COUNTRY REPORT INDIA

PRESENTED BY:
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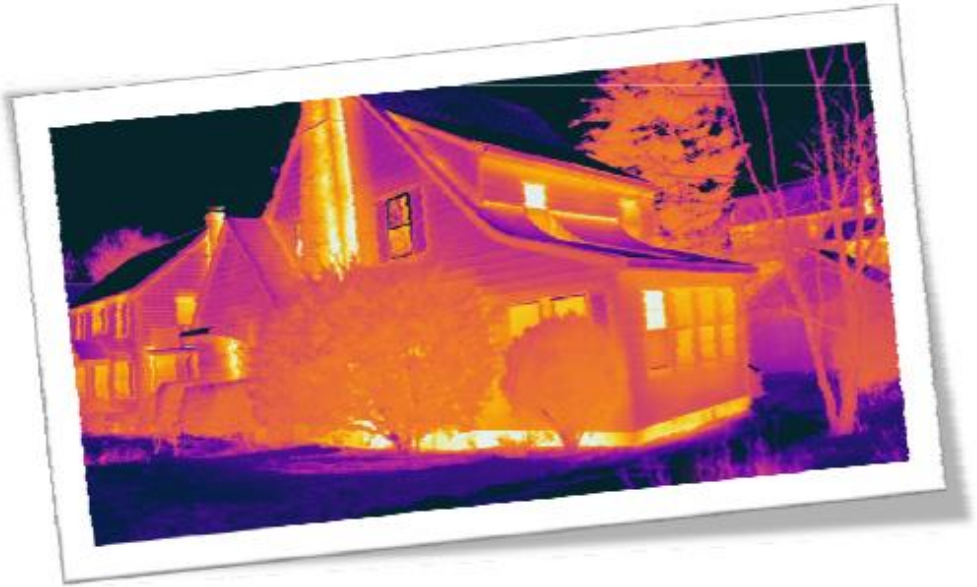
INDIAN INSTITUTE OF ARCHITECTS

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

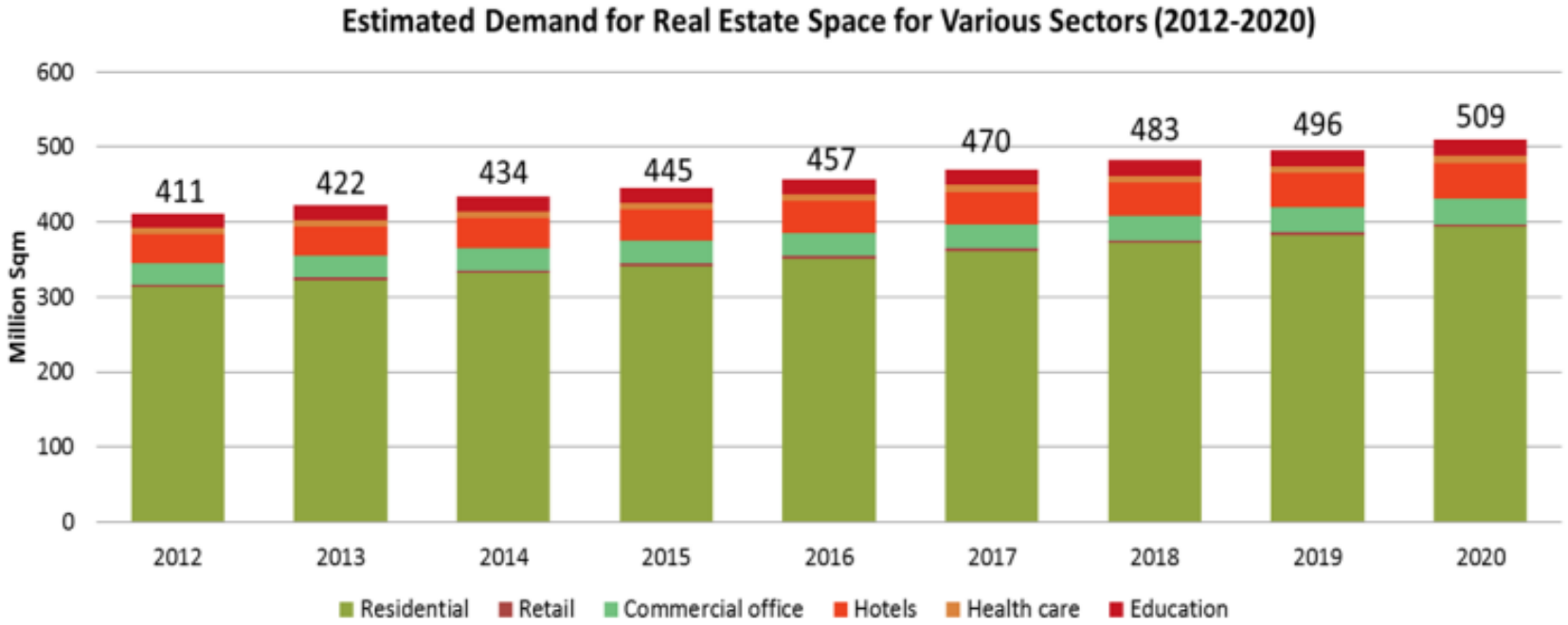

Green Building Construction presents a solution for sustainable growth


WORLD GREEN BUILDING COUNCIL
SUSTAINABLE DEVELOPMENT GOALS
Green buildings can improve people's health & wellbeing
Green buildings can use renewable energy, becoming cheaper to run
Building green infrastructure creates jobs & boosts the economy
Green building design can spur innovation & contribute to climate resilient infrastructure
Green buildings are the fabric of sustainable communities & cities
Green buildings use 'circular' principles, where resources aren't wasted
Green buildings produce fewer emissions, helping to combat climate change
Green buildings can improve biodiversity, save water resources & help to protect forests
Through building green we create strong, global partnerships
3 GOOD HEALTH AND WELL-BEING
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
15 LIFE ON LAND
17 PARTNERSHIPS FOR THE GOALS

GREEN BUILDING INDUSTRY IN INDIA

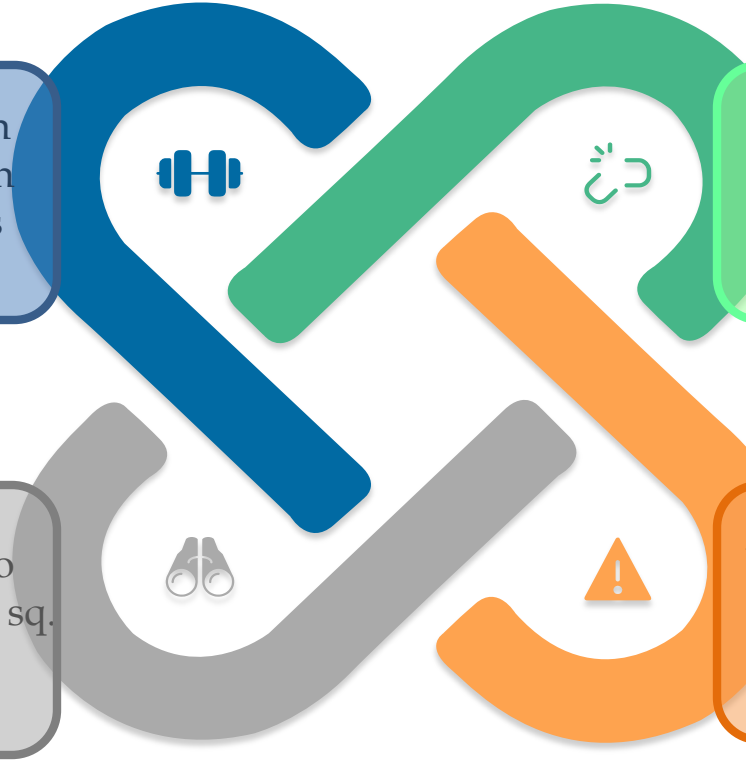
GROWTH IN INDIAN BUILDING SECTOR
(66 % new buildings yet to come)

As per a report of the Royal Institution of Chartered Surveyors (RICS), 4127 million m^2 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 SCENARIO IN INDIA



Green Building Industry in India to grow by more than 20% in 2018 than previous years.

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

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

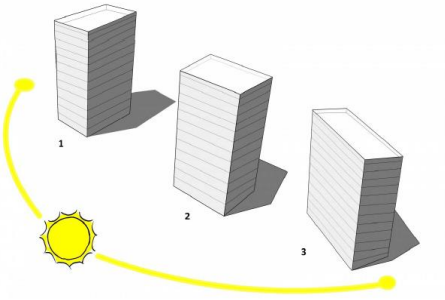
4,300 projects with about 4.7 billion sq. ft. of built-up area registered for green technology as of September 2017.

KEY GREEN BUILDING FEATURES

Energy Efficient Lighting

Day lighting

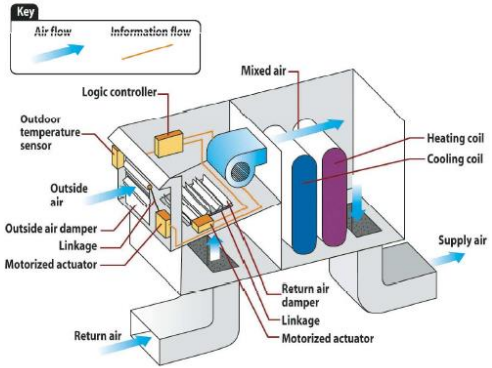
Water Recycling



Right Building Orientation

KEY GREEN BUILDING FEATURES

Efficient HVAC System



Green Construction Materials

LET'S GET TO THE FACTS....

ITC saves **45%** energy worth 9 0 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

LEED

1 Billion square footage building

area has been certified as green by leading green building rating system LEED-India

LEED- Zero

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.

GREEN BUILDING RATING TOOL

IGBC

IGBC

CII
Confederation of Indian Industry

India achieves 5 Billion Sq. ft. Green Building footprint

CII - IGBC spearheading green building movement in India, since 2001

Snapshots of Key Achievements*

IGBC

5.27
Billion sq. ft.
2nd Country in the world in terms of largest registered green building footprint

Green Building
4,500+
Projects

GreenPro
350+
Certified Products

IGBC Members
1,871+

Facilitated introduction of over
150
product & technologies

IGBC Accredited
2,893+
Professionals

Student Chapters
150

Trained over
30,000
Professionals

IGBC Green Rating Systems
22

Local Chapters
23

*As on March 2018

NET ZERO ENERGY BUILDINGS RATING

The Indian Green Building Council has come out with Net Zero Energy Buildings rating system in collaboration with the World Green Building Council and the United States Agency for International Development (USAID). The rating system, launched during the 16th Green building Congress 2018 here, seeks to complement the National Mission for Enhanced Energy Efficiency and the National Solar Mission.

IGBC GREEN CITIES RATING SYSTEM

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

IGBC

Green Building Rating Systems

COMMERCIAL

1 IGBC Green New Buildings

2 IGBC Green Existing Buildings

3 IGBC Green Interiors

4 IGBC Green Campus

5 IGBC Green Data Centres

RESIDENTIAL

6 IGBC Green Homes

7 IGBC Green Residential Society

8 IGBC Green Affordable Housing

TRANSIT

9 IGBC Green Metro Stations

10 IGBC Green Existing Metros

11 IGBC Green Railway Stations

BUILT ENVIRONMENT

12 IGBC Green Cities

13 IGBC Green Existing Cities

14 IGBC Green Villages

15 IGBC Green Township

16 IGBC Green Landscape

EDUCATION

17 IGBC Green Schools

18 IGBC Places of Worship

INDUSTRIAL

19 IGBC Green Factories

20 IGBC Green SEZ

HEALTH & WELL BEING

21 IGBC Green Healthcare Facilities

22 IGBC Health and Well-being

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

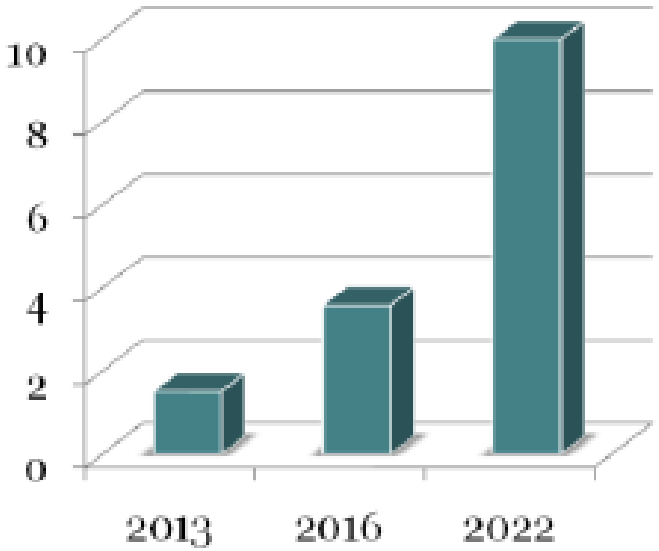
GREEN BUILDING RATING TOOL

GRIHA

MARKET OVERVIEW FOR GREEN BUILDINGS

GREEN BUILDING FOOT PRINT IN INDIA

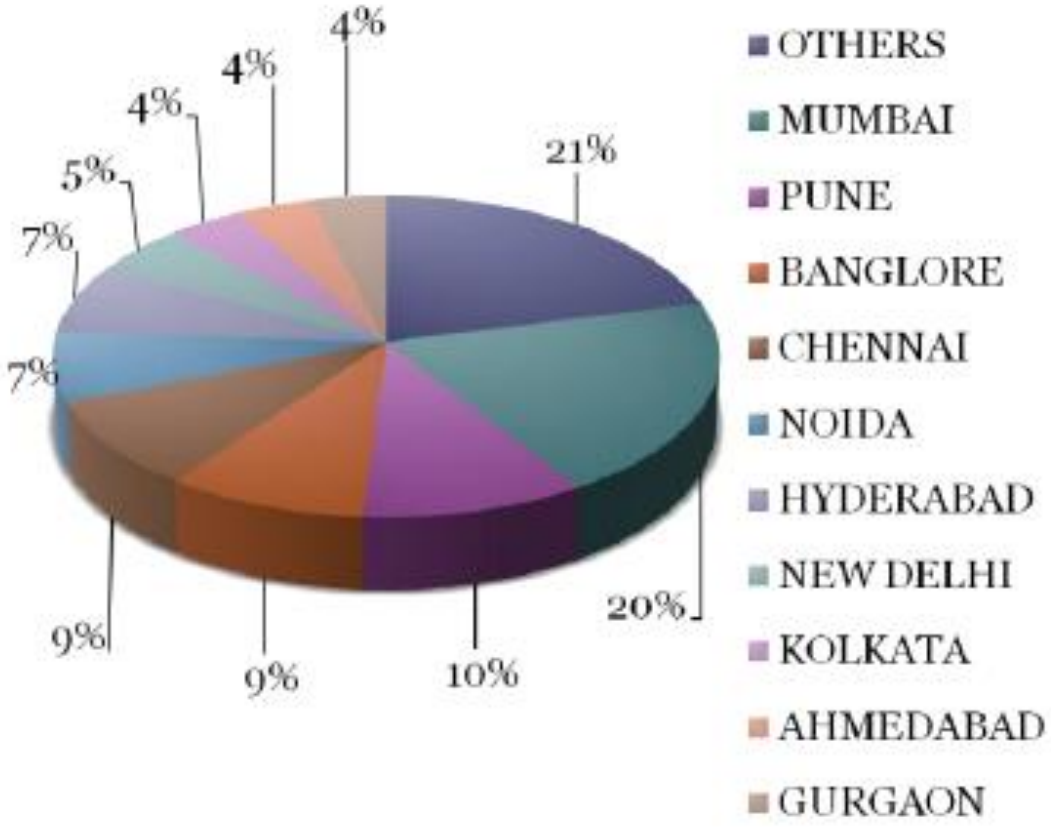
1. Both IGBC and GRIHA provide green building certification in India.
2. The total registered green footprint of India (4.5 billion sq.ft) is the second largest in the world after USA which is 13.8 billion sq.ft. of LEED certification spaces.
3. The market size of green building in India is expected 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

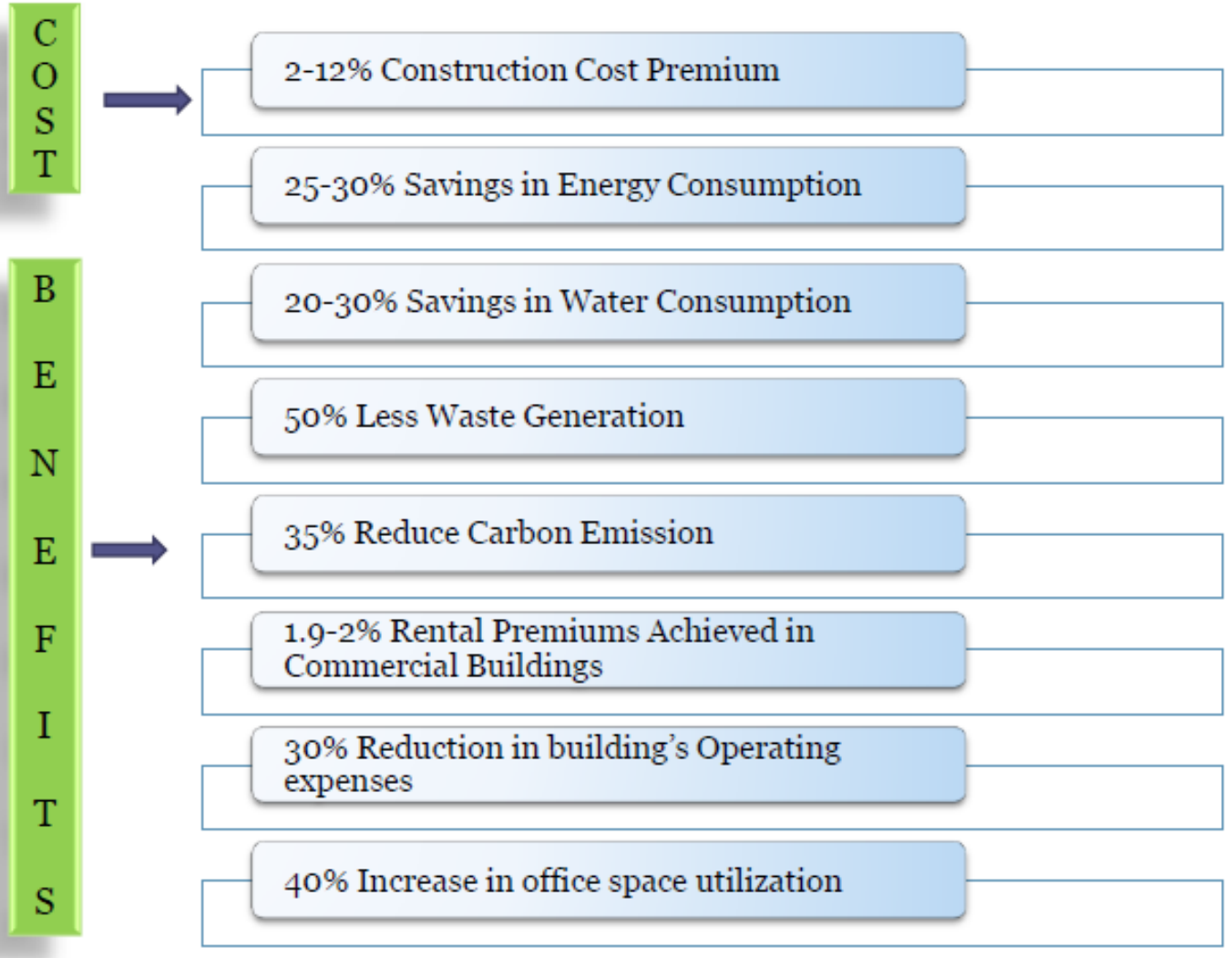
INCREASED REVENUE

- Higher close rates
- More sales

HIGHER PROFITS

CONSUMER BENEFITS

- Healthier indoor Benefits
- More comfortable
- More durable
- 30-60% more energy efficient
- More environmental responsible


COST
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

GREEN BUILDING RATING TOOL

GEM

ABOUT GEM…

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

THE ASSOCIATED CHAMBERS OF COMMERCE AND INDUSTRY OF INDIA

ASSOCHAM INDIA

GEM SUSTAINABILITY CERTIFICATION PROGRAM
Green and Eco-friendly Movement (GEM)

ASSOCHAM Recognising 100 HOMES as GEM SUSTAINABLE ECO-AAWAS

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.

LIST OF POINTS FOR GEM RATINGS

GREEN GOOD PRACTICES

(EACH PRINCIPLE CARRY ONE (1) MARK)

ASSOCHAM Recognising 100 HOMES as GEM SUSTAINABLE ECO-AAWAS

1.	Principle 1	Rain Water Harvesting/Storage System
2.	Principle 2	Renewable Energy System (Solar Hot Water/Solar PV/Any other)
3.	Principle 3	Use of LED Lights
4.	Principle 4	Use of BEE Star Rated Appliances (3 Star and above)
5.	Principle 5	Use of Building Materials to Reduce Heat Transfer in the House
6.	Principle 6	Use of Local Building Construction Materials
7.	Principle 7	Composting of Kitchen and Landscape Organic Waste
8.	Principle 8	Electric Charging Points for Electric Vehicles
9.	Principle 9	Use of Overhangs/Fins/Balconies (Passive Design Features)
10.	Principle 10	Low VOC Paints for Interiors
11.	Principle 11	Cross Ventilation in Living Spaces
12.	Principle 12	Ceiling Fans (BEE 3 Star Rated or above) in Living Spaces
13.	Principle 13	Provision for Plantation, Trees, Saplings and Potted plants
14.	Principle 14	Adequate Parking within the Premises
15.	Principle 15	Drip/Sprinkler Irrigation Systems
16.	Principle 16	Provide Portable Fire Extinguishers in the House
17.	Principle 17	Use of Aerators in Water Faucets and Dual-flushing in Water Closets
18.	Principle 18	Use of Recycled Engineered Wood Products (No Use of Hard Wood)
19.	Principle 19	Incorporation of Heritage Design Elements
20.	Principle 20	Spread Environment Education, Training and Capacity Building
21.	Principle 21	Going Extra Miles (Any Innovation in Design)

Cost of Building Green

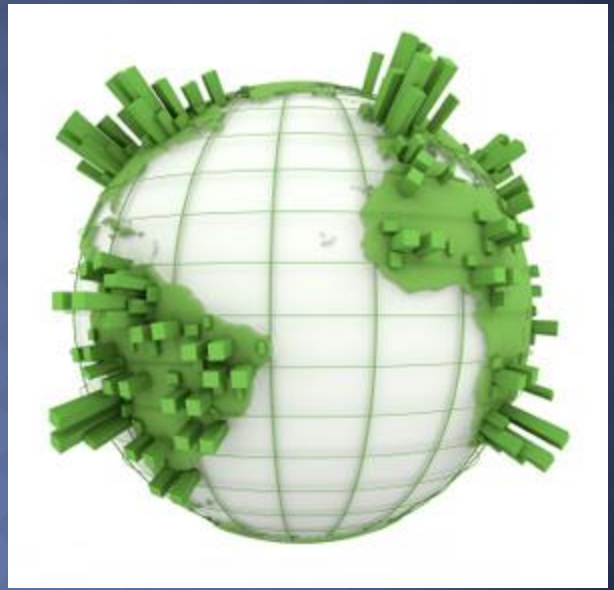
Several Studies claim that building green costs more.....

However, Cost of building green is coming down significantly

COST OF GREEN BUIDINGS AND PAYBACK TIME

Building	*Year Awarded*	*Built-in Area (Sq.ft)*	*Rating Achieved*	*% increase in cost*	*Payback (years)*
CII-Godrej GBC, Hyderabad	2003	20,000	Platinum	18 %	7
ITC Green Centre, Gurgaon	2004	1,70,000	Platinum	15 %	6
Wipro, Gurgaon	2005	1,75,000	Platinum	8 %	5
Grundfos Pumps, Chennai	2005	40,000	Gold	6 %	3
Technopolis, Kolkata	2006	72,000	Gold	6 %	3
Spectral Services Consultants Office, Noida	2007	15,000	Platinum	8 %	4
HITAM, Hyderabad	2007	78,000	Silver	2 %	3

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.

C40 CITIES BLOOMBERG PHILANTHROPIES AWARDS

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**

2019 C40 Cities Bloomberg Philanthropies Awards Finalists:

CITY	CATEGORY	PROJECT
Portland, Oregon, USA	***Resilience***	Crystal Springs Watershed Restoration
Medellín, Colombia	***Resilience***	Avenida Oriental Green Corridors
Quezon City, Philippines	***Resilience***	Quezon City's Socialized Housing Program
National Capital Territory (NCT) of Delhi, India	***Resilience***	"Jal Swaraj" Safe Drinking Water Initiative
Bengaluru, India	***Green Mobility***	"Tender SURE" Urban Street Design for People
Bogotá, Colombia	***Green Mobility***	"Muévete Mejor" Business Network for Mobility
Kolkata, India	***Green Mobility***	Low Carbon Commute Transition
New York City, USA	***Renewable Energy***	Efficiency, Electrification and Renewable Energy Mandate
London, UK	***Renewable Energy***	Zero Carbon Requirement for New Development
Cape Town, South Africa	***Renewable Energy***	Small-Scale Energy Generation Program
Seoul, South Korea	***Renewable Energy***	Solar City Expansion

Business Benefits Expected From Green Building Investments

(Medians Reported in 2012, 2015 and 2018)

	New Green Building		
	2012	2015	2018
Decreased 12-Month Operating Costs	8%	9%	8%
Decreased 5-Year Operating Costs	15%	14%	14%
Increased Asset Value (According to Owners)	5%	7%	7%
Payback Time for Green Investments	8 Years	8 Years	7 Years

	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.**

of their projects green, and moderate growth in this level of green activity is expected in the future.

Client demands is the top trigger in Canada, selected by a much higher percentage (50%) than the global average (34%).

61% in Canada consider **improved occupant health and well-being** a top social reason for building green.

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.

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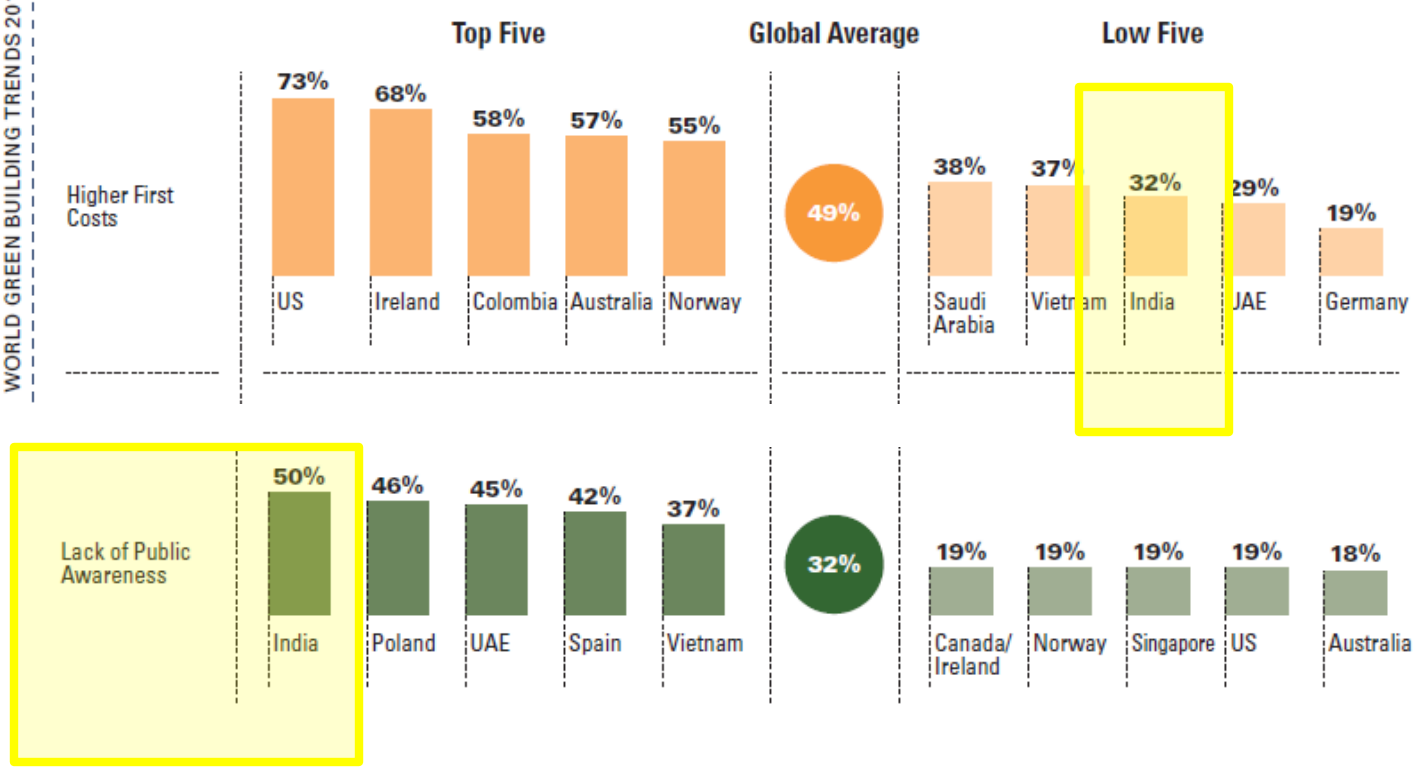
Countries With the Highest and Lowest Percentages Selecting the Top Barriers to Green Building Activity

Dodge Data & Analytics, 2018

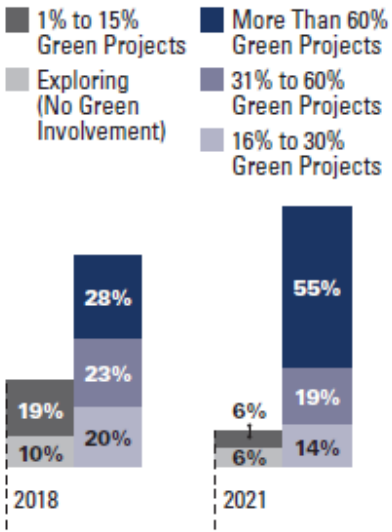


Green Building Activity and Trends in India

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

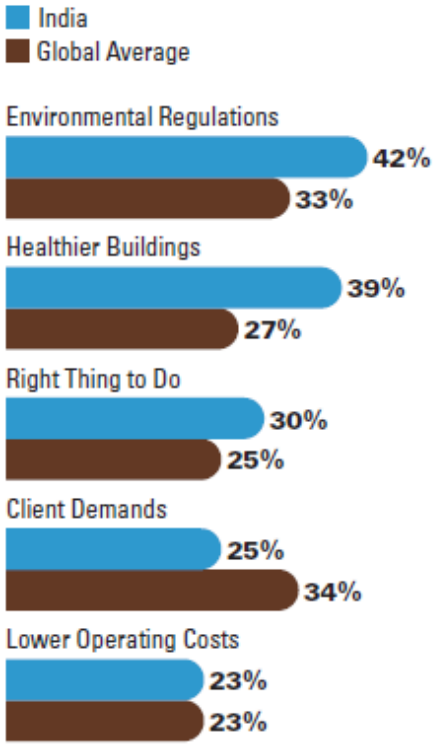


ENVIRONMENTAL REASONS

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



ACCORDING TO THE SUSTAINABLE DEVELOPMENT REPORT 2019 BY UNITED NATION

INDIA

East and South Asia

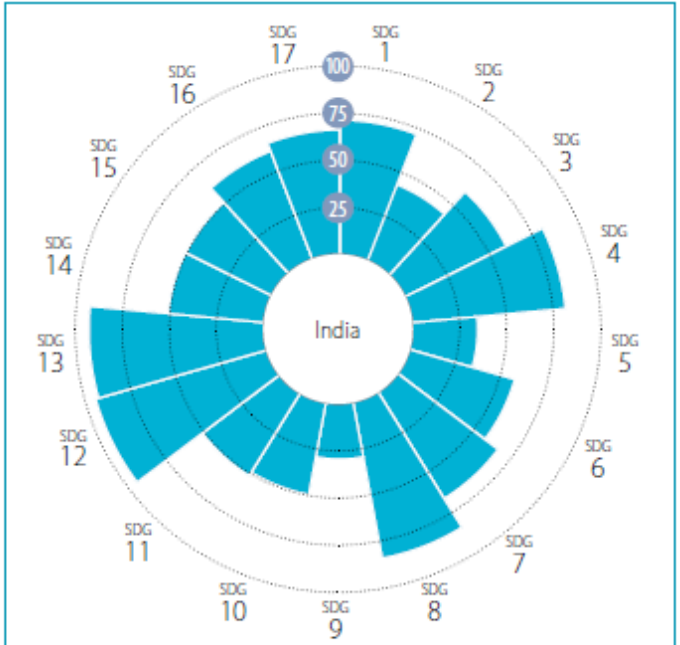
▼ OVERALL PERFORMANCE

Index score	Regional average score
61.1	65.7

SDG Global rank 115 (OF 162)

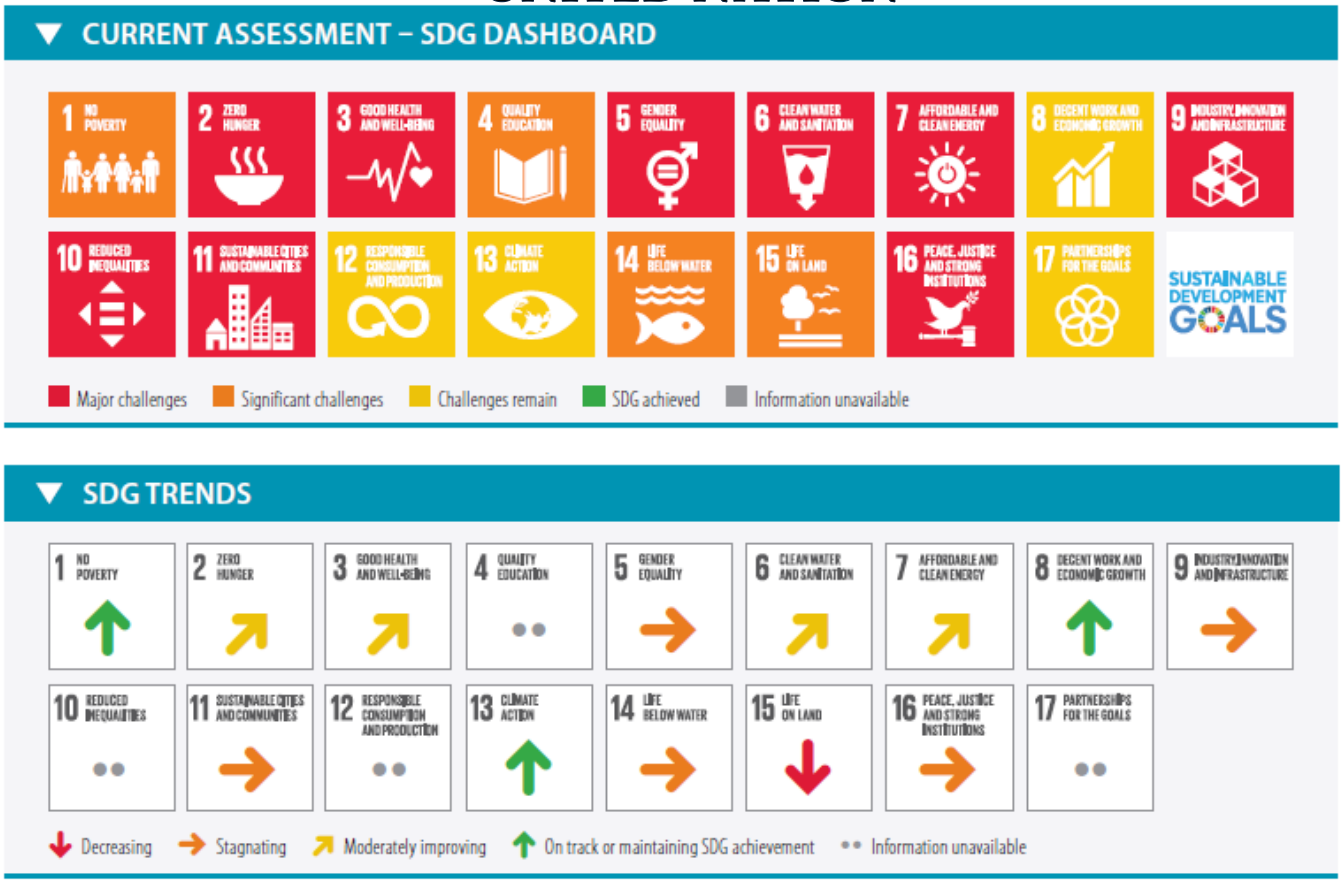
▼ SPILLOVER INDEX

100 (best) to 0 (worst)



▲ AVERAGE PERFORMANCE BY SDG

ACCORDING TO THE SUSTAINABLE DEVELOPMENT REPORT 2019 BY UNITED NATION



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