



Bureau of Energy Efficiency



सत्यमेव जयते
Government of India
Ministry of Power



german
cooperation
DEUTSCHE ZUSAMMENARBEIT

giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

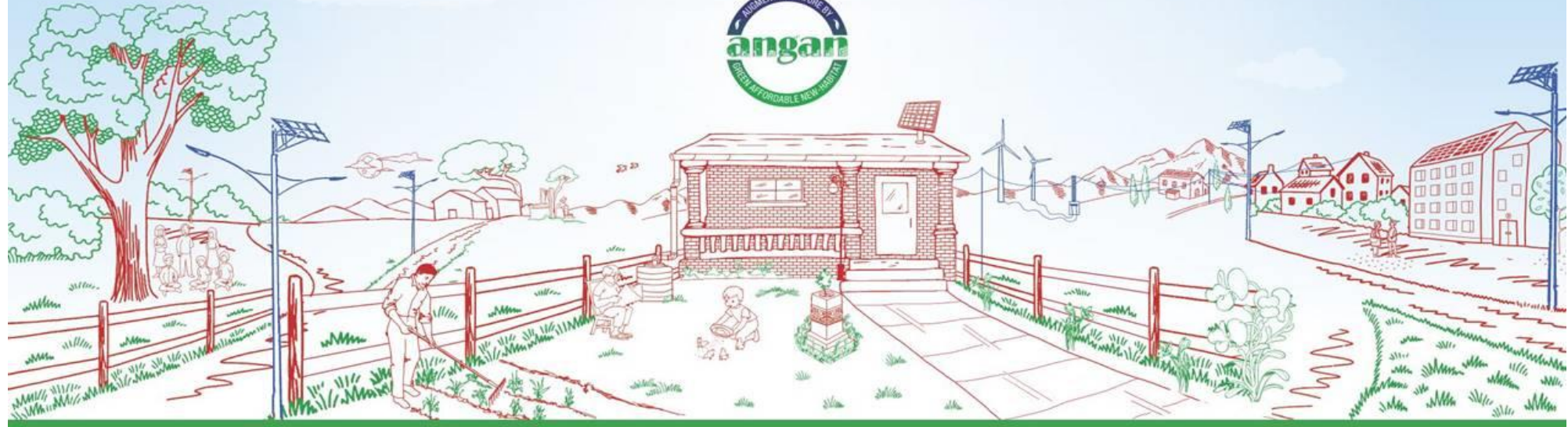
ANGAN

Augmenting Nature by Green Affordable New-habitat

A Courtyard for Revolutionary Change in Building Energy Efficiency

An International Conference on Building Energy Efficiency

9th-11th September, 2019 | Hotel The LaLiT, New Delhi





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THIS PRESENTATION WAS SHARED BY

Ms. Mili Majumdar

Managing Director, GBCI, New Delhi

FOR THE SESSION:

Policy Framework for Energy Efficiency in Buildings (Rating and Labelling System)”

DURING ANGAN 2019

Knowledge Partner

teri | THE ENERGY AND
RESOURCES INSTITUTE
Creating Innovative Solutions for a Sustainable Future

Event Partner

TEC INDIA™
EVENT & BRAND MANAGEMENT CO.

Revisiting Rating System Narrative: Connect Performance and people

Angan 2019, September 10, New Delhi



Mili Majumdar
Managing Director , GBCI, India
Sr. Vice President , U.S. Green Building Council



LEED

LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN

WHAT MAKES USGBC SPECIAL & UNIQUE

- #1 OUR VISION
- #2 LEED V4.1
- #3 WE SCALE IDEAS BY IMPLEMENTING THEM WELL IN PROJECTS
- #4 OUR ECO-SYSTEM OF LEADERS
- #5 PARTNERSHIP IS THE NEW LEADERSHIP
- #6 ✓ PERFORMANCE IS THE FUTURE OF GREEN BUILDINGS, COMMUNITIES & CITIES
- #7 ✓ LIVING STANDARD - LET'S OPEN OUR HEARTS & MINDS TO WHAT'S POSSIBLE
- #8 "GREEN BUILD"
- #9 MEMBERSHIP & LEED PROFESSIONALS
- #10 USGBC COMMUNITY - WE CARE DEEPLY ABOUT OUR FELLOW HUMANS - KNOWN & ARE UNKNOWN AROUND THE WORLD.

Key outcomes of applying a rating system

Perform to sustain

Better living standard
for people



LEED v4.1 for Operations & Maintenance: Existing Buildings Scorecard

Y	?	N		
0	0	0	Location and Transportation	14
			Prereq Transportation Performance	14

Y	?	N		
0	0	0	Sustainable Sites	4
			Credit Rainwater Management	1
			Credit Heat Island Reduction	1
			Credit Light Pollution Reduction	1
			Credit Site Management	1

Y	?	N		
0	0	0	Water Efficiency	15
			Prereq Water Performance	15

Y	?	N		
0	0	0	Energy and Atmosphere	35
Y			Prereq Energy Efficiency Best Management Practices	Required
Y			Prereq Fundamental Refrigerant Management	Required
			Prereq Energy Performance	33
			Credit Enhanced Refrigerant Management	1
			Credit Grid Harmonization	1

Y	?	N		
0	0	0	Materials and Resources	9
Y			Prereq Ongoing Purchasing and Waste Policy	Required
Y			Prereq Facility Maintenance and Renovations Policy	Required
			Prereq Waste Performance	8
			Credit Purchasing- Ongoing	1

Y	?	N		
0	0	0	Indoor Environmental Quality	22
Y			Prereq Minimum Indoor Air Quality	Required
Y			Prereq Environmental Tobacco Smoke Control	Required
Y			Prereq Green Cleaning Policy	Required
			Prereq Indoor Environmental Quality Performance	20
			Credit Green Cleaning	1
			Credit Integrated Pest Management	1

Y	?	N		
0	0	0	Innovation	1
			Credit Innovation	1

Y	?	N	TOTALS	Possible Points: 100
0	0	0		

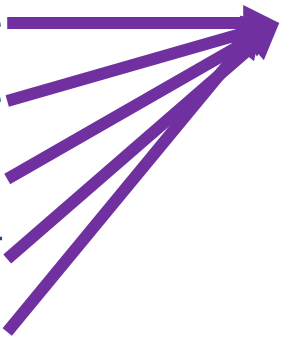
Certified: 40-49 points, Silver: 50-59 points, Gold: 60-79 points, Platinum: 80+ points

arc

The image features the lowercase letters 'arc' in a bold, orange, sans-serif font. To the right of the letter 'c' is a graphic element composed of five concentric, curved lines that fan out from the top to the bottom. The lines are colored from top to bottom: orange, grey, teal, blue, and lime green. The lines are separated by thin white gaps and are positioned such that they appear to be part of the 'c' or a continuation of its curve.

LEED v4

Minimum Energy Performance
Optimize Energy Performance
Renewable Energy Production
Green Power and Carbon Offset
Energy metering

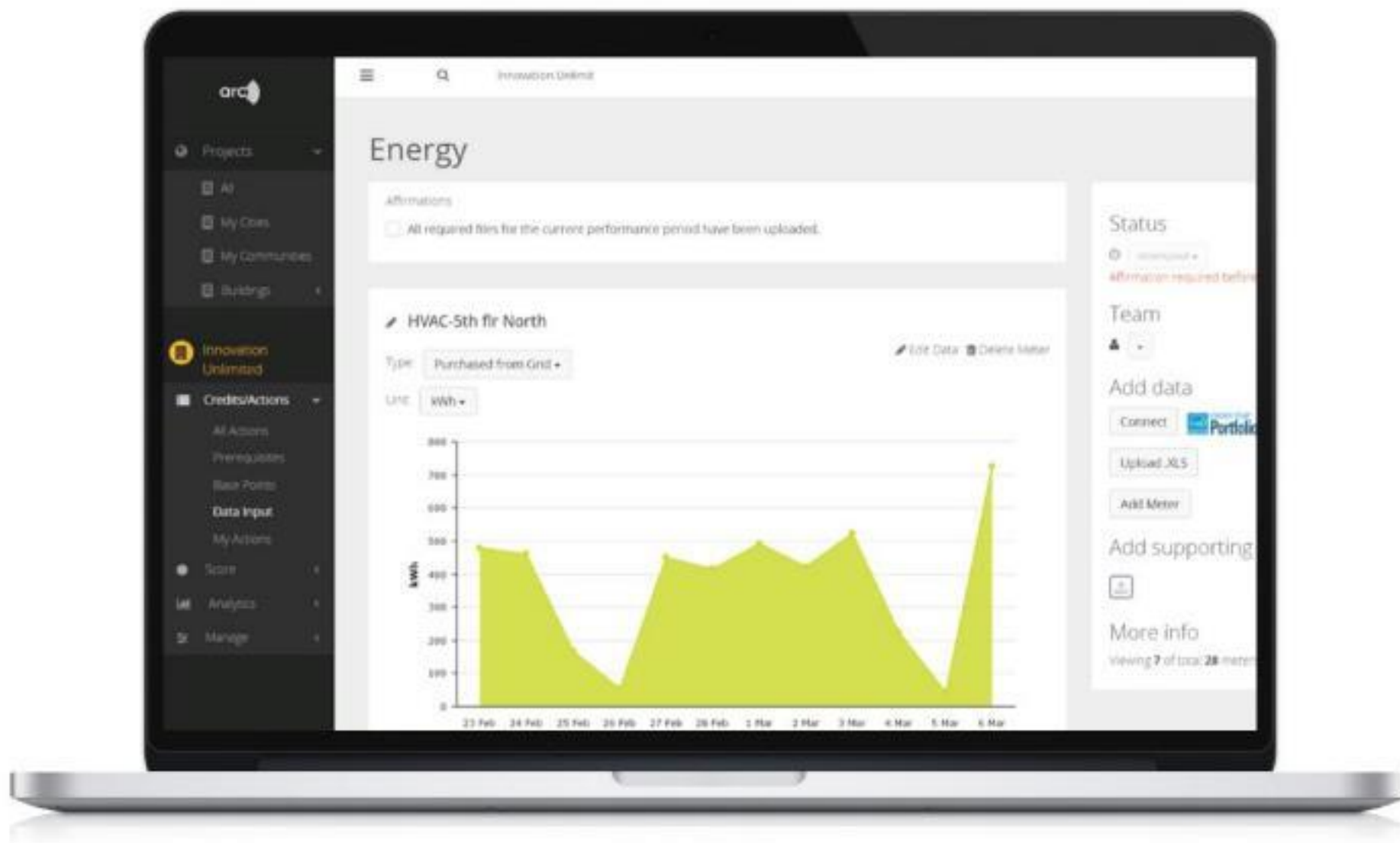


LEED v4.1

Energy Performance

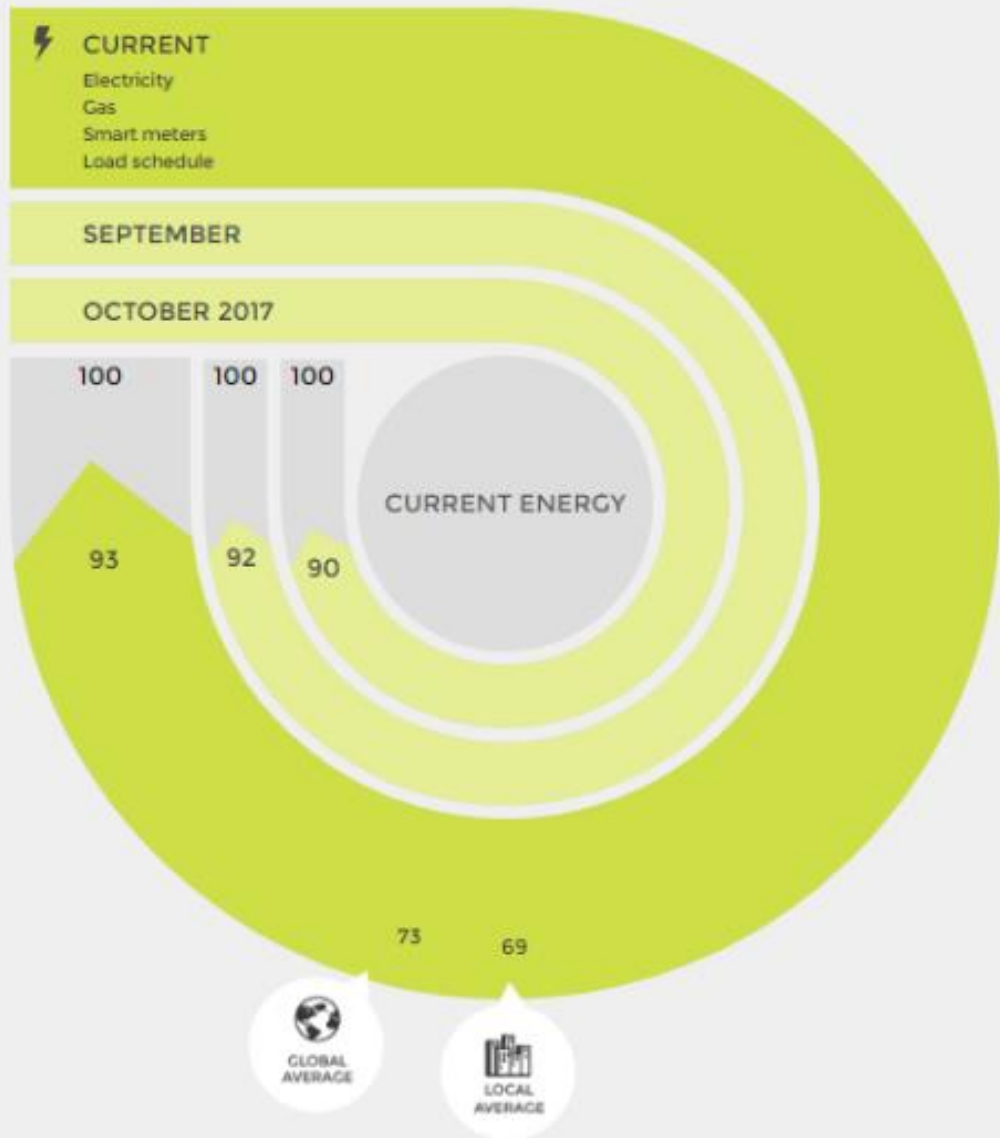
Credit evaluated through performance score

ENTER DATA:

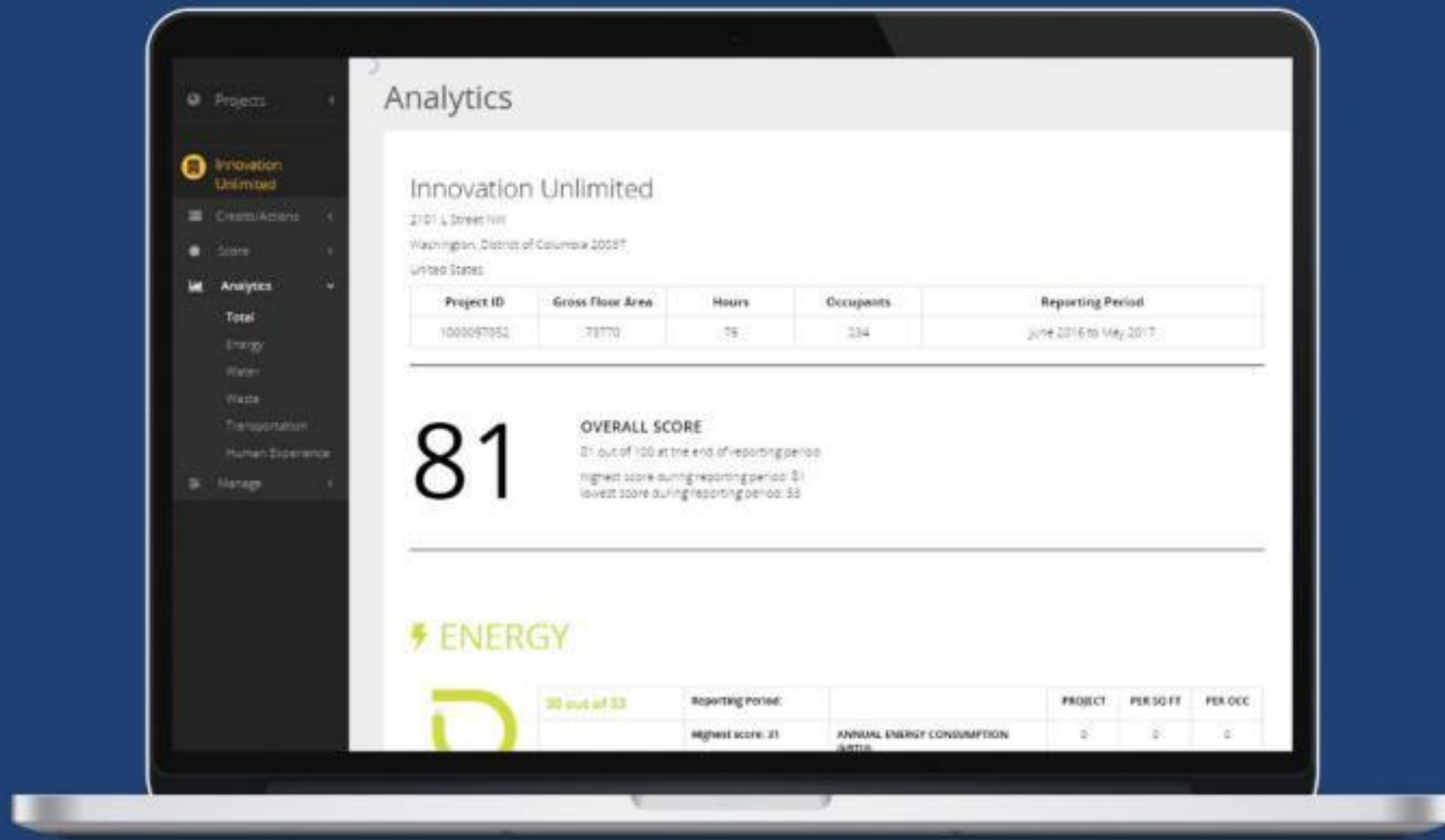


VISUALIZE SCORE:





ANALYTICS



- Waste
- Transportation
- Human Experience

Analytics



- Total
- Energy**
- Water
- Waste
- Transportation
- Human Experience

Manage

- Project
- Team
- Certifications
- Apps
- Billing
- Agreements
- Settings
- Score Version

CARBON CONSUMPTION

Per year ▼

	Limited Scope 1	Limited Scope 2
 MTCO ₂ e/ occupant	0.000000	0.986486
 MTCO ₂ e/ square foot	0.000000	0.001484

If I reduce my emissions by

2%

My new **energy** score will be

31

↑ 0POINTS

If I want to increase my score by

+1

I will need to reduce emissions by

↓ **76%**



Projects >

Innovation Beyond

Portfolio

Overview >

Projects

Analytics >

Total

Carbon

Energy

Water

Waste

Transportation

Human Experience

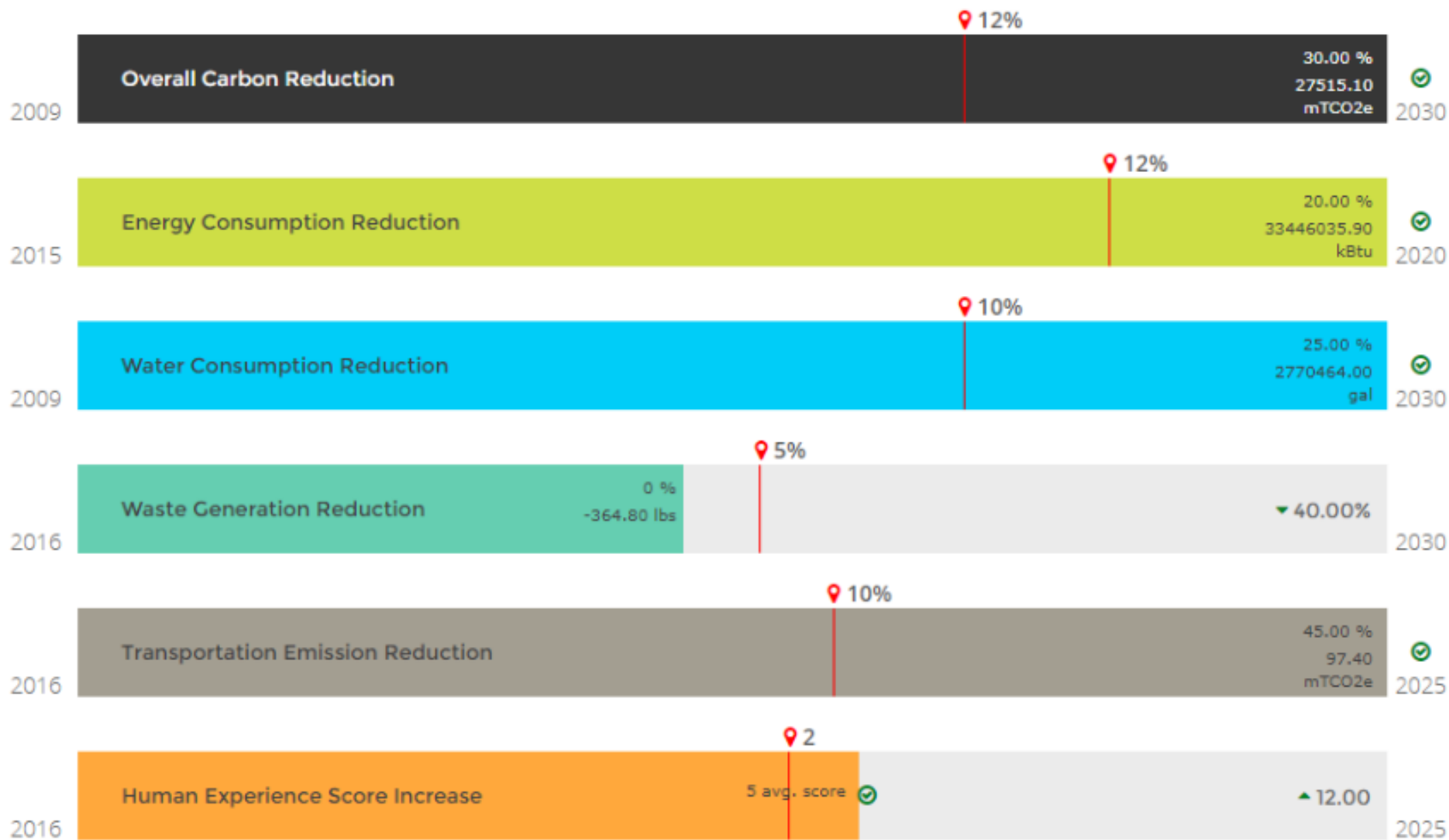
Goals

History

Manage >

📍 = Incremental goal for this year

✅ = Goals Achieved



ASCENDAS PINNACLE From Silver to Gold



An aerial photograph of a city at dusk. The city is illuminated with warm lights, and a large body of water is visible on the right side. In the background, there are mountains under a dark, cloudy sky. The text "BEYOND BUILDINGS." is overlaid in the center of the image.

BEYOND BUILDINGS.



LEED FOR CITIES AND COMMUNITIES INCORPORATES OUR
EXPERIENCES WITH 160+ GLOBAL CITIES AND COMMUNITIES

LEED for Cities and Communities is Aligned with Global Goals



DATA DRIVEN AND PERFORMANCE BASED



EVIDENCE BASED AND CONTINUOUSLY IMPROVING



Plan and Design

Develop

Measure

Continuously Improve



We believe that LEED Certification will help Surat City in creating image of "City with Green Initiatives". Also, this will help us in attracting best practices and technologies from developed countries.

- Mr Nagarajan, CEO, Surat Smart City Development Limited and Deputy Commissioner of Surat Municipal Corporation

Location	Surat, Gujarat, India
City Area	326 square kilometre
Population	5.32 Million
Project owner	Surat Municipal Corporation
Stakeholders	Hydraulic Department, Drainage Department Social Welfare Department, Solid Waste Management Department, Department on Election and Census, Traffic Cell and BRTS Cell, Health Department, Gujarat Pollution Control Board (GPCB) and Citizens

About the city

- **First city in Asia** to achieve **LEED Platinum Certification**, with a score of 87 points in total.
- Achieved **full points** in Energy, Water and Transportation Categories.
- It is the **8th largest city and fastest growing city in India** known for various industries including textile processing, diamond cutting and polishing, petrochemical, thermal power, fertilizer and heavy engineering.
- The city has secured **4th position** among 100 participating cities under **Smart City Mission** announced by central government.
- Surat city has been **certified with ISO 37120 Certification** with Gold Level In year 2016.
- Surat has **adopted City Resilience Strategy**, developed in partnership with ACCRN, SMC, TARU.
- Surat stands as **4th cleanest city in India** under Swachh Bharat Abhiyan.

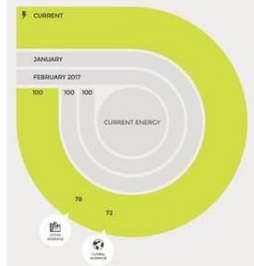
KEY METRICS

4.06	Annual GHG emission in tCO ₂ e per capita
146	Water consumption in liters per capita per day
0.33	Waste generated in tonnes per capita per day
3%	Waste diverted from going to landfill
2.83	Vehicle miles travelled daily in miles per capita
37.75%	Population with (at least) High School degree
9.85%	Population with (at least) Bachelor's degree
15.97%	Median gross rent as % of household income
0.35	Gini coefficient
3,75,600	Median household income (INR per Year) or USD 5924
0.29%	Unemployment rate
91	Median air quality index
48	Air quality days unhealthy for sensitive groups (Days/yr)
0.00012	Violent Crime in per capita per year



STORY BEHIND THE NUMBERS

Energy



Energy score
33/33

Surat city's target is to reduce energy demand by 10% with renewable energy and energy efficiency initiatives.

Renewable Energy (RE) initiatives:

- 1. Solar PV installation** - 30 MW of Solar Power Plants by the end of 2019-20 of which 1.39 are commissioned.
- 2. Biogas based power plants** – 6 MW plant in progress and installation of 10 MW of MSW based power plants is targeted. Also, 5.4 MWe of Biogas based power plants required of which 3.5 MWe are already commissioned and in operation and 1.9 MWe is in pipeline.
- 3. Wind mill installation** - 55 MW of Wind Power Plants by the end of 2019-20. Out of which 17.7 MW capacity are already commissioned and in operation.

Energy Efficiency (EE) measures:

- 1. Efficient water supply system** – Reengineering of water transmission routes, replacement of inefficient machinery.
- 2. Efficient street lighting system** – Replacement of conventional luminaires with energy efficient ones, switching "OFF" Streetlights during low traffic, installation of energy conservation feeder pillar.

Water



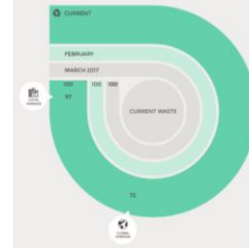
Water score
15/15

Water supply - Coverage of direct municipal water supply in Surat is 94%.

Rainwater Harvesting – Subsidy scheme for Rain Water Harvesting at Residential societies, apartments, Industrial units, Open plots by municipal corporation. 90 RWH structures completed till date and 500 RWH structures planned.

Water Audits - Targets to achieve reduction in water losses and achieve NRW of 15% by regular water audits and leakage mapping.

Waste

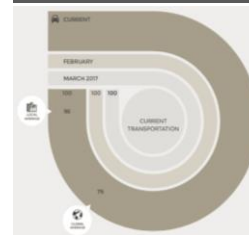


Waste score
8/8

Surat city aims to increase the percentage of MSW diverted from going to landfill from 3% (50 TPD) to 80% (1610 TPD) in the future years by:

- Composting, Vermi-composting, Bio-methanation – 300 TPD
- Refuse Derived Fuel (RDF) – 300 TPD
- Waste to Energy – 1000 TPD
- Others – 10 TPD

Transportation



Transportation score
14/14

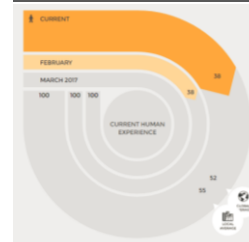
Initiatives to improve traffic related experience:

Traffic Islands have been made which are theme based traffic junctions to improve experience on road and reduce traffic congestion.

Bus Rapid Transit System in Surat:

Surat aims to shift major traffic flow from private vehicles to BRTS to counter rising traffic congestion in the city. Development in 2 phases of 29.7 km and 58 km each.

Human Experience



Human Experience score
14/14

Use of e-governance and ICT for administration:

- Facility of online payments.
- Vaccination Alert System via SMS intimation.
- First ULB in India to launch Mobile App for citizen centric information & service delivery.

Monitoring ambient air quality:

- Continuous air quality monitoring by state pollution control board of 12 pollutants - PM10/2.5, NO₂, SO₂, CO, O₃, NH₃, Pb, As, Ni, Benzene at 7 stations across city.
- Mobile pollution-monitoring vans across city.

WHAT MAKES USGBC SPECIAL & UNIQUE

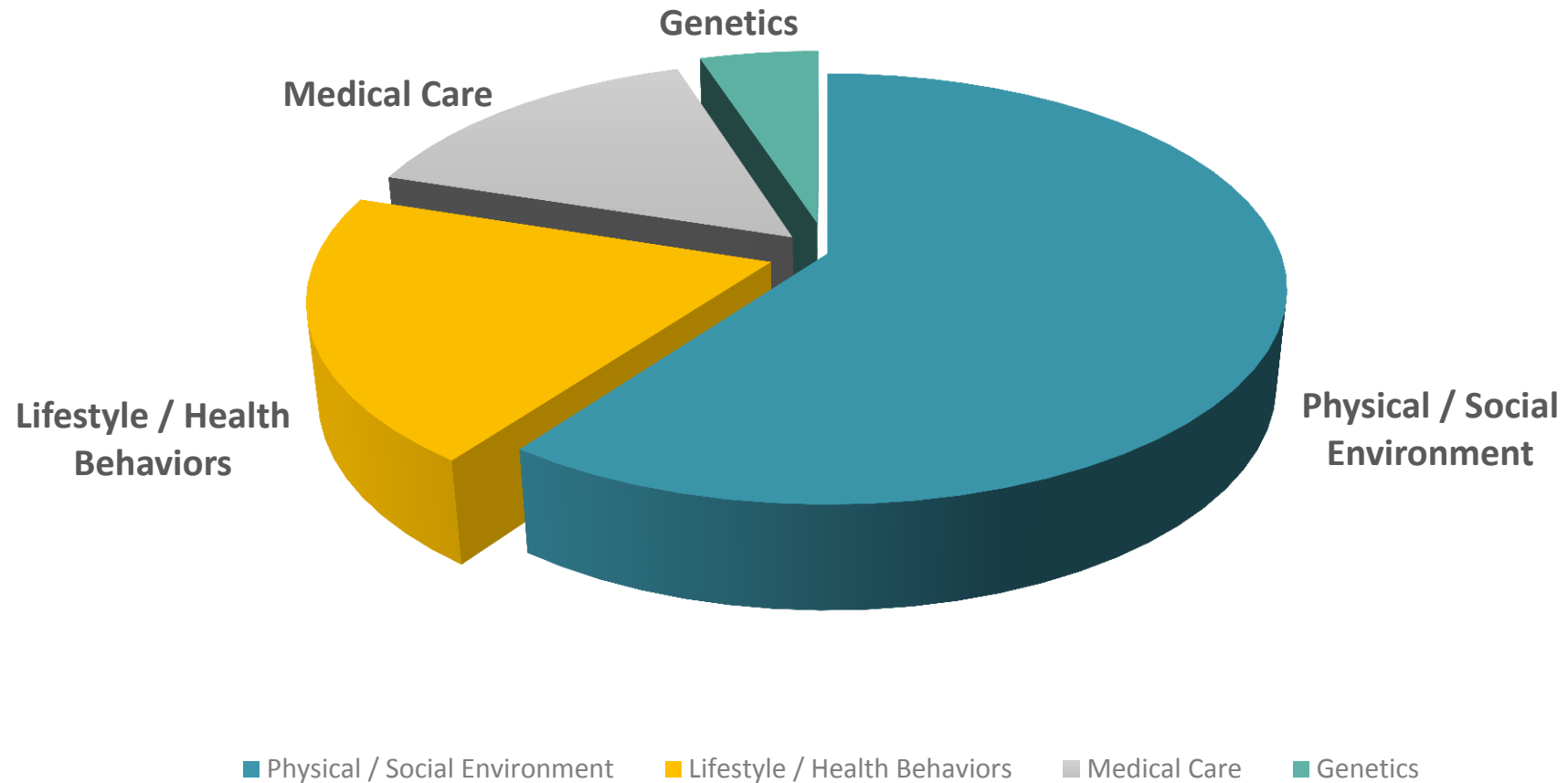
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Key outcomes of applying a rating system

Perform to sustain

Better living standard
for people

WHAT FACTORS INFLUENCE HEALTH?



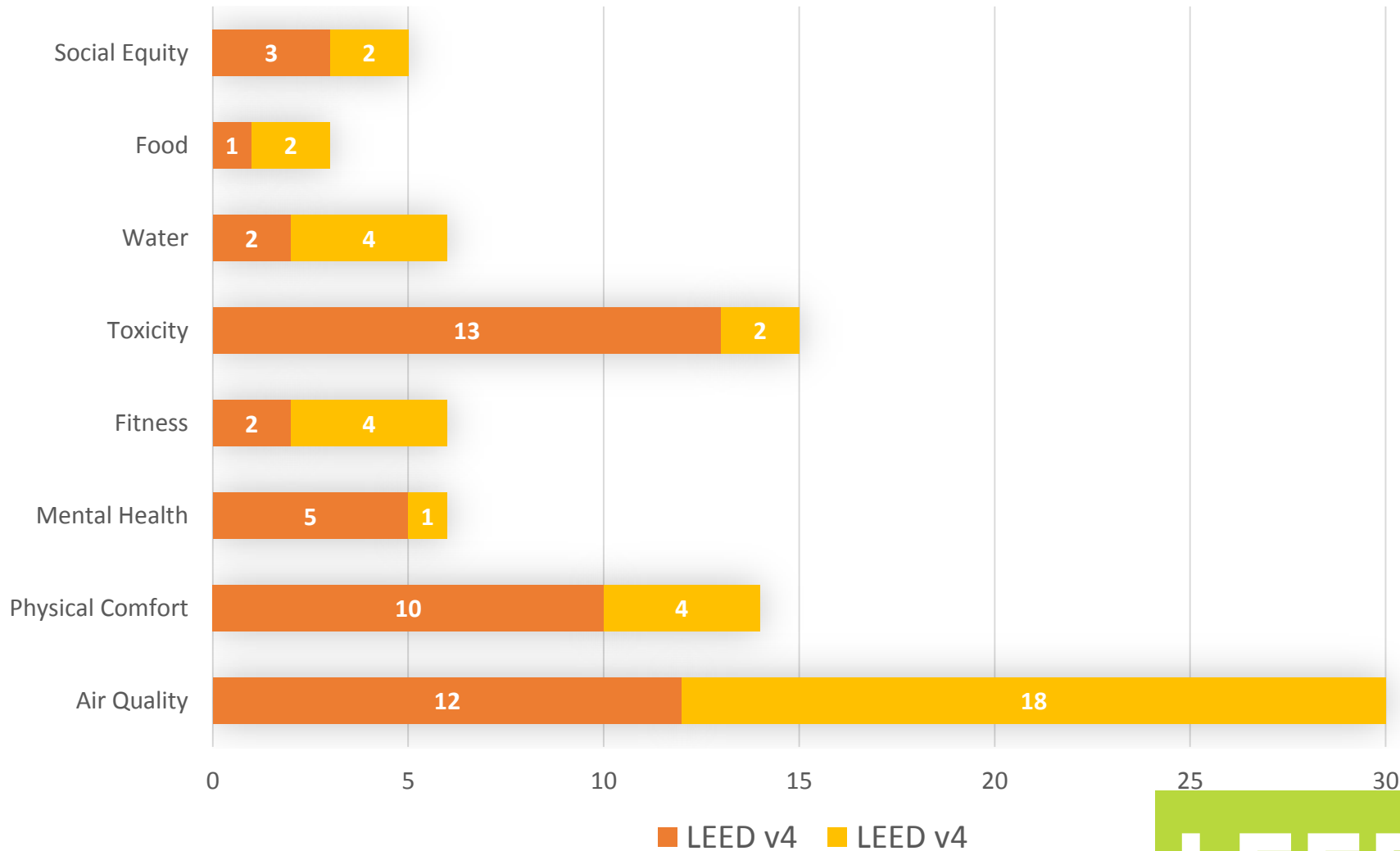




HUMAN CENTRIC



LEED v4.1 HEALTH & WELLNESS MAPPING



LEED V4 (BD+C;ID+C;O+M)		
HEALTH		
PARAMETERS	MICRO	MACRO
Air Quality	12	18
Physical Comfort	10	4
Mental Health	5	1
Fitness	2	4
Toxicity	13	2
Water	2	4
Food	1	2
Social Equity	3	2

60 OUT OF **81** CREDITS
RELATE TO HEALTH &
WELLNESS **74.07%**

LEED v4.1 (NC; CI; EBOM)

Air Quality

AIR QUALITY

37.04%



OCCUPANT HEALTH

PUBLIC HEALTH

HEALTHY INDOOR AIR

12

REDUCE FOSSIL FUEL COMBUSTION

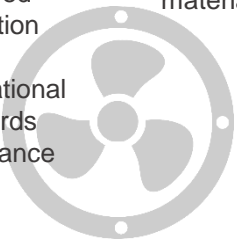
13

MINIMIZE AMBIENT AIR POLLUTION

5

VENTILATION SYSTEM DESIGN

- Improved ventilation design
- International standards compliance



MATERIALS

- use of non toxic materials

OPERATIONS

- Prohibiting smoking indoors
- Nonchemical/ Safe cleaning products
- System efficiency
- Construction measures
- Assessment of occupants comfort
- Monitor Indoor Air Quality

VEHICULAR EMISSION REDUCTION

- Reducing vehicle miles travelled ;
- Encouraging walkability
- Encouraging bicycle commuting
- Promoting alternate low-emission automobiles

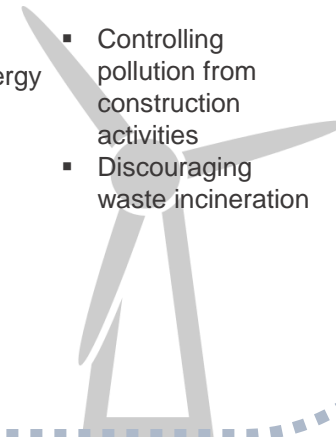


ENERGY CONSUMPTION REDUCTION

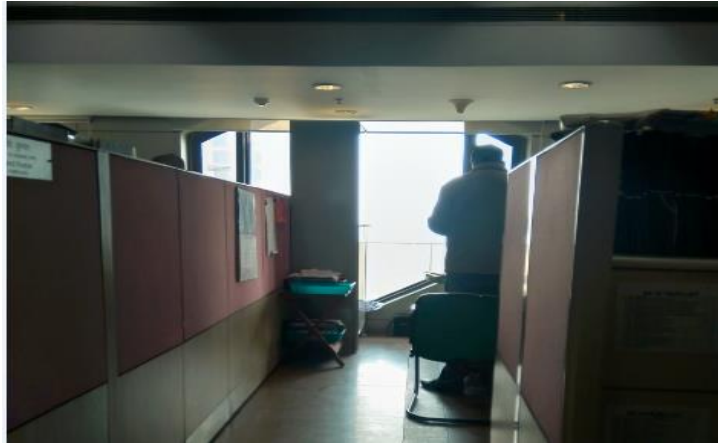
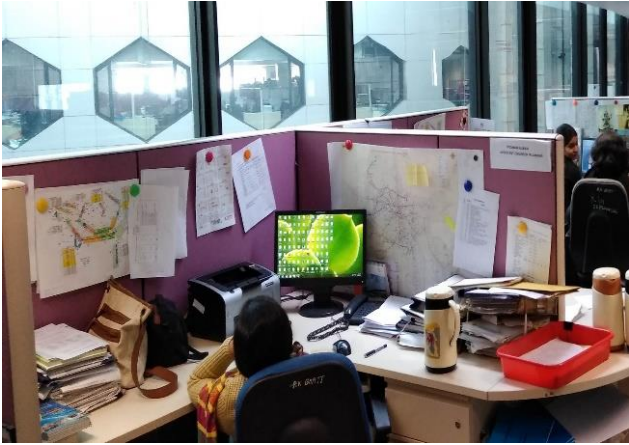
- Reducing energy consumption
- Increasing distribution system efficiency and grid reliability
- Emissions regulation for combustion based products

CLEAN ENERGY GENERATION

- Encouraging renewable energy generation & consumption
- Controlling pollution from construction activities
- Discouraging waste incineration



Case 1: Certified space with poor maintenance and unhealthy housekeeping practices



Inadequate daylight, Less Supplemental lighting; Bad air quality; No air balancing, No biophilic elements

Case 2: Certified space with good maintenance and healthy housekeeping practices



Impact of operational strategies on indoor air quality

Operational issues

- Gap between design and operation
- Poor commissioning practices - improper location or absence of CO₂ sensor

Contaminants	Compliance with ISHRAE IEQ Standard
PM 10	x
PM 2.5	x
NO ₂	x
CO ₂	x



Closed outdoor air damper



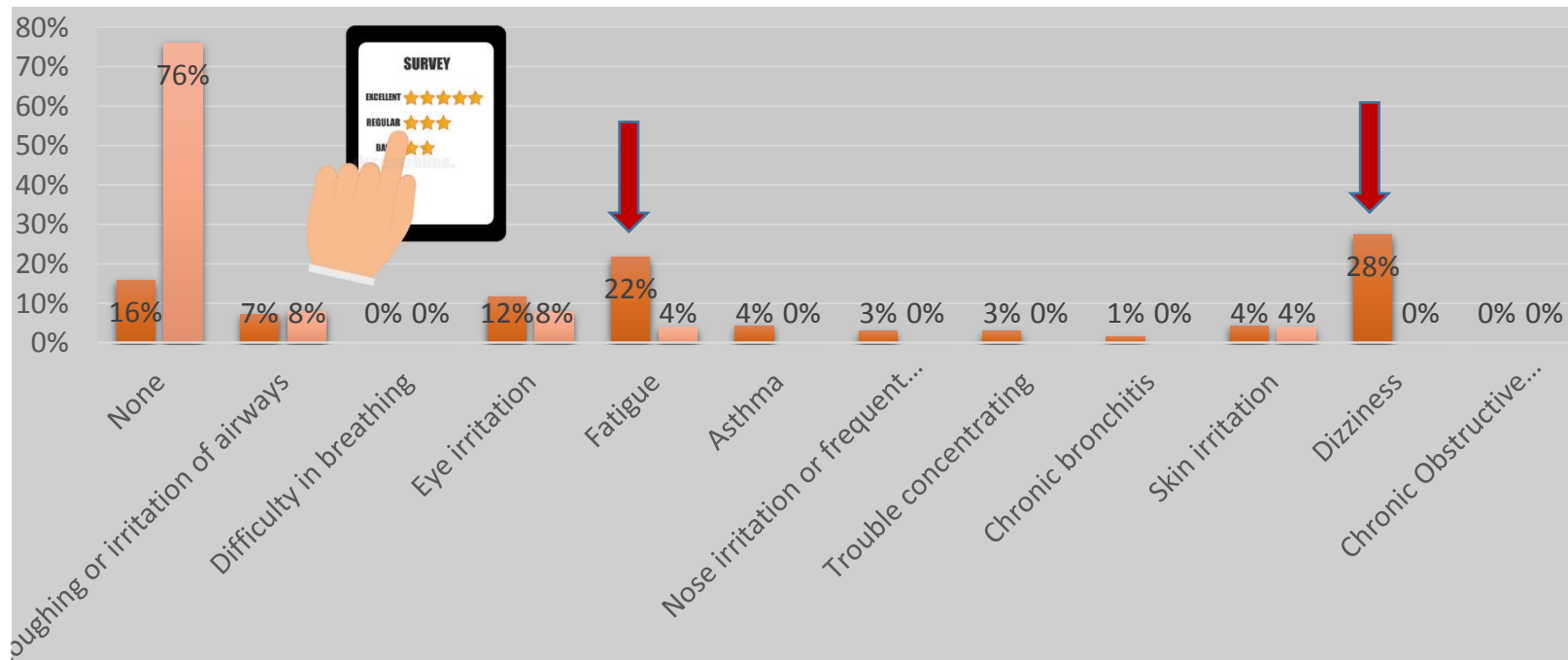
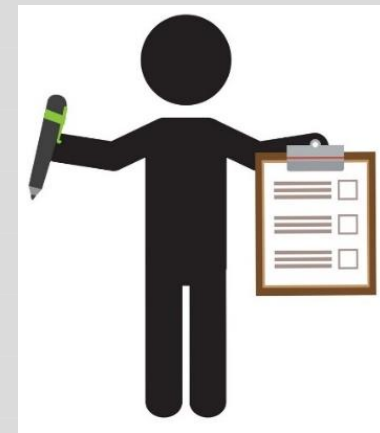
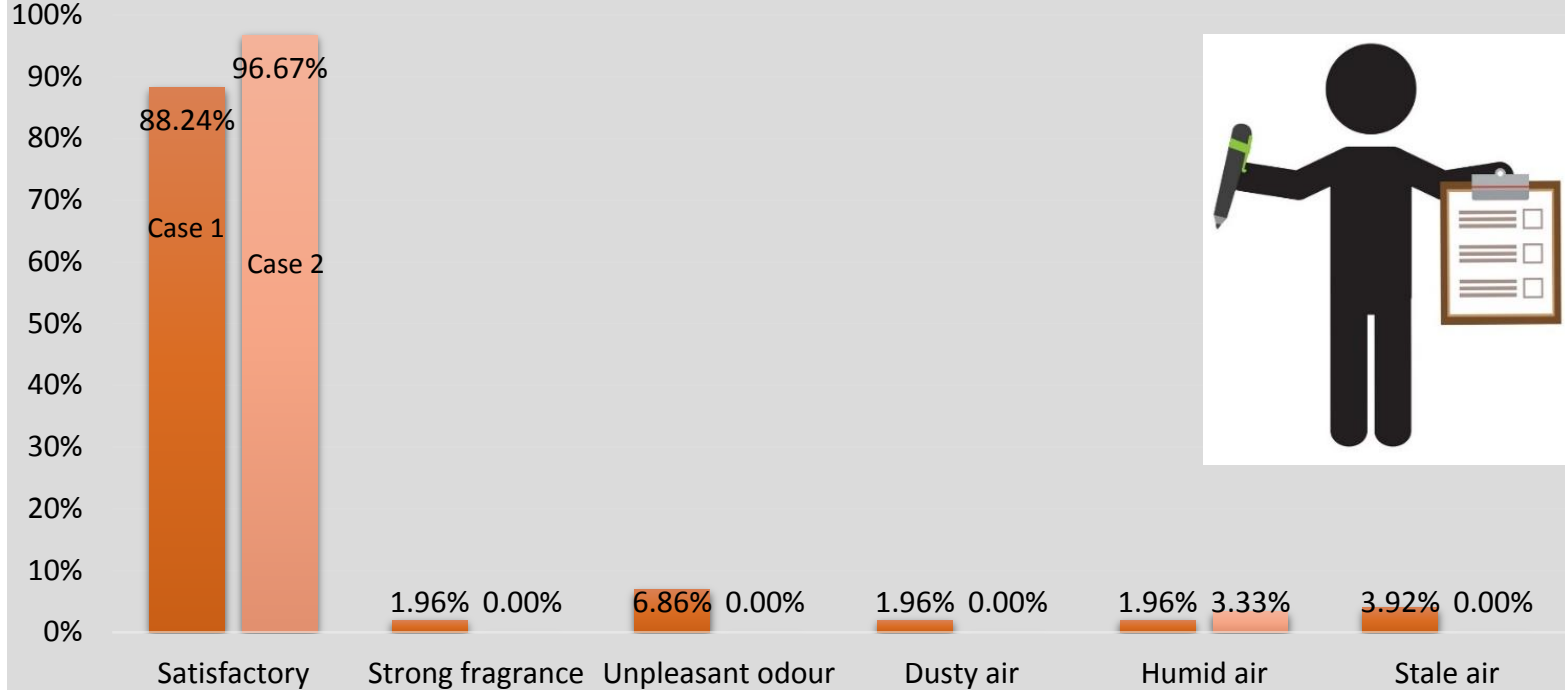
Poor maintenance of filtration systems



Air

Compliance with standard

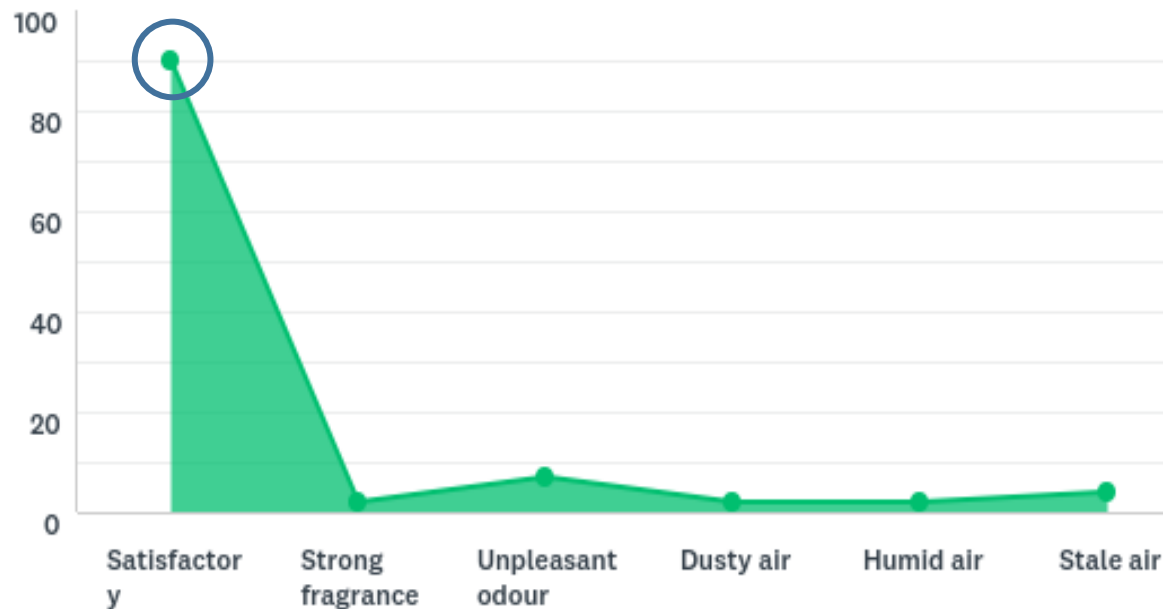
	Case-1	Case-2
CH ₂ O	✘	✓
TVOC	✓	✓
PM 10	✘	✓
PM 2.5	✘	✓
O ₃	✓	✓
NO ₂	✘	✓
CO	✓	✓
CO ₂	✘	✓



Highlighting Latent IEQ issues

Occupant perception may not be representative of the actual indoor air quality, measurement + health issues information.

90% percent people were satisfied with indoor air quality in case 1 although the measurements indicate poor air quality levels.



Contaminants	Compliance with ISHRAE IEQ Standard
	Case 1
PM 10	✘
PM 2.5	✘
NO2	✘
CO2	✘

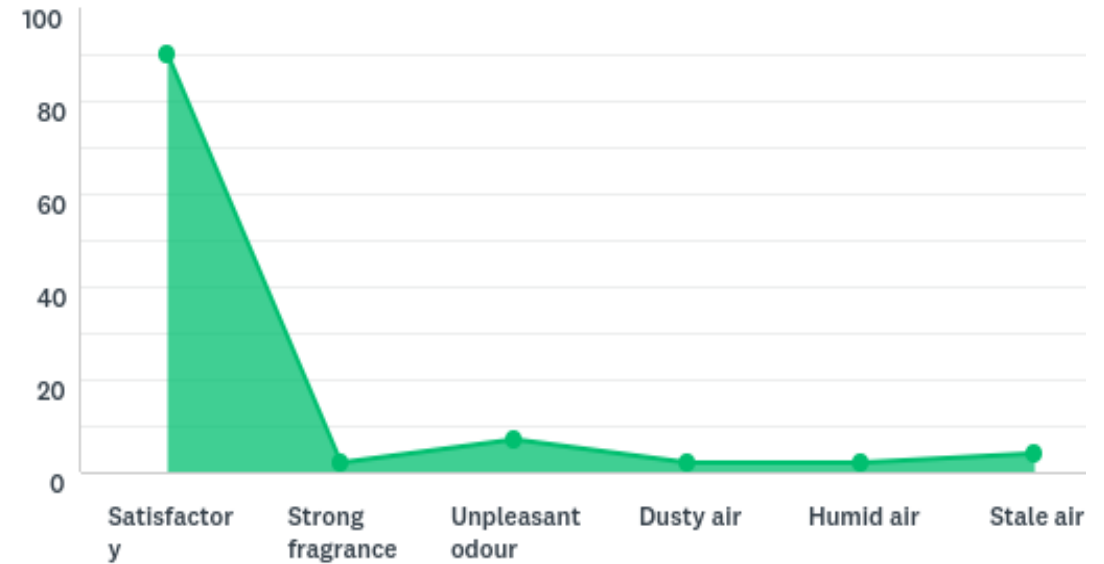
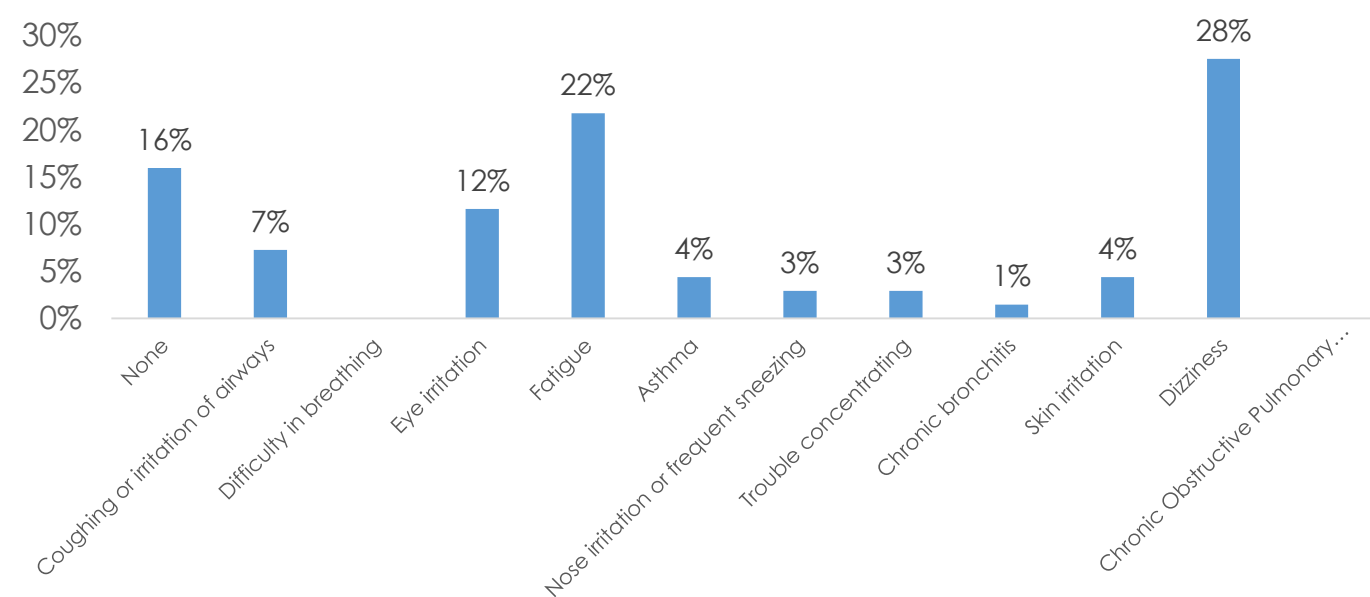
Lack of awareness of IEQ and its impact on comfort & health

Satisfaction levels reported do not match with issues people report

Out of 70 people who attempted this question, **84%** reported some health symptoms that could be related to air quality

90% percent people reported satisfaction with indoor air quality

Case Study 1 (70 responses)



GBCI India office: "LEED" ing by example





GBCI INDIA CORPORATE OFFICE

Noida, India

HAS FULFILLED THE REQUIREMENTS OF THE LEED GREEN BUILDING RATING SYSTEM CERTIFICATION ESTABLISHED
BY THE U.S. GREEN BUILDING COUNCIL AND VERIFIED BY GREEN BUSINESS CERTIFICATION INC.

LEED v4

INTERIOR DESIGN AND CONSTRUCTION: COMMERCIAL INTERIORS

PLATINUM

November 2018

A handwritten signature in black ink, reading 'Mahesh Ramanujam', is written over a horizontal line.

MAHESH RAMANUJAM, PRESIDENT & CEO, U.S. GREEN BUILDING COUNCIL,
PRESIDENT & CEO, GREEN BUSINESS CERTIFICATION INC.

LEED V4 ID+C: Commercial Interiors

Attempted: 91, Denied: 1, Pending: 0,
Awarded: 90 Of 110 Points

81%

Reduction in parking capacity

86%

Indoor Water Use Reduction

v4 MR Credits

Demonstrated achievability of BPDO:
EPD and BPDO: Material Ingredients
credit

36%

Energy cost savings

96%

Building materials including
furniture are VOC compliant

Highest Scoring LEED v4 PLATINUM CI Project in the World (till Nov 2018); Processing “WELL” certification



Satisfaction Rating



EMPLOYEE HEALTH @GBCI INDIA



DAYLIGHT & VIEWS: Dynamic lighting



BIOPHILIA

- *Design measures*
- *Policy interventions*
- *Occupant perception feedback*
- *Regular monitoring*

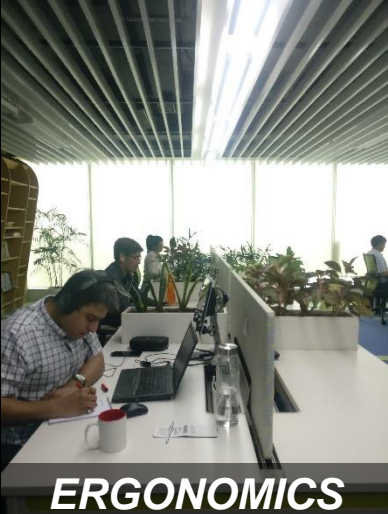
“A continued commitment to health...”



INDOOR AIR QUALITY



VISUAL COMFORT



ERGONOMICS



NOURISHMENT

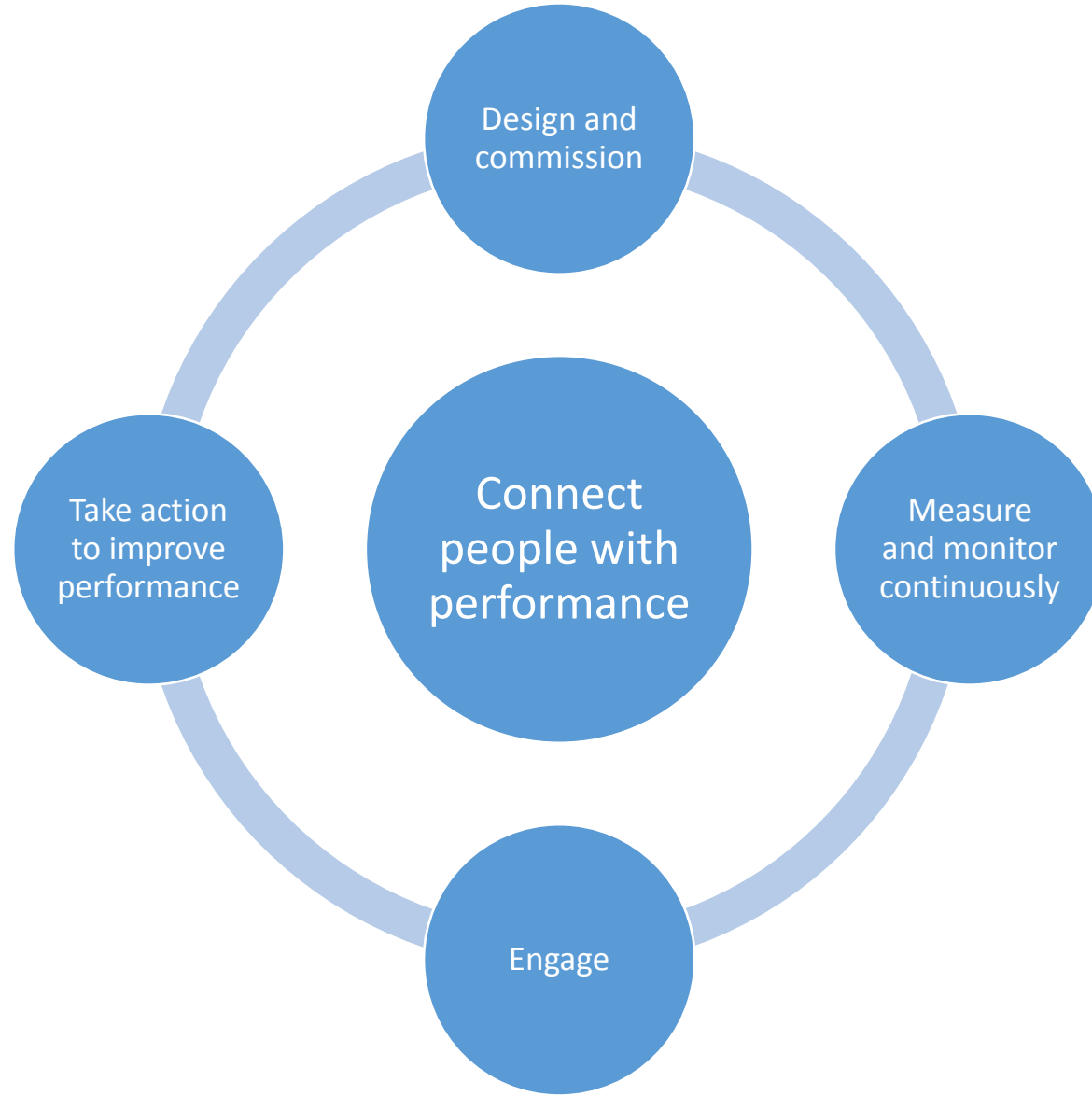


REAL TIME PERFORMANCE MONITORING

Design to perform and

Maintain to perform

Occupant comfort and well being is key to success of any enterprise



LEED ON

