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

Janhavi Parab

Mahindra Lifespaces

FOR THE SESSION:

"Affordable and Sustainable Development: Priorities for India"

DURING ANGAN 2019

Knowledge Partner

teri The Energy and Resources Institute
Creating Innovative Solutions for a Sustainable Future

Event Partner

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Sustainable Urbanisation

Business Responsibility

Environment Stewardship

Community Outreach

Outline

Mahindra LIFESPACES
JOYFUL HOMECOMINGS

- About us… Who we are
- Green Building Approach
- Design Interventions
- Materials Interventions
- Total Cost of Home Ownership

Mission

‘Transforming Urban landscapes by creating sustainable communities’

Customer Value Proposition

Mahindra LIFESPACES
JOYFUL HOMECOMINGS

Our green buildings continue to optimise natural resource consumption across their life cycles.

MLDL

Mahindra Lifespace Developers Limited

Our world cities continue to improve quality of life, living and livelihood.

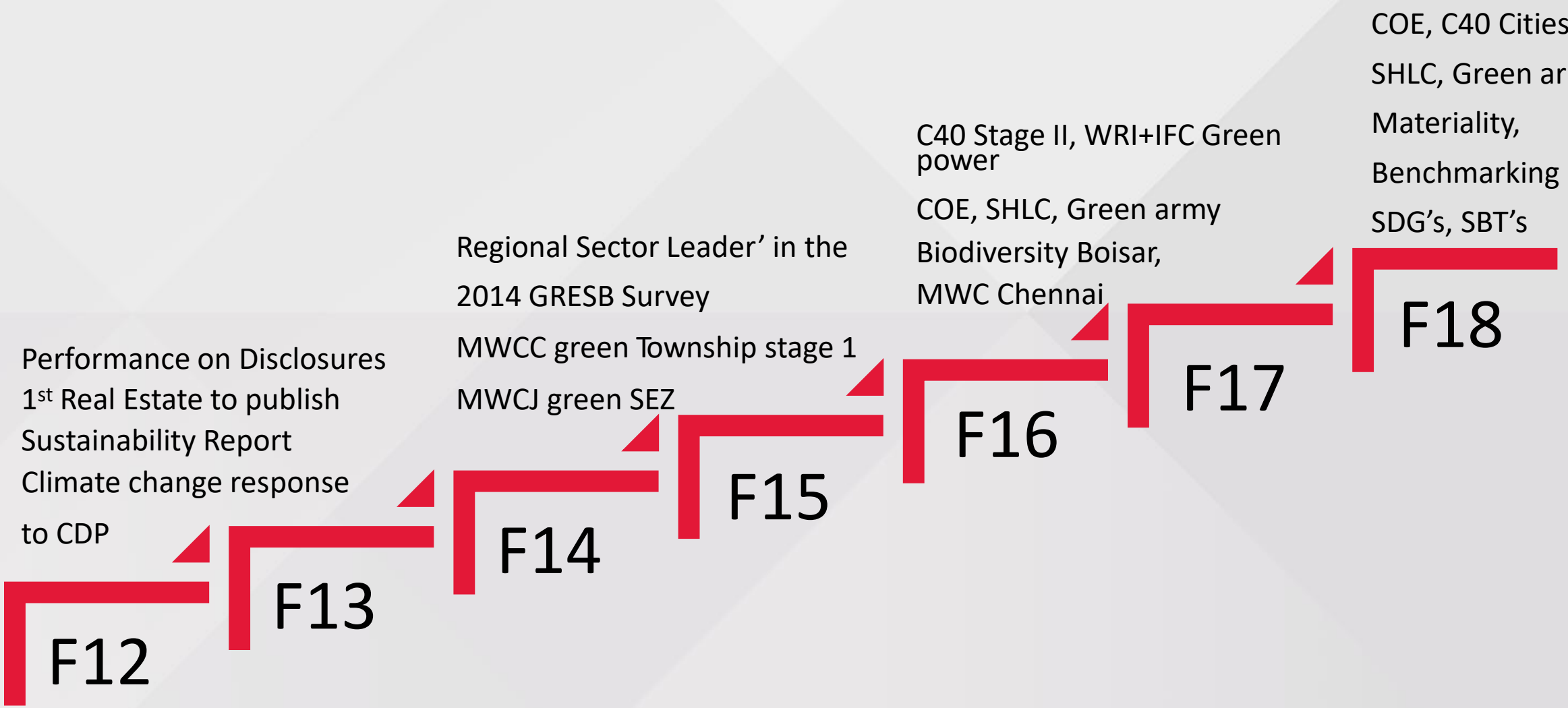
IC & IC

Integrated Business Cities and Industrial Clusters

Our affordable housing projects continue to help thousands realise their dream of owning a house.

Happinest

Sustainability Journey so far



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Green Buildings way of life....

Green Building Approach…

- Schematic Design- project feasibility, decision on targets/ ratings
- Design development- modifications as per Green norms
- Pre-certification- commitment, project launch
- Execution- monitor and revisit
- Certification- Validation

Green Building Approach...GRIHA as enabler

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LIFE CYCLE CONSIDERATIONS... HOLISTIC APPROACH

E

- Site Selection and Planning
- Construction Management
- Water Efficiency
- Energy Efficiency
- Occupant comfort well being
- Sustainable Materials
- Solid Waste Management

S

SOCIO-ECONOMIC STRATEGIES

G

PERFORMANCE MONITORING & VALIDATION

Green Building Process...GRIHA as enabler

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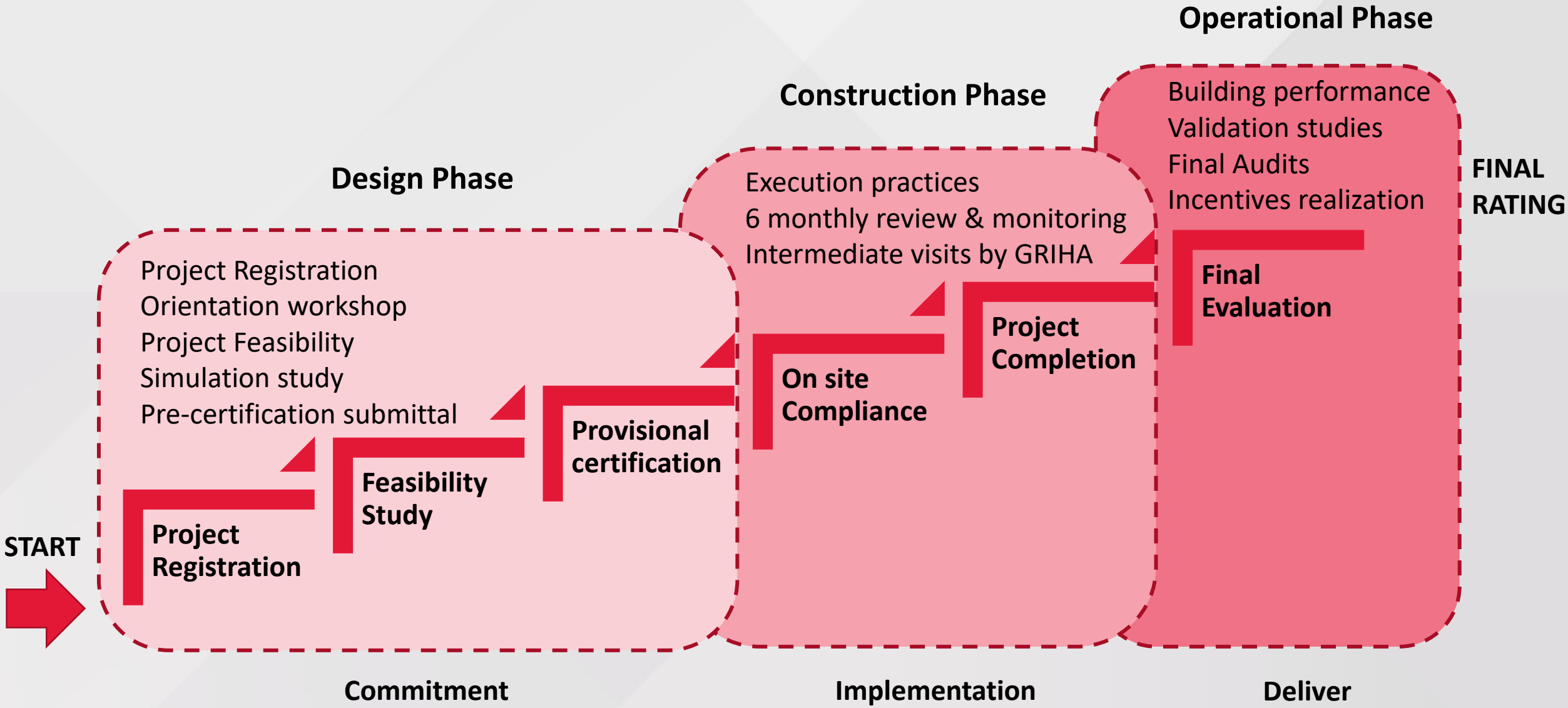

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Passive Design Strategies

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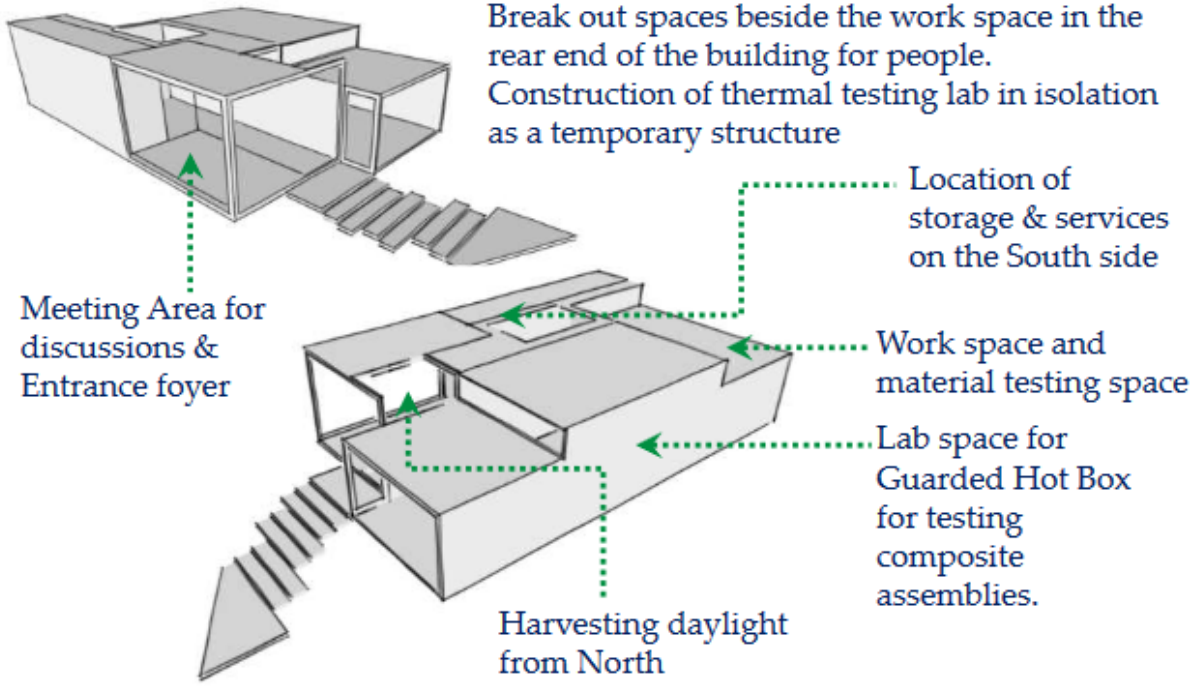
Conceptualization & Zoning



Study model and Simulations

Active Design Strategies

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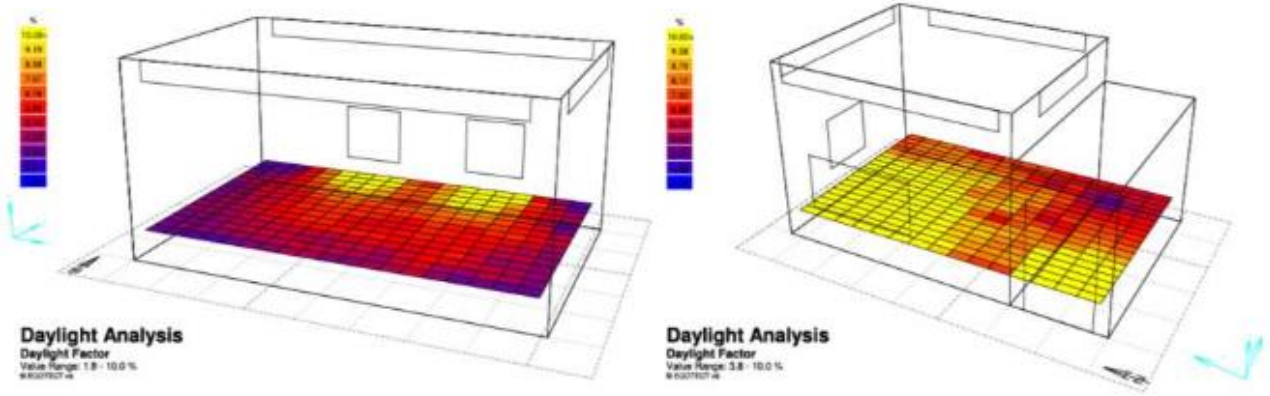
Bringing Sustainability into the Built Form

Effective Daylight Integration

Leading To Reduction In Artificial Lighting Loads



Total Living Area (sq.m.)	123.03
Total Daylight Zone Area (sq.m.)	120.15
Percentage of living area falling under Daylight zone	97.66

Bringing Sustainability into the Built Form

Energy Efficient HVAC and Lighting Appliances

Total Building Area	199.05 sq.m.	**Lighting Power Density**	6.38 w/sq.m.
Total Lighting Load	1271 wattage	**LPD Benchmark** (SVA GRIHA)	10.8 w/sq.m.

Other Features

- Water savings through low-flow CP and sanitary fixtures.

Water Use Reduction	48.46

- Energy efficient HVAC installation through BEE 5-Star rated inverter ACs.

Active Design Strategies

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Bringing Sustainability into the Built Form

Other Features

- Energy efficiency through
  - Spray – foam insulation on roof to minimize cooling loads
  - Installation of double – glazed uPVC doors and windows

Savings achieved with 2" XPS Insulation on Roof:

	Proposed case	Without Roof Insulation	Savings %
HVAC Load TR	8	10	20
HVAC Energy consumption (kWh)	15,295	18,340	16.6

Design Strategies Implementation

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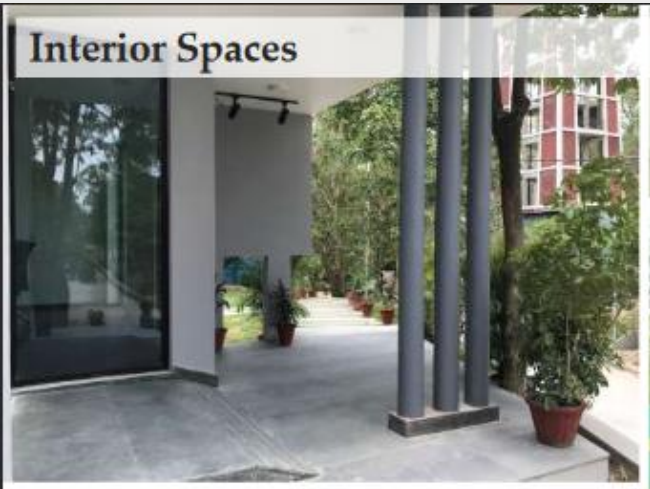
Interior Spaces



Naturally Lit and Well Ventilated Working Spaces

Materials and Resources

Green Supply Chain Management

Green Supply Chain Management policy

Encouraging Local Procurement

Reduction in CO2 emissions (Scope 3)

Sourcing 75% Building Materials within 400 kms

Building Materials with 20% Recycle con

Construction Waste Management- 75%

Waste Segregation at every household (dry, wet)

Organic Waste Management- OWC System

Cellular Light Weight Concrete Blocks for Building Envelope

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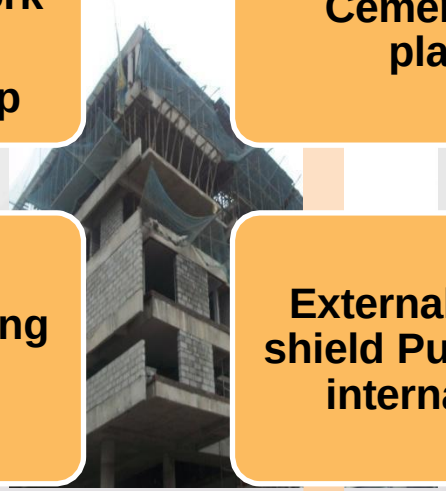
Patent filing in progress for building envelope with elastomeric nano- protection over CLC

Walls and finishing on walls

Hybrid System

RCC in framework With CLC as Building Envelop

No extrnal, internal Cement sand plaster



CLC manufacturing unit at site

External weather shield Putty + Paint internal putty

Direct control , quality , any size

Overall 20% cost effective than brick, Cement Sand plaster

FRP encased Cellular Light Weight Concrete (CLC) Frames

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FRP encased CLC door frames

Complete frame will be made in a factory

Fixing with anchor fasteners

Wt of 2.7 m ht frame is 15 kg w.r.t wooden frame of 35 kg

50% less costlier than wooden frame. No Lintel Beam

Time cycle for fixing on one frame = 60 min

Patent applied

Actual Frame at Show Flat

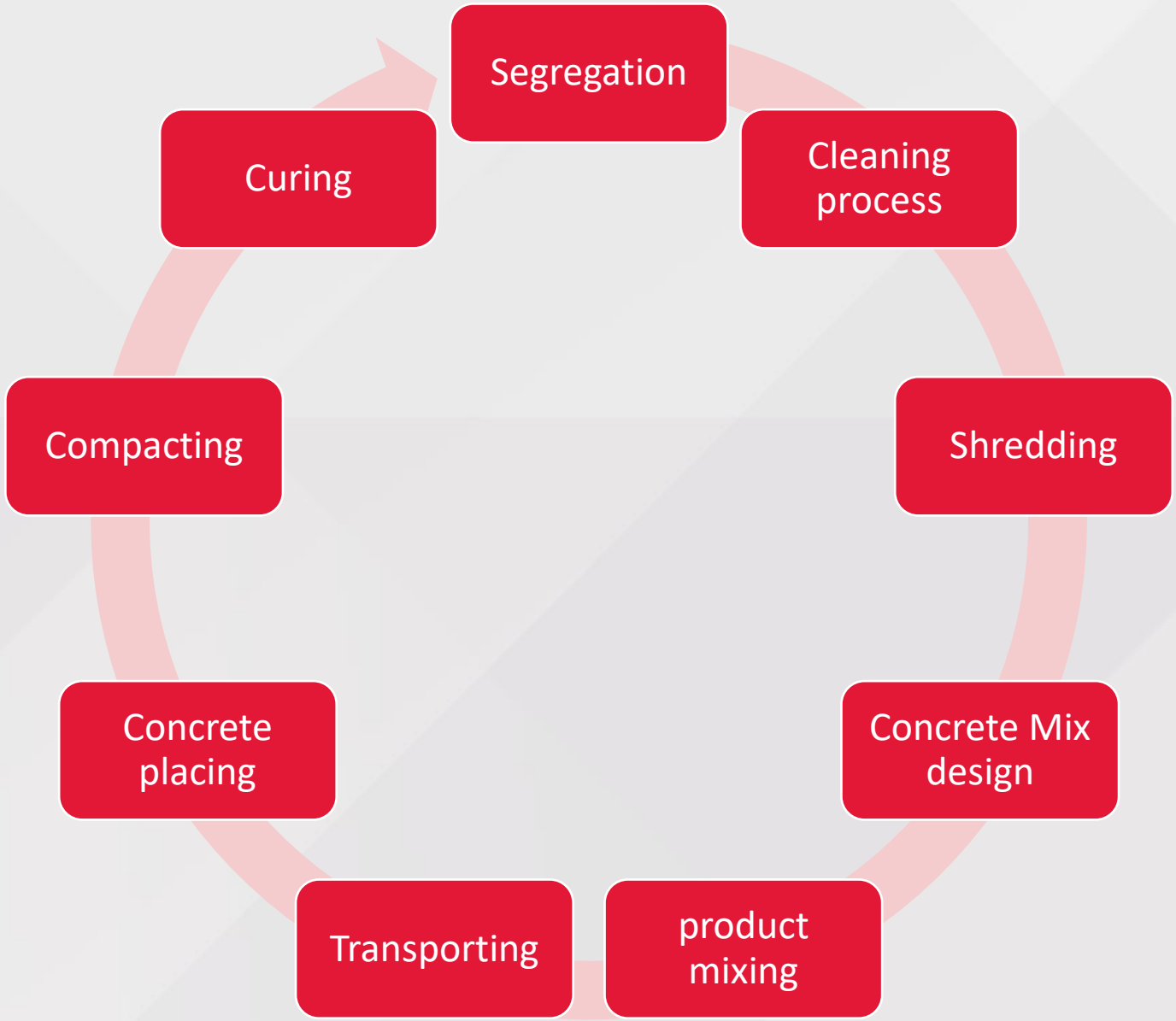
Cut section of frame filled with CLC

Section of frame filled with hinges

Concrete- Plastic RCC Road

- Recycling waste plastic has become a crucial issue to a developing country like India.
- Since melting the plastic releases highly toxic fumes, using it as a constituent in making roads will prove to be a major boon for the Construction Industry.
- Switching from asphalt to plastic roads will reduce the carbon dioxide emissions when compared to traditional road construction.
- Creating roads out of recycled plastic is one of many ways in which cities can work towards building a more sustainable future.
- Plastic roads serve as a ready-made landfill for a certain kind of ubiquitous urban trash. Flimsy, single-use items like shopping bags and foam packaging are the ideal raw material

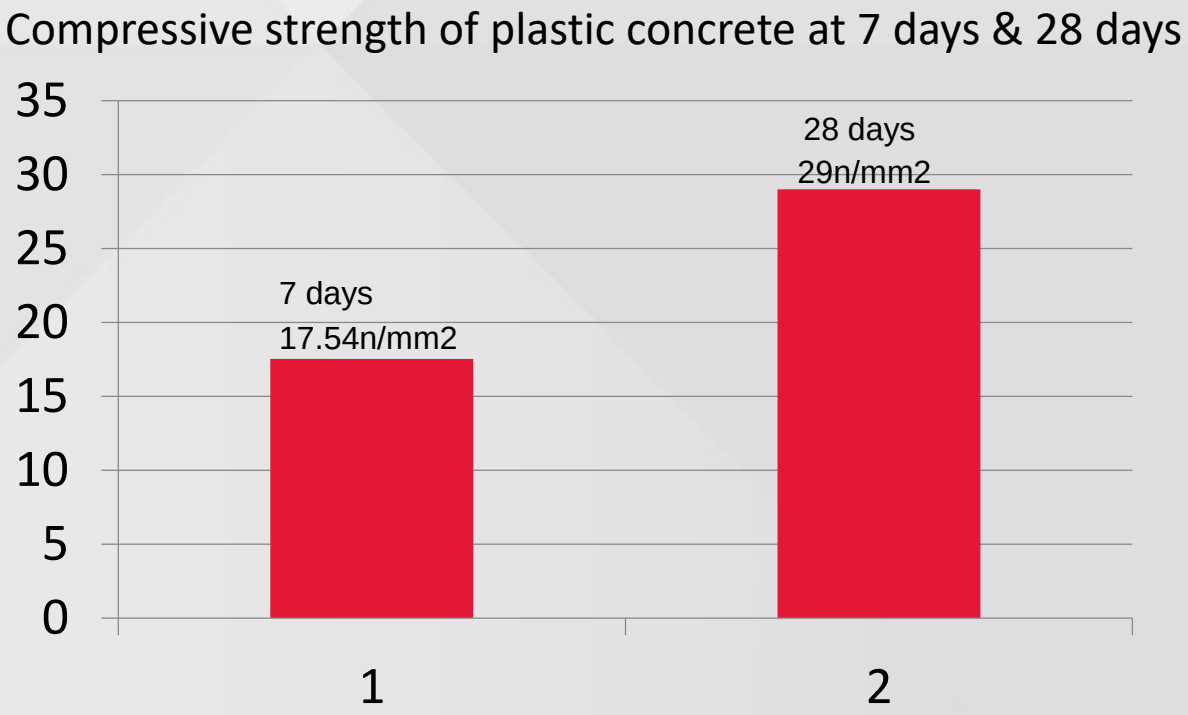
Methodology, Process Followed



- **Segregation** : Plastic wastes collected from various sources are separated from other wastes.
- **Cleaning process**: Plastic wastes get cleaned & dried.
- **Shredding**: Plastic wastes will be cut into small pieces & size shall be between 2.36 to 4.75 mm aggregate.(It will work as a replacement of fine aggregate)
- **Concrete mix design**: As per IS 10262 (2009)
- **Product Mixing** : By concrete mixer machine.
- **Placing**: By concrete pump.
- **Compacting**: By internal vibrator(needle) & surface vibrator.
- **Curing**: By sprinkling method, covering with hessian & gunny bags, ponding method. The minimum period of curing will be 28 days from initial placing time.

Mixing of Plastic

Mixing Shredded plastic in the mixer



Placing of concrete

Level pad marking

Slump measurement of concrete

Placing of concrete

Pouring of concrete

Finished Surface

Broom finishing

Curing of surface

Collection of plastic

Shredded plastic

Weighing of plastic per 0.5m3 batch

Use of Bamboo reinforcement in Drainage Cover

- Nature’s material, bamboo has been widely used for many purposes. Mainly as a strength bearing material. It is used for building shelters from an earlier time.
- Bamboo has used for scaffolding works, formwork supporting stands and many in building construction works. These are limited to medium-large projects.
- The steel as a reinforcing material is a demand that is increasing day by day in most of the developing countries. There is situations when the production is not found enough to face the demand for steel.
- The tensile strength property which is the main requirement of a reinforcing material is seen appreciable for bamboo, compared with other materials including steel. The structure of bamboo from its origin gives this property.

Use of Bamboo reinforcement in Drainage Cover

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CONCRETE MIX DESIGN

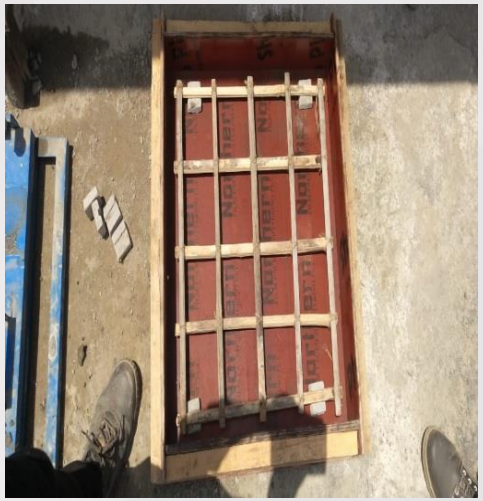
- Water-cement ratio plays an important role in strength and durability of reinforced concrete. Bamboo being a natural building material has the property of absorbing water as discussed earlier. The absorption of water causes swelling of bamboo.
- Thus, concrete mix proportion for bamboo reinforced concrete must have water-cement ratio as low as possible. It should also be considered to use concrete with high early-strength cement to minimize cracks caused by swelling of bamboo.
- The mix design of concrete can be as per the strength requirement for structure, as per structural design. Since use of reinforcement has no effect on compressive strength requirement of concrete, bamboo reinforced concrete mix proportion can be same as steel reinforced concrete mix design.

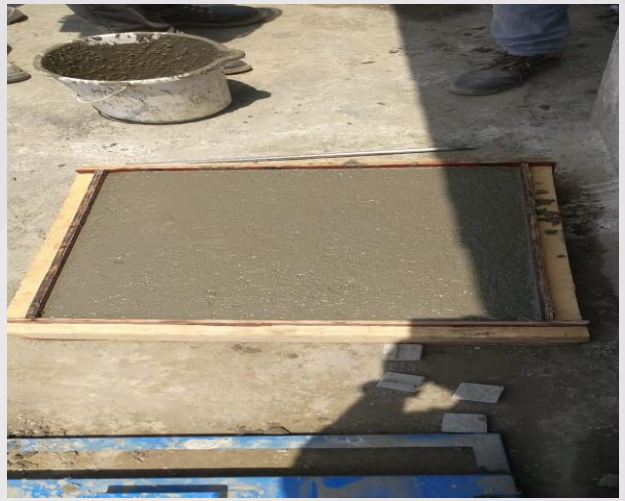
Mechanical Property	Symbol	Value (psi)
Ultimate compressive strength	—	8,000
Allowable compressive stress	s	4,000
Ultimate tensile strength	—	18,000
Allowable tensile stress	s	4,000
Allowable bond stress	u	50
Modulus of elasticity	E	2.5×10^{6}

Use of Bamboo reinforcement in Drainage Cover



Photographs of the pilot done in Happinest Palghar, Mumbai





Use of Bamboo reinforcement in Drainage Cover

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Benefits to customer

- Reduce the customer complain by using proper work sequence and work stage by maintaining quality.
- Cost of construction to infra work is reduced.

Benefits to the Company

- Improve the knowledge & awareness of engineers and supervisors.
- New engineers and supervisors can be easily educated with quality parameters.
- Easy to monitor the work sequence.
- Increase in awareness of Quality standards
- Reduction in the cost of Project

Incremental cost of Green?

Total Cost of Ownership

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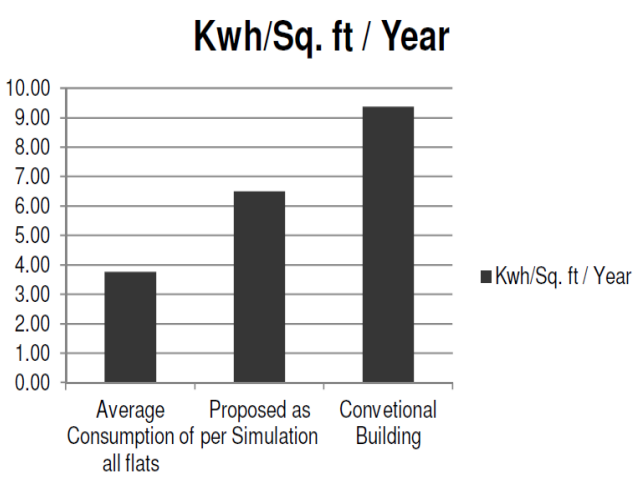
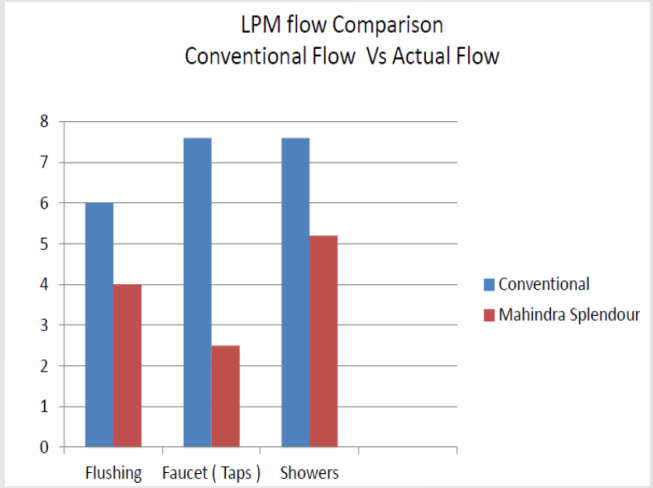
Life cycle cost

- Cost of Apartment- Rs. 55 lakh
- Maintenance cost of a conventional apartment- approx. Rs. 21 lakh Vs. Green Building Rs. 16 lakh
- Energy savings- up to INR 250 per month/ 3,000 annual savings per household in maintenance cost
- Water savings- up to INR 350 per flat/ per year, society level INR 35,000 per tower (assuming 100 units in a tower)
- Total cost of ownership for Conventional Rs. 76 lakh, Vs Green Bulding Rs. 71 lakh





Maintenance period for any apartment is – 30-35 years (min)

Benefits to the Company

Pilot project- Centralis post completion benefit- about 1.5 Cr. to be received from PCMC

At Pre-certification level

- Differentiated product
- A SMART and sustainable Organizational commitment towards Project Design, planning, construction, operation and maintenance of the Project.

At Final Certification

- Pimpri Chinchwad Municipal Corporation: GRIHA incentives - discounts on the premium amount of building permission charges.
- NOIDA and Greater NOIDA have incentivized GRIHA projects (on a plot of more than 5000 sq m and above) with free of cost 5% additional FAR for projects for complying with 4 or 5 Star GRIHA Rating.
- The Ministry of Environment and Forests (MoEF), Government of India issued a memorandum to facilitate fast track environmental clearance for GRIHA pre certified projects.
- Ministry of Urban Development, Government of India announces free of cost 1% to 5% extra ground coverage and FAR for GRIHA projects.

Benefits to Vendor/other stakeholder

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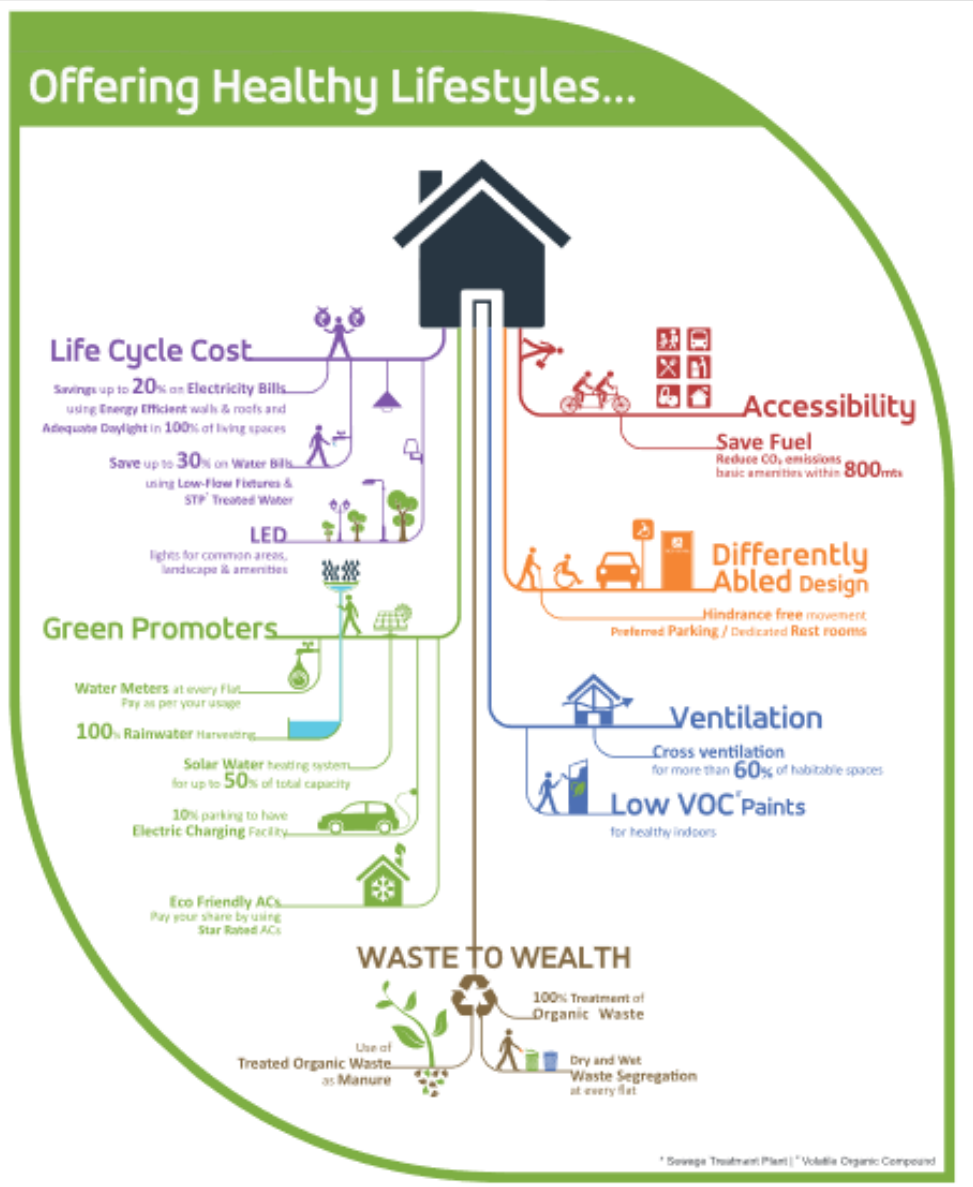
- Sales & Marketing Team- differentiated product and differentiated sales pitch
- Design Team- learning/ understanding the new standards, guidelines to make the product efficient
- Projects Team- helps to uplift the execution processes and maintain environment and labour related compliances
- MOEF Clearance- project gets lined up under Fast Track clearance.
- In the case of PCMC the project gets appeared only once to the SEAC level committee, hence reduces the approval timelines significantly



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Thank you…

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