



WORLD  
GREEN  
BUILDING  
COUNCIL



## Net Zero Energy in High-rise residential buildings

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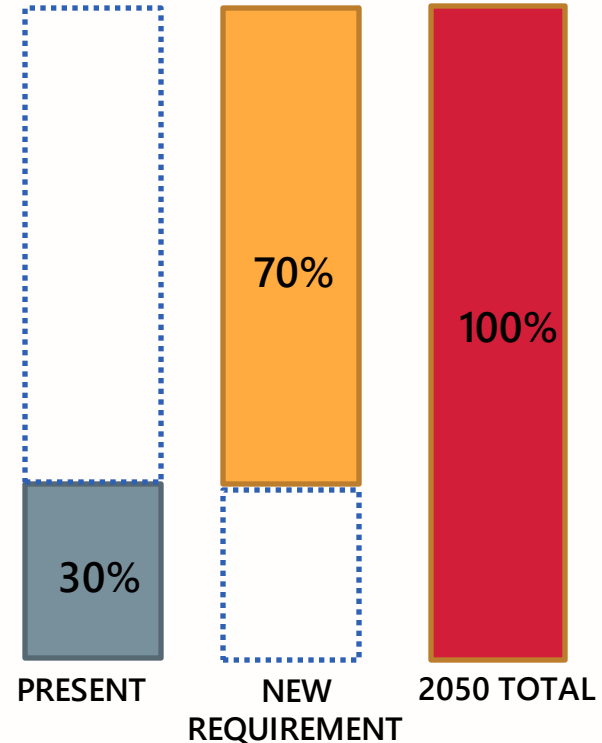
India has presented the following five nectar elements (Panchamrit) of India's climate action

1. Reach **500 GW Non-fossil energy capacity** by 2030.
2. **50 per cent of its energy requirements** from renewable energy by 2030.
3. **Reduction of total projected carbon emissions** by one billion tones from now to 2030.
4. **Reduction of the carbon intensity** of the economy by 45 per cent by 2030, over 2005 levels.
5. Achieving the **Target of net zero emissions** by 2070.

## Why Net ZERO Energy?

World population is growing exponentially, and the global real estate sector is growing at unprecedented rate to meet the demand.

- Over 40 years there will be 230 billion square metres of new construction worldwide.
- The energy demand in buildings is expected to increase by 50% by the year 2050



**INDIA'S BUILDING STOCK**

# Why Net ZERO Energy?

Use of energy and electricity in buildings has grown by 1% to 2.5% every year since 2015



The buildings and construction sectors are responsible for 36% of global final energy consumption and nearly 40% of total direct and indirect CO2 emissions

Buildings in India contribute to

- 40% of energy use
- 30% raw material use
- 20% water use
- 20% land use
- 30% of solid waste will be generated and
- 20% water effluents



THE BUILDINGS AND CONSTRUCTION SECTORS  
ARE RESPONSIBLE FOR **36% OF ENERGY CONSUMPTION**  
AND CLOSE TO **40% OF CARBON EMISSIONS\***

# Why Net ZERO Energy?

The world becoming conscious for better utilization of both renewable and non-renewable energy resources

The globe consider Net Zero Energy Buildings is a reliable and judicial approach to minimize the impact on our surroundings



## Net ZERO Energy building

Buildings that do not depend on fossil fuels for energy. They use secondary source of energy that is renewable and has minimum carbon footprint.



A Case study on  
Net zero Energy  
Highrise building





# NET ZERO Highrise building case study

**Mahindra** Eden



# NET ZERO Highrise building case study

Vajarahalli Village, off Kanakapura Road in South Bangalore.

Project land : 7.75 acres

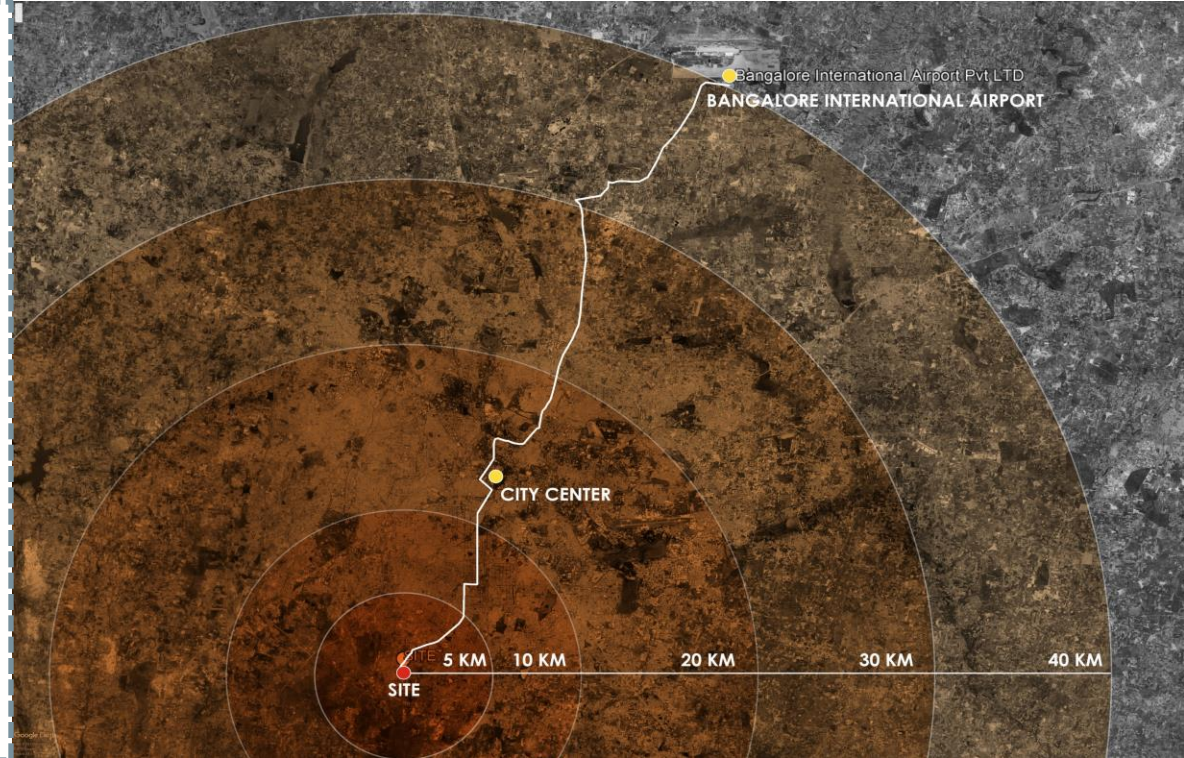
Phases : 2 phases

Units : 527

Typologies : 1, 2, 3 and 3+ Study

Height : 90m

Floors : 2 Basements + G +28



## Ways to Achieve NetZero energy buildings

1. **Reducing the total energy demand** through design and various technology interventions
2. **Generate and utilizing renewable** energy through Solar and wind energy on site
3. **Utilizing renewable sources** like Solar PV, Wind energy, geothermal energy from off site to meet the energy demand of the building.



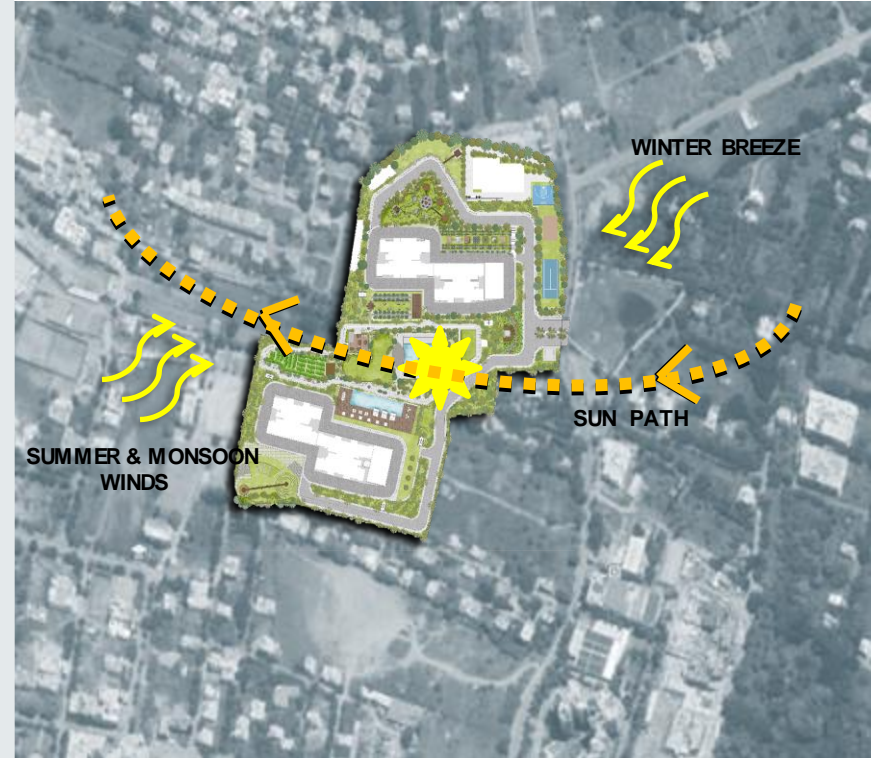


# Reducing the total energy demand

## Design –site level

Climate responsive design which is  
Analysis of local climate,  
Sun path diagram,  
Wind patterns,  
Rainfall and  
Temperature ranges

The orientation of building is very  
critical

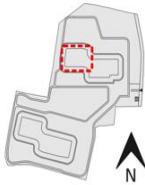
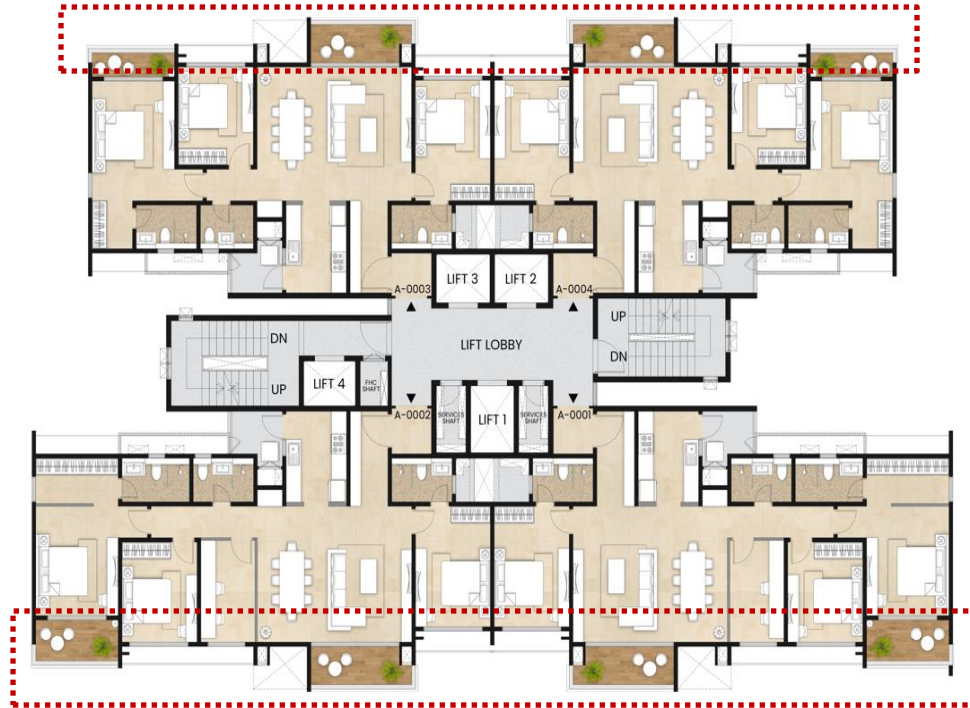


# Reducing the total energy demand

## Design – Tower level

Shading elements like Larger fins, sunshades, High SRI paint in certain walls and roof help in reduction of heat transmission

Low SHGC glass in windows to limits solar radiation inside the apartments and ensuring lower indoor temperatures.



# Reducing the total energy demand

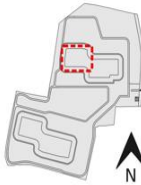
## Design – Tower level

With 160mm thick RCC walls and large Windows, Mahindra Eden matches the benchmark, as:

### Residential Envelope Transmittance Value

	RETV
Tower A	14.55
Tower B	14.67
Tower C	14.51
Tower D	14.860

National benchmark  
RETV  $\leq 15$  W/m<sup>2</sup>

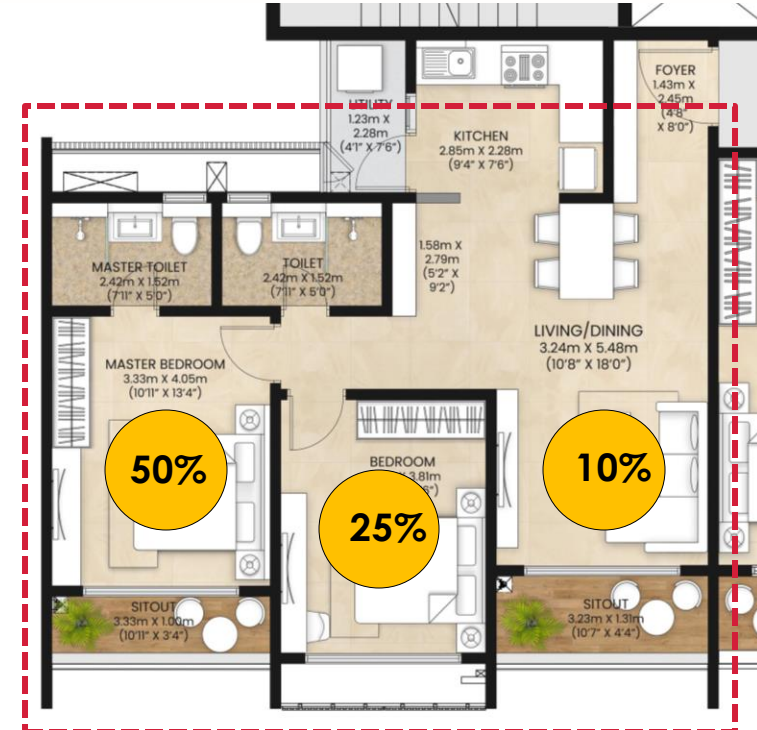


# Reducing the total energy demand CRD strategies –Unit level

**% Hrs uncomfortable  
in a year?**

**~65 – 95%  
reduction in  
discomfort  
possible**

**~6-15%  
reduction in  
energy use  
possible**



Flat selected for detailed analysis (Tower D)

As per sun-path analysis, sun-exposure is much higher in the S-W orientation. Therefore, SW facing corner flat where two exterior surfaces are exposed are selected to account for worst case scenario.

Paint external wall surfaces with high SRI paint: SRI 107 (In lieu of regular external paint)

Outside surface reflectivity increased from 0.5 to 0.85

Energy Performance Index (EPI):  
50-60 kWh/m<sup>2</sup>.y

Out of which ~50% will be for cooling  
\*AC use: Mar – Jun; Ceiling fan use: Mar - Oct.

# Reducing the total energy demand CRD strategies –clubhouse

Setpoint increased fuse ceiling fans

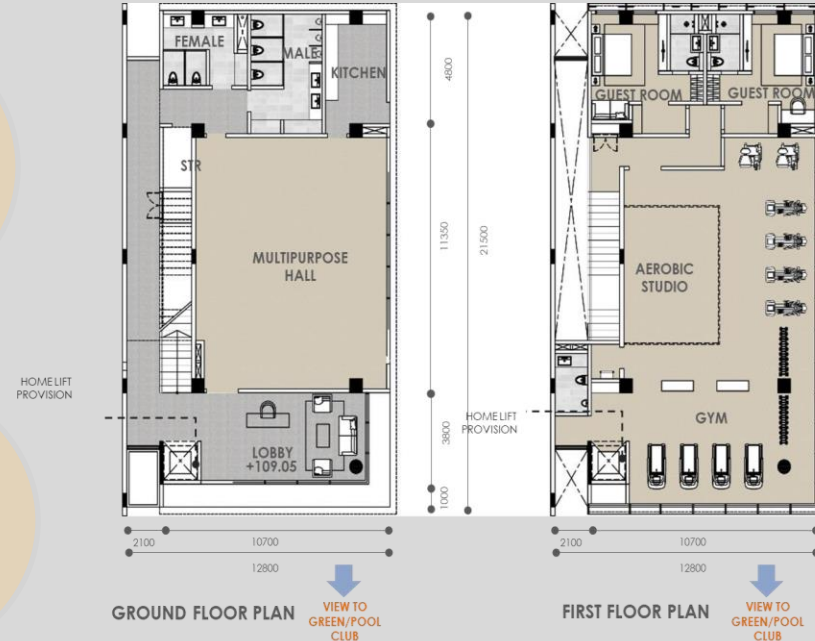
Shading (like in the sales gallery) on east and south glazed facades OR Better glass  
Make 20% of the glass area in the spaces openable. Natural

High SRI paint on the roof insulation)

Daylight sensor based

~30% energy savings

Maintenance cost saving  
₹8.25 lakh/ yr





# Reducing the total energy demand

## Common measures

LED light fixture in basements and common area to save

**~1.6 lakh kWh Vs CFLs**

Power saving by using lift with VVVF drive

**~0.8 lakh kWh**



# Generate and utilizing renewable energy

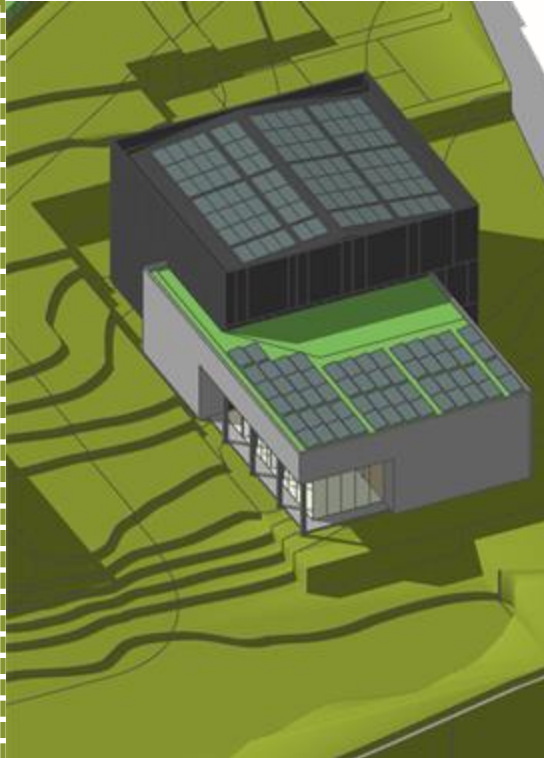
## Solar PV

On site Power generation from solar panels from

**Sales gallery (clubhouse) - 60kW**

**All tower terrace – 32 kW**

**92 kW through solar panels**



# Generate and utilizing renewable energy

## Small wind Turbine

Onsite Power generation from Wind turbines in

**Phase 1 towers - 20kW**

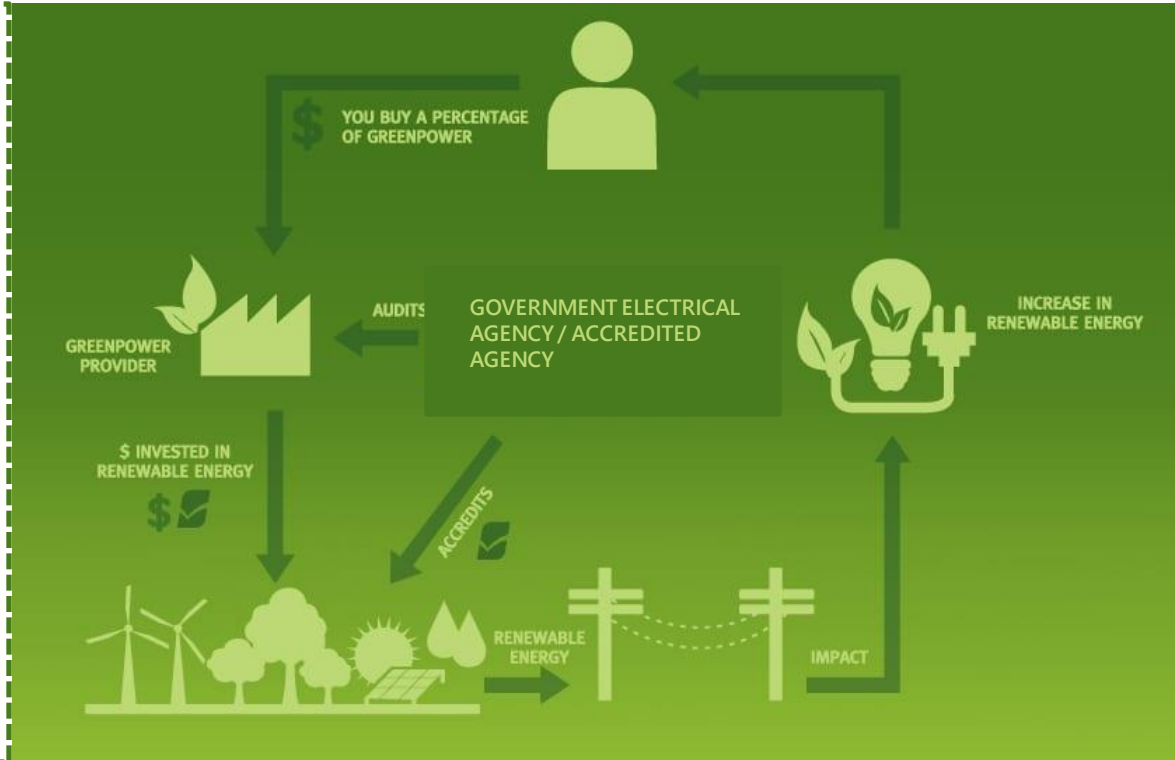
**Phase 2 towers – 20kW**

**40 kW through Wind turbines**



# Utilizing renewable energy Green power from Government/ accredited agency

Green Power procurement from Solar PV, Wind energy, geothermal energy from off site to meet the energy demand of the building.  
Government electrical agency / Accredited agency



## Customer contribution Utilizing the feature and contribute

Take advantage of the design for daylight-  
you won't need to switch on lights during  
the day

Open your windows to cool your buildings  
as much as possible

Operate your AC at **26°C** (even 28°C) +  
switch on your fans: **12% - 20% savings** in  
cooling electricity than if using AC at  
24°C





## Green power from Government/ accredited agency

- An “energy efficiency rating scheme for Electrical appliances”



1. Metal Fan Body
2. Metal Fan Blade.
3. Double Bearings.
4. External Controller.
5. Brushless DC Motor.
6. Pure Copper Winding.
7. Five Levels Remote Control.
8. DC12V Input Fan.
9. DC6V-24V Operating.
10. 36W Power Consumption.
11. 380RPM Super High Speed.
12. 10+ Years Life Time Motor.



Use star rated appliances: 5 star AC nearly 40% more efficient than 3 star AC

Use super efficient fans: Uses 30W instead of 60 W; 50% more efficient

Unplug your devices or switch off from mains: Can save 7-10% electricity

Project reflects various Green features

The infographic is set against a background of green grass. A large wooden oval frame in the center contains the following text: "Embrace #NaturePositive living at", "INDIA'S 1st NET ZERO ENERGY HOMES", and "Mahindra Eden". To the right of the oval, five green icons represent different sustainability features, each with a title and a list of specific details.

**Energy Efficiency**  
Wind energy system | Solar PV system | Energy-efficient lighting  
Building orientation for minimum heat gain

**Waste Management**  
Waste segregation at source | Waste composting  
Water recycling | Toxic waste management

**Water Conservation**  
Low flow fixtures | Waterless urinals | Rainwater harvesting  
Aerators to control flow of water from taps

**Biodiversity Hotspot**  
Over 800 trees & 100 species of plants | A natural waterbody  
Over 25 species of birds & butterflies | Toxic waste management

**Climate-responsive low-impact design**  
85% open spaces | Maximum sunlight & wind-channelling  
Nature-inspired amenities & features





Thank you