GEM SUSTAINABLE
ECO-AAWAS
Let’s Create a Better Earth for the Next Generation

THE NEW RATING POINTS FOR HOUSES
OBJECTIVE

ASSOCHAM “GEM Sustainable Eco-Aawas Program” is a process to educate individual house owners on Sustainability, Energy and Water Efficiency Standards for Homes.

PROCESS

A team of Sustainability Experts will identify the sustainability, energy, water and other green good practices and parameters of the house and will facilitate the house owner to design and construct Sustainable, Energy and Water Efficient Homes with adequate daylight, fresh air and human comfort.

There are Twenty One (21) green good practices of the design and any house willing to achieve GEM Eco-Aawas Rating must have to meet atleast 15 practices.

Successful houses will then be rated as “GEM Sustainable Eco-Aawas”.

BENEFITS

The program helps the house owners to achieve following benefits –

1. Energy Efficiency upto 25%
2. Water Efficiency upto 35%
3. Adequate Daylight

4. Adequate Fresh Air
5. Healthy Indoor Environment
6. Improved Human Comfort
7. Use of Regional and Recycled Materials so as to save Environment

Moreover, this is our responsibility to give a better Earth to the next generation.
### Green Good Practices
(Each Principle Carry One (1) Mark)

<table>
<thead>
<tr>
<th>Principle</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Principle 1 Rain Water Harvesting/Storage System</td>
</tr>
<tr>
<td>2.</td>
<td>Principle 2 Renewable Energy System (Solar Hot Water/Solar PV/Any other)</td>
</tr>
<tr>
<td>3.</td>
<td>Principle 3 Use of LED Lights</td>
</tr>
<tr>
<td>4.</td>
<td>Principle 4 Use of BEE Star Rated Appliances (3 Star and above)</td>
</tr>
<tr>
<td>5.</td>
<td>Principle 5 Use of Building Materials to Reduce Heat Transfer in the House</td>
</tr>
<tr>
<td>6.</td>
<td>Principle 6 Use of Local Building Construction Materials</td>
</tr>
<tr>
<td>7.</td>
<td>Principle 7 Composting of Kitchen and Landscape Organic Waste</td>
</tr>
<tr>
<td>8.</td>
<td>Principle 8 Electric Charging Points for Electric Vehicles</td>
</tr>
<tr>
<td>10.</td>
<td>Principle 10 Low VOC Paints for Interiors</td>
</tr>
<tr>
<td>11.</td>
<td>Principle 11 Cross Ventilation in Living Spaces</td>
</tr>
<tr>
<td>12.</td>
<td>Principle 12 Ceiling Fans (BEE 3 Star Rated or above) in Living Spaces</td>
</tr>
<tr>
<td>13.</td>
<td>Principle 13 Provision for Plantation, Trees, Saplings and Potted plants</td>
</tr>
<tr>
<td>14.</td>
<td>Principle 14 Adequate Parking within the Premises</td>
</tr>
<tr>
<td>15.</td>
<td>Principle 15 Drip/Sprinkler Irrigation Systems</td>
</tr>
<tr>
<td>16.</td>
<td>Principle 16 Provide Portable Fire Extinguishers in the House</td>
</tr>
<tr>
<td>17.</td>
<td>Principle 17 Use of Aerators in Water Faucets and Dual-flushing in Water Closets</td>
</tr>
<tr>
<td>18.</td>
<td>Principle 18 Use of Recycled Engineered Wood Products (No Use of Hard Wood)</td>
</tr>
<tr>
<td>19.</td>
<td>Principle 19 Incorporation of Heritage Design Elements</td>
</tr>
</tbody>
</table>
Cost of Building Green

Several Studies claim that building green costs more.....

However, Cost of building green is coming down significantly
<table>
<thead>
<tr>
<th>Building</th>
<th>Year Awarded</th>
<th>Built-in Area (Sq.ft)</th>
<th>Rating Achieved</th>
<th>% increase in cost</th>
<th>Payback (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CII-Godrej GBC, Hyderabad</td>
<td>2003</td>
<td>20,000</td>
<td>Platinum</td>
<td>18 %</td>
<td>7</td>
</tr>
<tr>
<td>ITC Green Centre, Gurgaon</td>
<td>2004</td>
<td>1,70,000</td>
<td>Platinum</td>
<td>15 %</td>
<td>6</td>
</tr>
<tr>
<td>Wipro, Gurgaon</td>
<td>2005</td>
<td>1,75,000</td>
<td>Platinum</td>
<td>8 %</td>
<td>5</td>
</tr>
<tr>
<td>Grundfos Pumps, Chennai</td>
<td>2005</td>
<td>40,000</td>
<td>Gold</td>
<td>6 %</td>
<td>3</td>
</tr>
<tr>
<td>Technopolis, Kolkata</td>
<td>2006</td>
<td>72,000</td>
<td>Gold</td>
<td>6 %</td>
<td>3</td>
</tr>
<tr>
<td>Spectral Services Consultants</td>
<td>2007</td>
<td>15,000</td>
<td>Platinum</td>
<td>8 %</td>
<td>4</td>
</tr>
<tr>
<td>Office, Noida</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>HITAM, Hyderabad</td>
<td>2007</td>
<td>78,000</td>
<td>Silver</td>
<td>2 %</td>
<td>3</td>
</tr>
</tbody>
</table>
INDIA ON WORLD GREEN PLATFORM
Sustainable buildings are playing a critical role in the development of many emerging economies. India’s Sustainable building market is estimated to double by 2022 at 10 billion sqft.

India has emerged as one of the leading countries in terms of sustainable building projects and ranks only second after US in terms of number of green projects and built-up area.

Still this is only about 5% of total buildings in India, and hence there is huge potential for further penetration of sustainable building design.
WORLD’S 26 BEST CLIMATE PROJECTS COMPETE FOR THE 2019 C40 CITIES BLOOMBERG PHILANTHROPIES AWARDS

C40 and Bloomberg Philanthropies Announce City Finalists, Recognizing the World’s Most Impactful Efforts by Mayors to Tackle Climate Change

seven categories that define this year’s theme – The Future We Want:

1. The future we want is resilient
2. The future we want relies on green mobility
3. The future we want runs on renewable energy
4. The future we want engages all citizens
5. The future we want breathes clean air
6. The future we want requires transformative change
7. The future we want uses green technologies
<table>
<thead>
<tr>
<th>CITY</th>
<th>CATEGORY</th>
<th>PROJECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portland, Oregon, USA</td>
<td>Resilience</td>
<td>Crystal Springs Watershed Restoration</td>
</tr>
<tr>
<td>Medellín, Colombia</td>
<td>Resilience</td>
<td>Avenida Oriental Green Corridors</td>
</tr>
<tr>
<td>Quezon City, Philippines</td>
<td>Resilience</td>
<td>Quezon City’s Socialized Housing Program</td>
</tr>
<tr>
<td>National Capital Territory (NCT) of Delhi, India</td>
<td>Resilience</td>
<td>“Jal Swarañ” Safe Drinking Water Initiative</td>
</tr>
<tr>
<td>Bengaluru, India</td>
<td>Green Mobility</td>
<td>“Tender SURE” Urban Street Design for People</td>
</tr>
<tr>
<td>Bogotá, Colombia</td>
<td>Green Mobility</td>
<td>“Muévete Mejor” Business Network for Mobility</td>
</tr>
<tr>
<td>Kolkata, India</td>
<td>Green Mobility</td>
<td>Low Carbon Commute Transition</td>
</tr>
<tr>
<td>New York City, USA</td>
<td>Renewable Energy</td>
<td>Efficiency, Electrification and Renewable Energy Mandate</td>
</tr>
<tr>
<td>Cape Town, South Africa</td>
<td>Renewable Energy</td>
<td>Small-Scale Energy Generation Program</td>
</tr>
<tr>
<td>Seoul, South Korea</td>
<td>Renewable Energy</td>
<td>Solar City Expansion</td>
</tr>
</tbody>
</table>
# Business Benefits Expected From Green Building Investments
(Medians Reported in 2012, 2015 and 2018)

<table>
<thead>
<tr>
<th></th>
<th>New Green Building</th>
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<tbody>
<tr>
<td></td>
<td>2012</td>
<td>2015</td>
<td>2018</td>
</tr>
<tr>
<td>Decreased 12-Month Operating Costs</td>
<td>8%</td>
<td>9%</td>
<td>8%</td>
</tr>
<tr>
<td>Decreased 5-Year Operating Costs</td>
<td>15%</td>
<td>14%</td>
<td>14%</td>
</tr>
<tr>
<td>Increased Asset Value (According to Owners)</td>
<td>5%</td>
<td>7%</td>
<td>7%</td>
</tr>
<tr>
<td>Payback Time for Green Investments</td>
<td>8 Years</td>
<td>8 Years</td>
<td>7 Years</td>
</tr>
</tbody>
</table>

|                                | Green Retrofit     |        |        |
|                                | 2012               | 2015   | 2018   |
| Decreased 12-Month Operating Costs | 9%                 | 9%     | 9%     |
| Decreased 5-Year Operating Costs   | 13%                | 13%    | 13%    |
| Increased Asset Value (According to Owners) | 4%                 | 7%     | 5%     |
| Payback Time for Green Investments | 7 Years            | 6 Years| 6 Years|
GLOBAL FINDINGS BY COUNTRY

Each of the 19 countries featured in this report has different triggers and challenges, and different social and environmental priorities.

Australia has a high share of GBC respondents (63%) and the highest percentage who report doing the majority (over 60%) of their projects green. Steep growth in that percentage is also expected by 2021.

Market factors drive new green activity, including market demands and client demands for green. Improving occupant health and well-being is the top social reason for building green.

Brazil
A moderate percentage in Brazil (21%) do the majority of their projects green now, but twice as many (42%) expect to do that share of green by 2021.

A wide range of triggers drive this green building market, including market demands, market transformation, client demands and healthier buildings.

China
Only 9% in mainland China currently do the majority of their projects green, which is likely due to the low share of respondents who are members of a GBC (14%). However, three times as many expect to do a majority of green projects by 2021, even in this group.

In contrast, Hong Kong currently has the second highest percentage of those doing the majority of their projects green, and a relatively high share are market demands, healthier buildings, right thing to do and branding/PR, while client demands and regulations are the top triggers in Hong Kong.

Colombia
While the percentage currently doing the majority of their projects green in Colombia is relatively low at 19%, nearly half (46%) expect to do a majority of green projects by 2021.

Internal corporate commitments is one of the top triggers in Colombia and demonstrates the importance of private industry in promoting green in this country. Another top trigger is lower operating costs, which shows the importance of bottom-line business benefits. However, regulations are also an important trigger in this market.

The top triggers for new green building activity in Germany are client demands and environmental regulations, and its selection of worker productivity as the top social reason for building green is unique in this study.

India
The percentage of respondents doing the majority of their projects green in India is expected to nearly double by 2021, from 28% to 55%.

New green building in India is being driven most by environmental regulations and healthier buildings. The need for more public awareness about green is the top challenge faced in this country, and the lack of educated green building professionals is also an issue of note.
Countries With the Highest and Lowest Percentages Selecting the Top Barriers to Green Building Activity

**Higher First Costs**
- US: 73%
- Ireland: 68%
- Colombia: 58%
- Australia: 57%
- Norway: 55%

**Global Average**: 49%
- Saudi Arabia: 38%
- Vietnam: 37%
- India: 32%
- JAE: 29%
- Germany: 19%

**Low Five**
- Canada/Ireland: 19%
- Norway: 19%
- Singapore: 19%
- US: 19%
- Australia: 18%

**Lack of Public Awareness**
- India: 50%
- Poland: 46%
- UAE: 45%
- Spain: 42%
- Vietnam: 37%

**Global Average**: 32%
- Canada/Ireland: 19%
- Norway: 19%
- Singapore: 19%
- US: 19%
- Australia: 18%
Green Building Activity and Trends in India

Indian respondents anticipate steep growth in their green activity in the next three years, driven by environmental regulations and the drive for healthier buildings. Many of the challenges they face are typical of an emerging market, including the need for more public awareness of green and more green-educated professionals.

Levels of Green Building Activity for Respondents in India (2018 and 2021 Expected)  

Dodge Data & Analytics, 2018

- 1% to 15% Green Projects
- More Than 60% Green Projects
- Exploring (No Green Involvement)
- 31% to 60% Green Projects
- 16% to 30% Green Projects

ENVIRONMENTAL REASONS

Over 80% of Indian respondents consider all five environmental reasons for building green important. When asked to select their top two, though, reducing energy consumption is selected by the highest percentage (62%), as it is in most green markets. The second most important environmental reason is reducing water consumption, ranked in the top two by 48%, followed closely by protecting natural resources, which is ranked in the top two by 43%.

Top Triggers Driving Future Green Building Activity in India  

Dodge Data & Analytics, 2018

- Environmental Regulations
- Healthier Buildings
- Right Thing to Do
- Client Demands
- Lower Operating Costs

India

Global Average

- Environmental Regulations: 42% vs. 33%
- Healthier Buildings: 33% vs. 27%
- Right Thing to Do: 30% vs. 25%
- Client Demands: 25% vs. 34%
- Lower Operating Costs: 23% vs. 23%
ACCORDING TO THE SUSTAINABLE DEVELOPMENT REPORT 2019 BY UNITED NATION

INDIA
East and South Asia

▼ OVERALL PERFORMANCE

Index score

61.1

Regional average score

65.7

SDG Global rank

115 (OF 162)

▼ SPILLOVER INDEX

100 (best) to 0 (worst)

▲ AVERAGE PERFORMANCE BY SDG
CURRENT ASSESSMENT – SDG DASHBOARD

SDG TRENDS

Notes: The full title of Goal 2 "Zero Hunger" is "End hunger, achieve food security and improved nutrition and promote sustainable agriculture".
The full title of each SDG is available here: https://sustainabledevelopment.un.org/topics/sustainabledevelopmentgoals
Let’s Together We Build a Sustainable Future