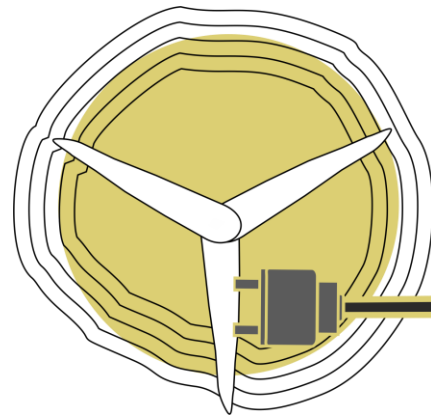


KNOWLEDGE SERIES

May | June | July 2019



sourzeb
net zero energy buildings



An initiative under

MAITREE

MARKET INTEGRATION AND TRANSFORMATION FOR ENERGY EFFICIENCY



Implementing Partner



28th May, 2019

GREEN CONVERSATIONS:

MNRE HQ

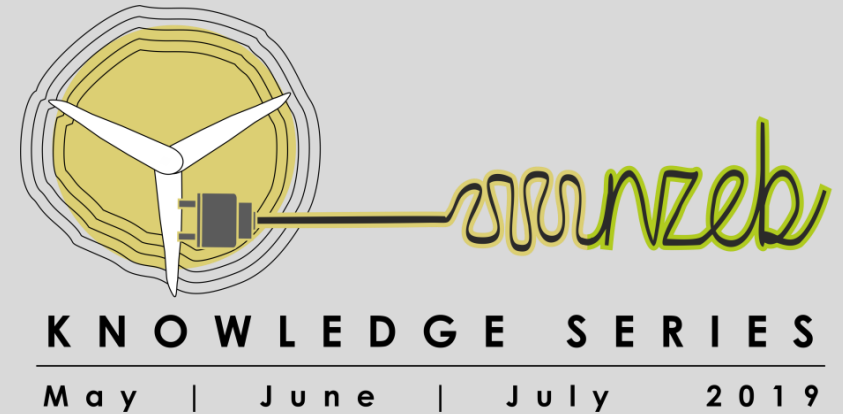
EXPERT PANEL



SESSION MODERATOR

DEEPA PAREKH

Environmental Design Solutions



EXPERT PANEL



BEDANTA SAIKIA

Vertical Head
Edifice Consultants



SAMDARSH NAYYAR

Director
Sunil Nayyar Consulting
Engineers (SNC)

BRIEF INTRODUCTION



BRIEF INTRODUCTION



Headquarters for the Ministry of New
and Renewable Energy, Delhi

Winning competition entry

2.76 acre site area

10 storeys, 238,368 sft office building

BRIEF INTRODUCTION

The image shows a large, modern building with a prominent, wide, overhanging roof. The underside of the roof is covered in a complex, perforated metal lattice. The main facade is composed of light-colored panels, with a large section of blue, perforated metal cladding on the right side. A vertical concrete pillar supports the roof structure. To the left, there are sections of green wall. The building is set against a clear blue sky with light clouds. In the foreground, there is a paved area with a few cars and a flagpole flying the Indian national flag. The overall scene is bright and clear.

Construction ongoing

Targeting 5 Star GRIHA rating

Targeting Platinum level under LEED-India NC rating

WHY ARE WE TALKING ABOUT THIS PROJECT?

Designed to be a Net Zero Energy Building

CLIENT AND COMPETITION BRIEF

An aerial architectural rendering of a modern, multi-story building. The building features a prominent blue, textured roof and a large, vertical green wall on its side. The facade is primarily light-colored with several windows. The building is situated in a landscaped area with numerous green trees and a paved road with a few cars. In the background, other buildings and a cityscape are visible under a clear sky.

CLIENT AND COMPETITION BRIEF

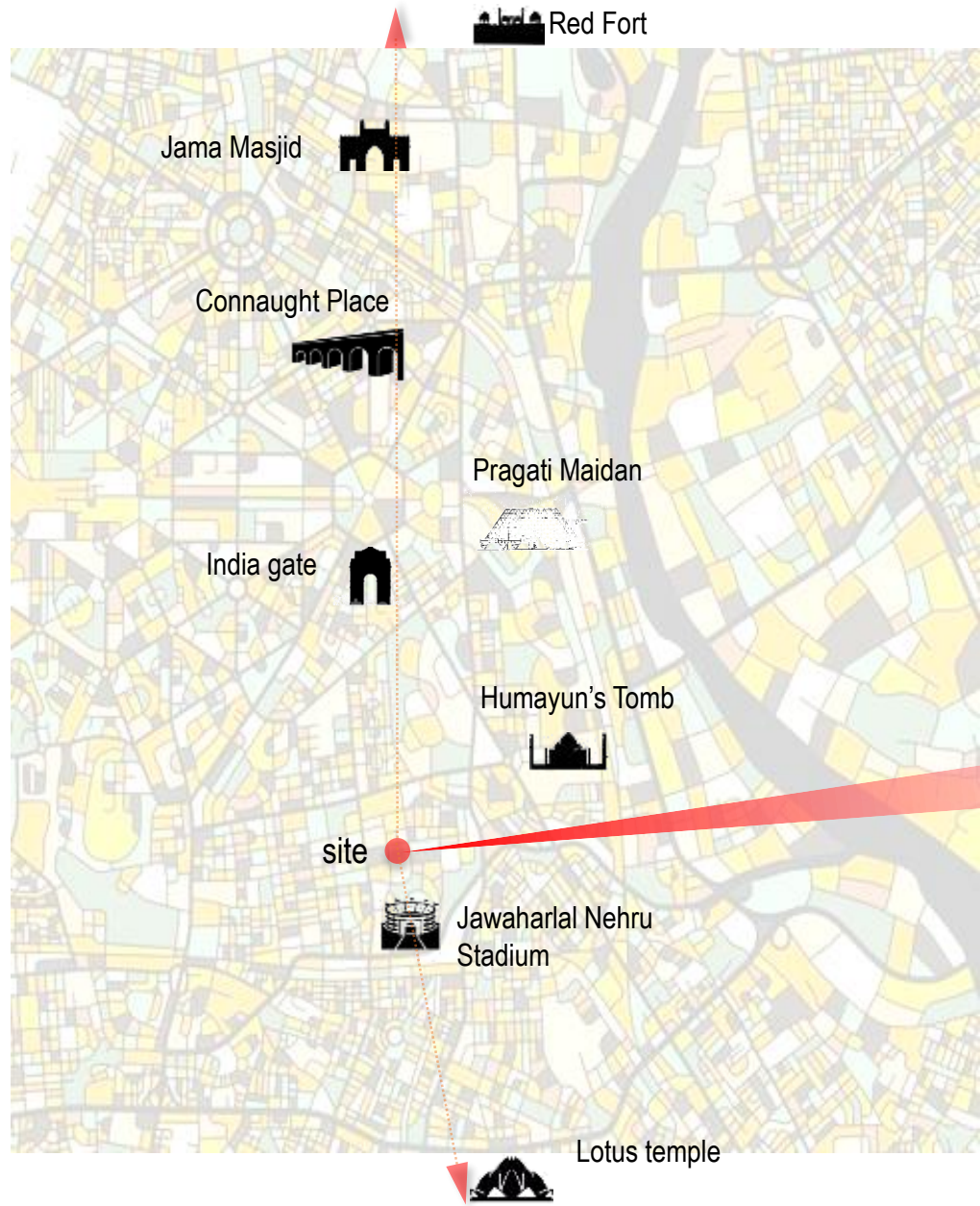
An aerial architectural rendering of a modern, multi-story building. The building features a prominent blue solar panel roof and a large, textured green wall on its side. The building is situated in a city environment with other buildings, trees, and a road with a few cars. The overall scene is bright and clear, suggesting a sunny day.

Iconic landmark

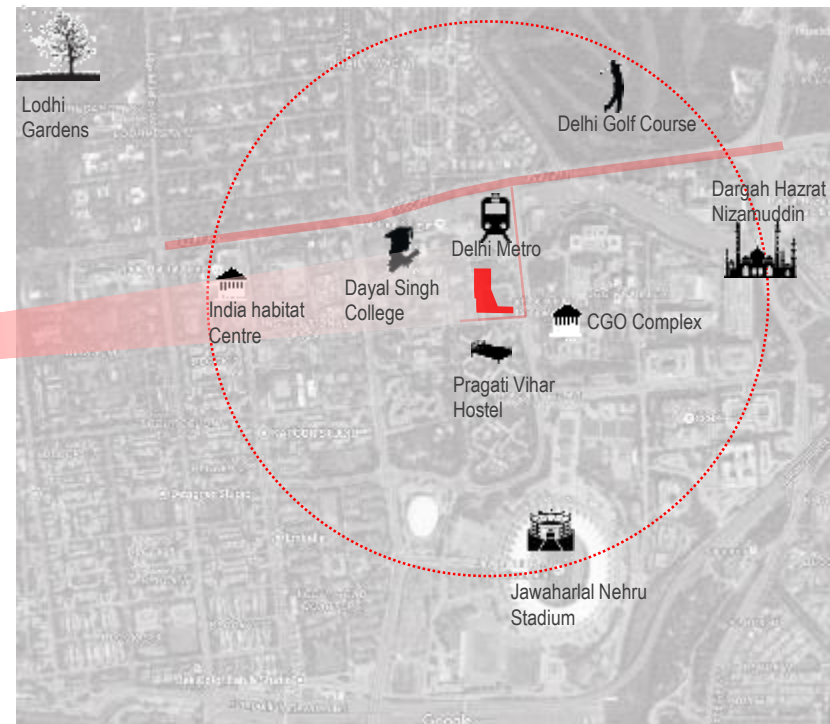
Energy efficient renewable energy integrated building

Setting new standards for resource efficiency in design, construction and operation stage.

THE SITE



- The plot lies on the axis dotted by landmarks
- Proximity to the Metro Rail
- Proximity to institutions
- Proximity to Jawaharlal Nehru Stadium



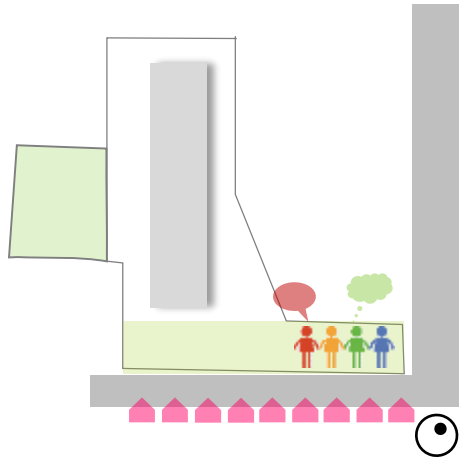
DESIGN PROCESS – PLANNING STRATEGY

Plot Area 2.7 Acre =1,20,226.7 sft.
Max Ground Coverage: 30%

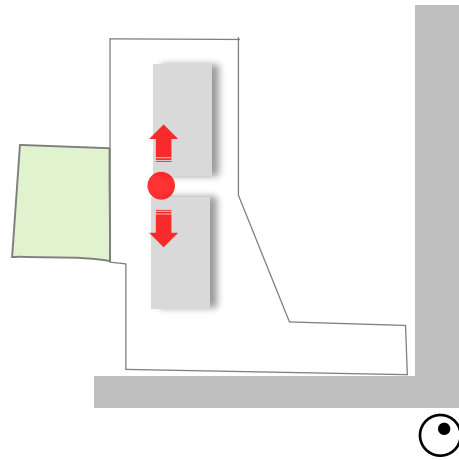
FAR=2=2,40,453.4 sft.

Setback Considered: Front 15m, Rear & Sides 12m.

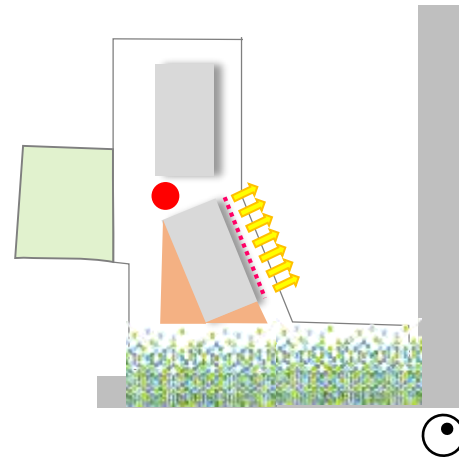
Height restriction based on setback = 40m



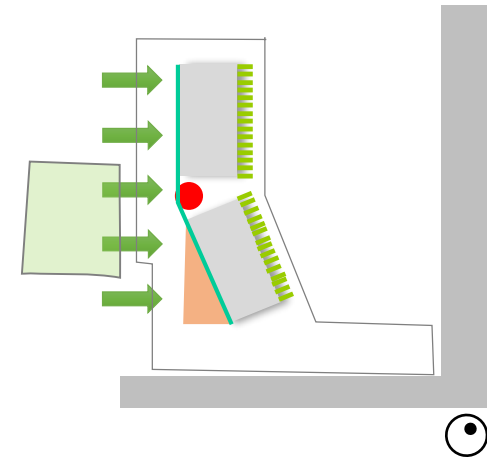
- Celebrating the frontage
- Permeable public edge
- Establishing the built footprint



- The atrium acts as a central hinge to help segregate departmental functions.
- It also acts as a collaborative spine connecting departments



- Maximizing the NE light by tilting the south wing.
- Respecting the geometry of the site
- Enhancing the entry experience.



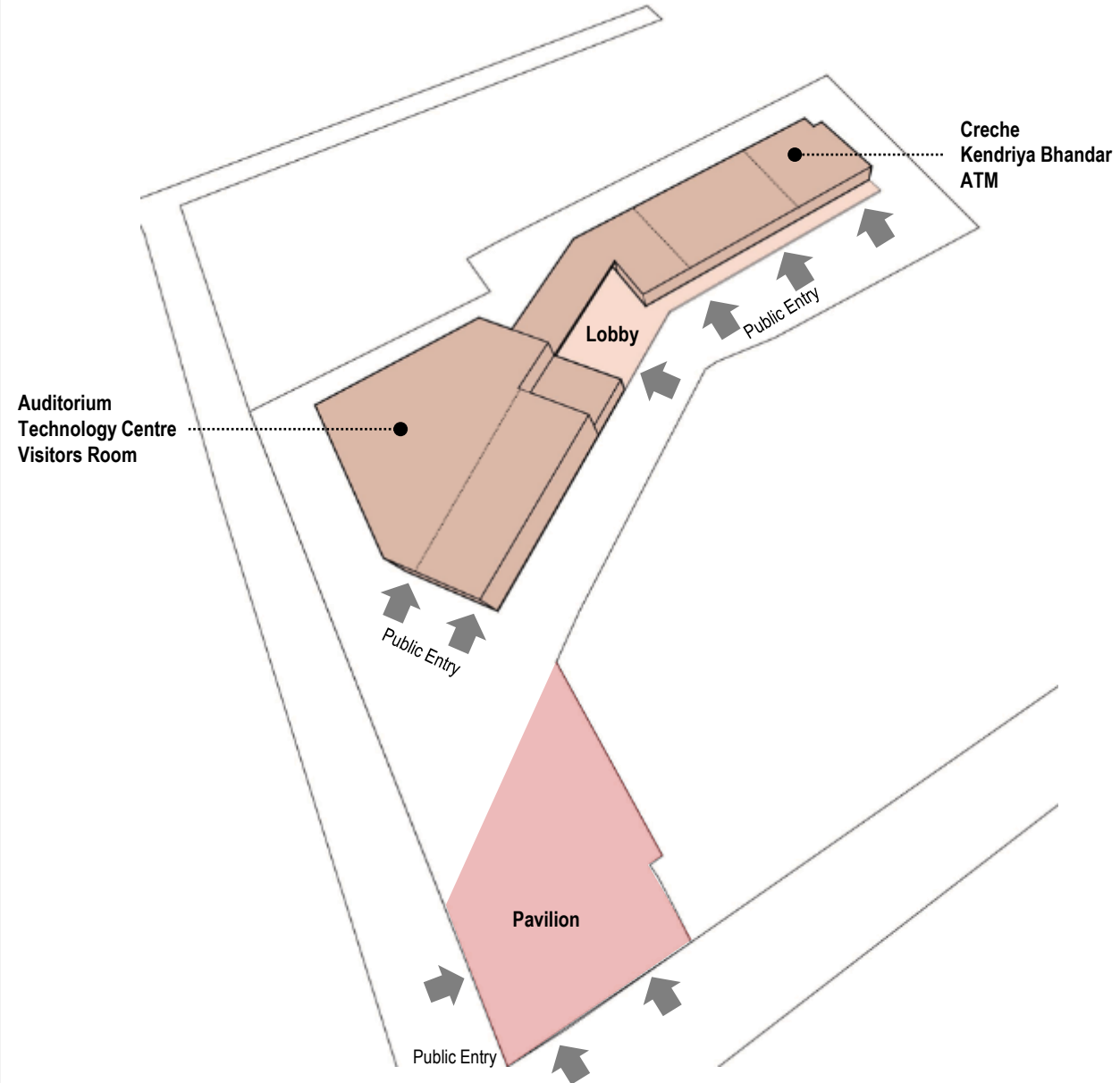
- Shielding the west by introducing the service core
- Shielding the east by bio fins- shading devices

DESIGN PROCESS – MASSING STRATEGY

Ground Floor

Public & Semi-Public Zone

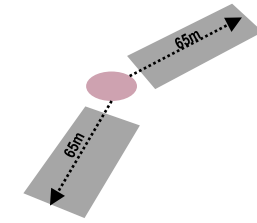
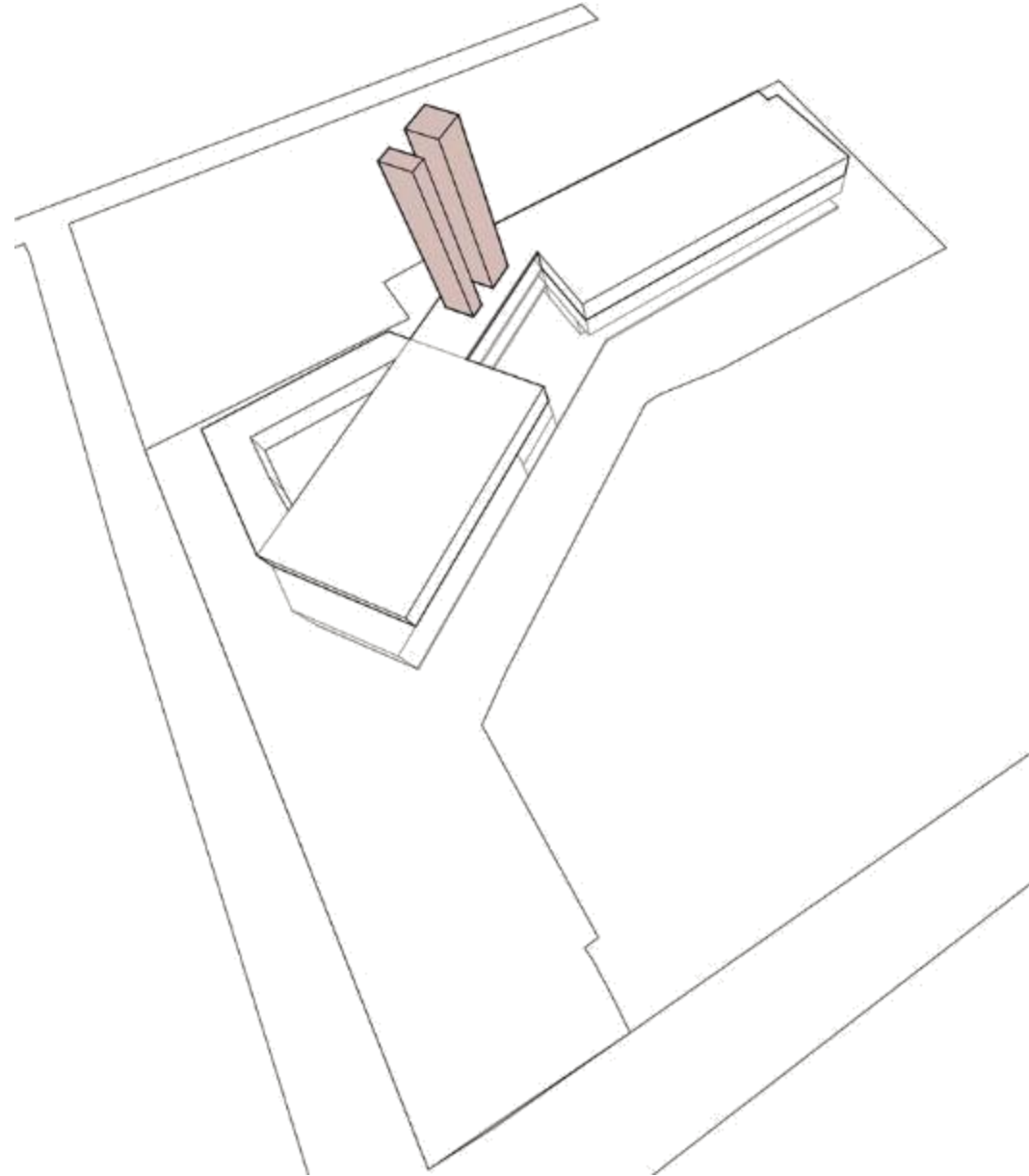
The public & semi-public activities are located on the ground floor so as to respond to the urban context that the site is located in.



DESIGN PROCESS – MASSING STRATEGY

Main Service Core

Located between the two wings



Centrally located



DESIGN PROCESS – MASSING STRATEGY

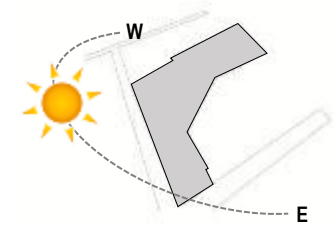
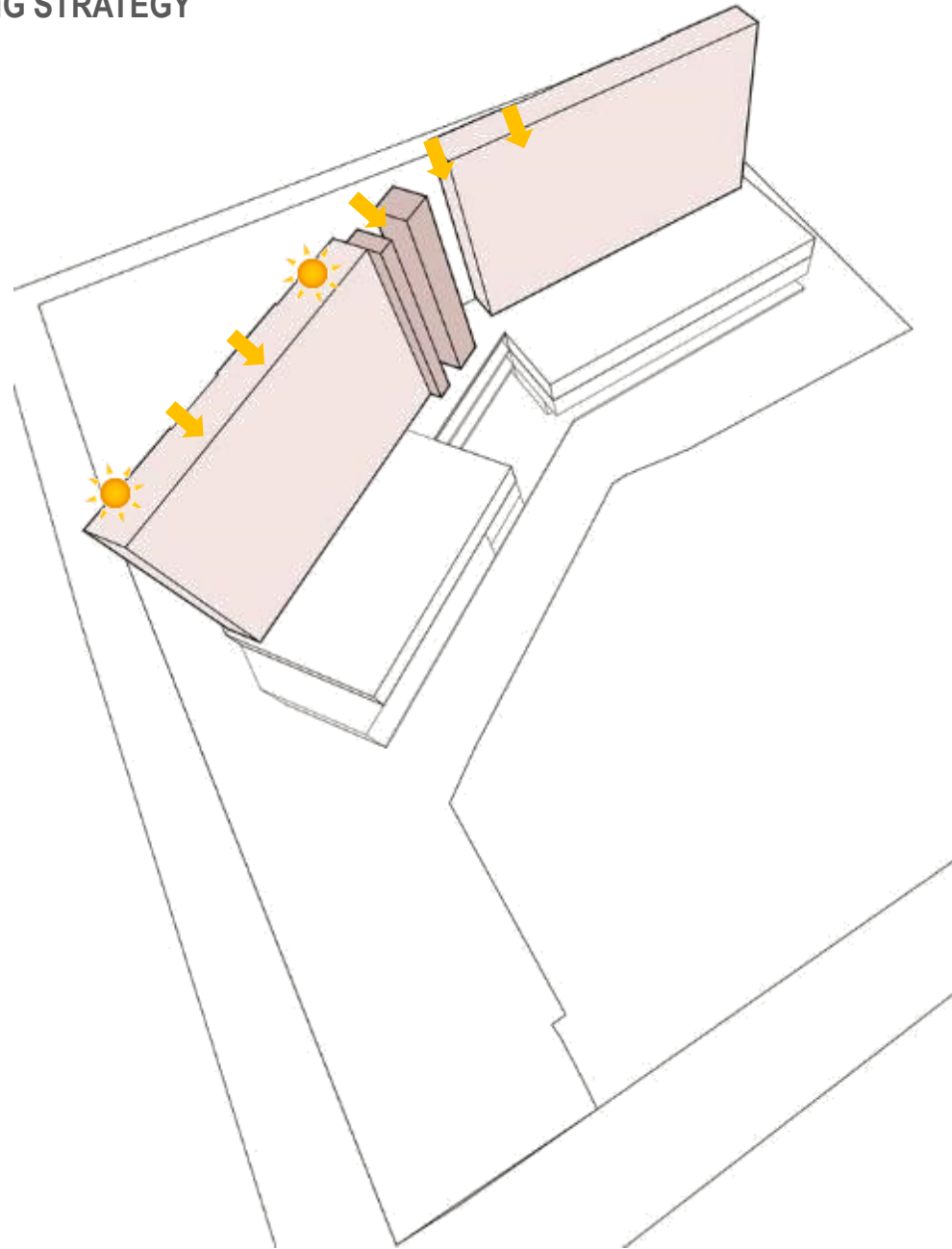
Ancillary Service Cores

Located along west façade to protect against harsh western sun

Allowing for Light & Ventilation

Punctures along the façade bring in natural light into the building

Cross ventilation for the atrium



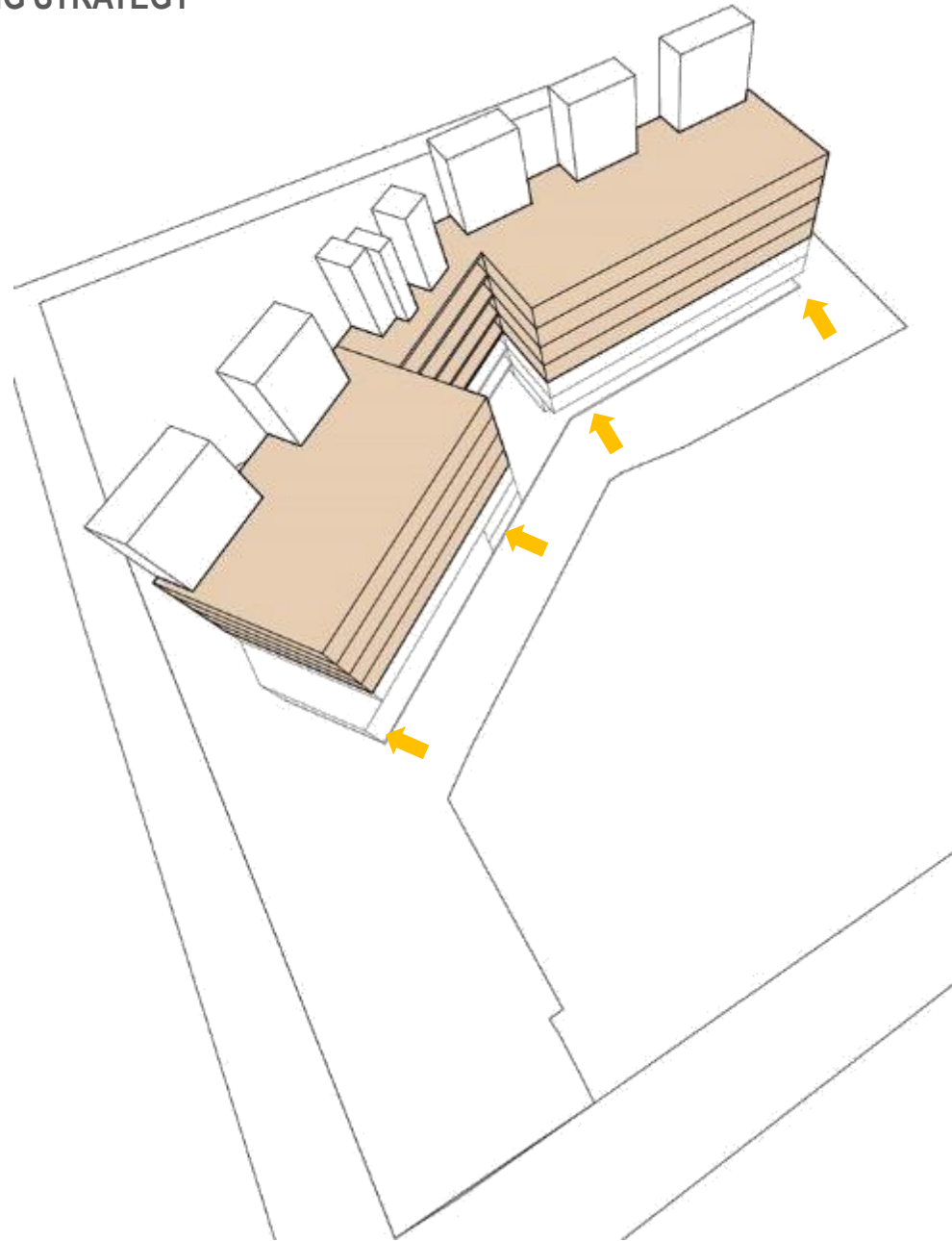
Sun Path Diagram



DESIGN PROCESS – MASSING STRATEGY

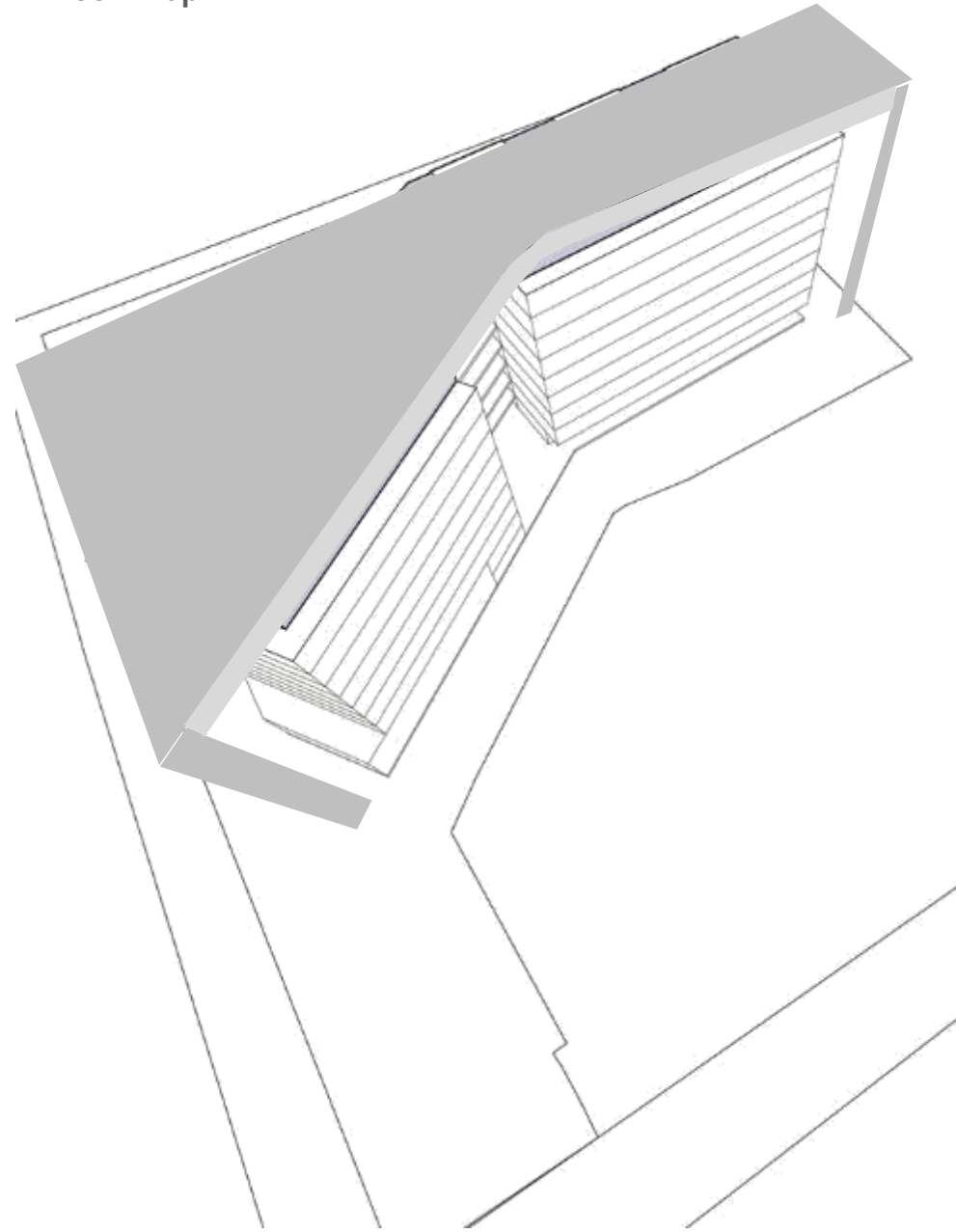
Third to Sixth Floor
Group A, B & C Offices
Daylight from eastern façade
for offices

The offices are placed on
from the third floor upwards
for optimum sunlight, views
and isolation from the public
activities below.



DESIGN PROCESS – MASSING STRATEGY – Roof Wrap

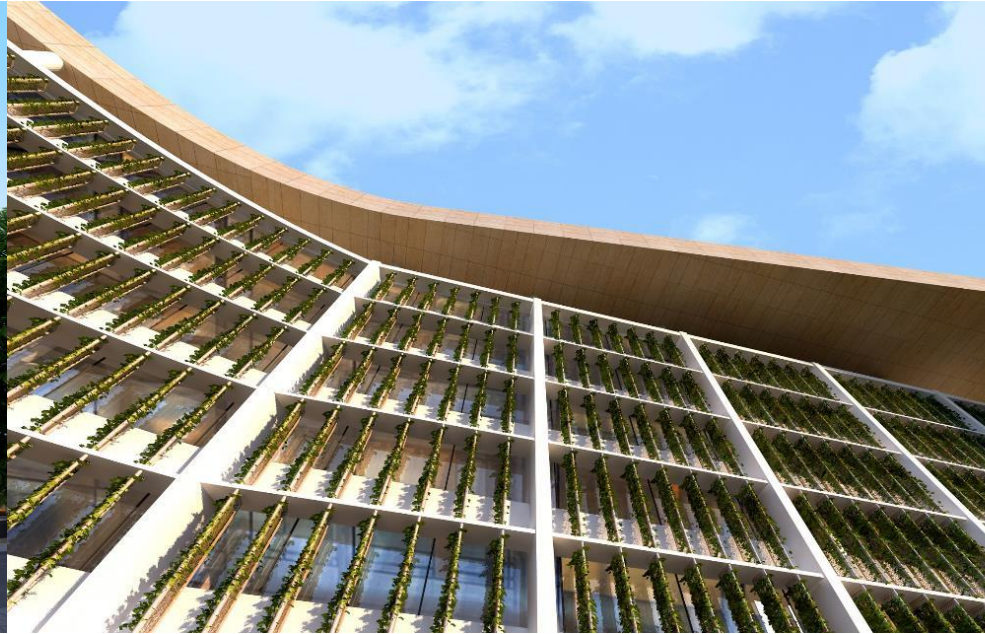
Above the terrace floor to house
the solar panels



FAÇADE DESIGN



SOUTH

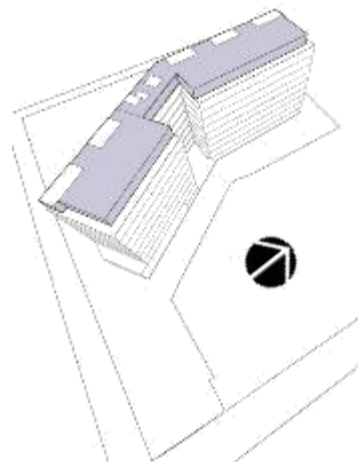


EAST

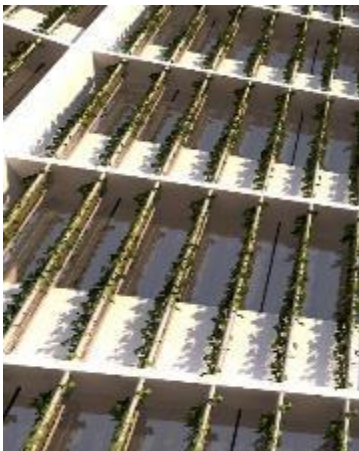


WEST

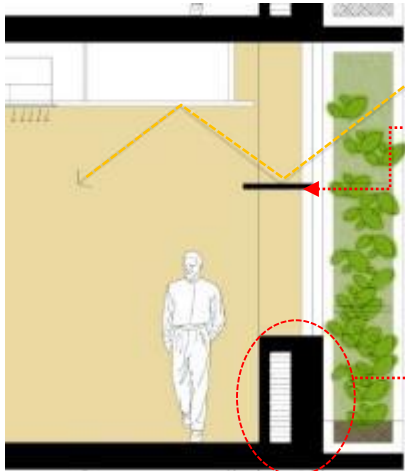
DESIGN PROCESS



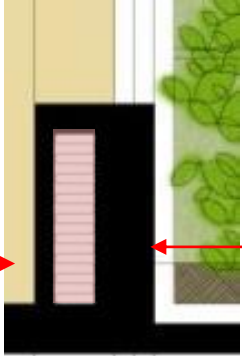
Best Feasible **Orientation**



Use of Light shelf for **day light** penetration. Vertical **bio fins** for **glare control** and fresh air.



Light Shelf.



600 mm Thick double wall with insulation.

Insulated Wall Section



Window Wall ratio = 27%



Growing our Indoor Fresh-Air. Up to 17% reduction in cooling load



Enhancing Solar Panel Area

DESIGN PROCESS

South West View



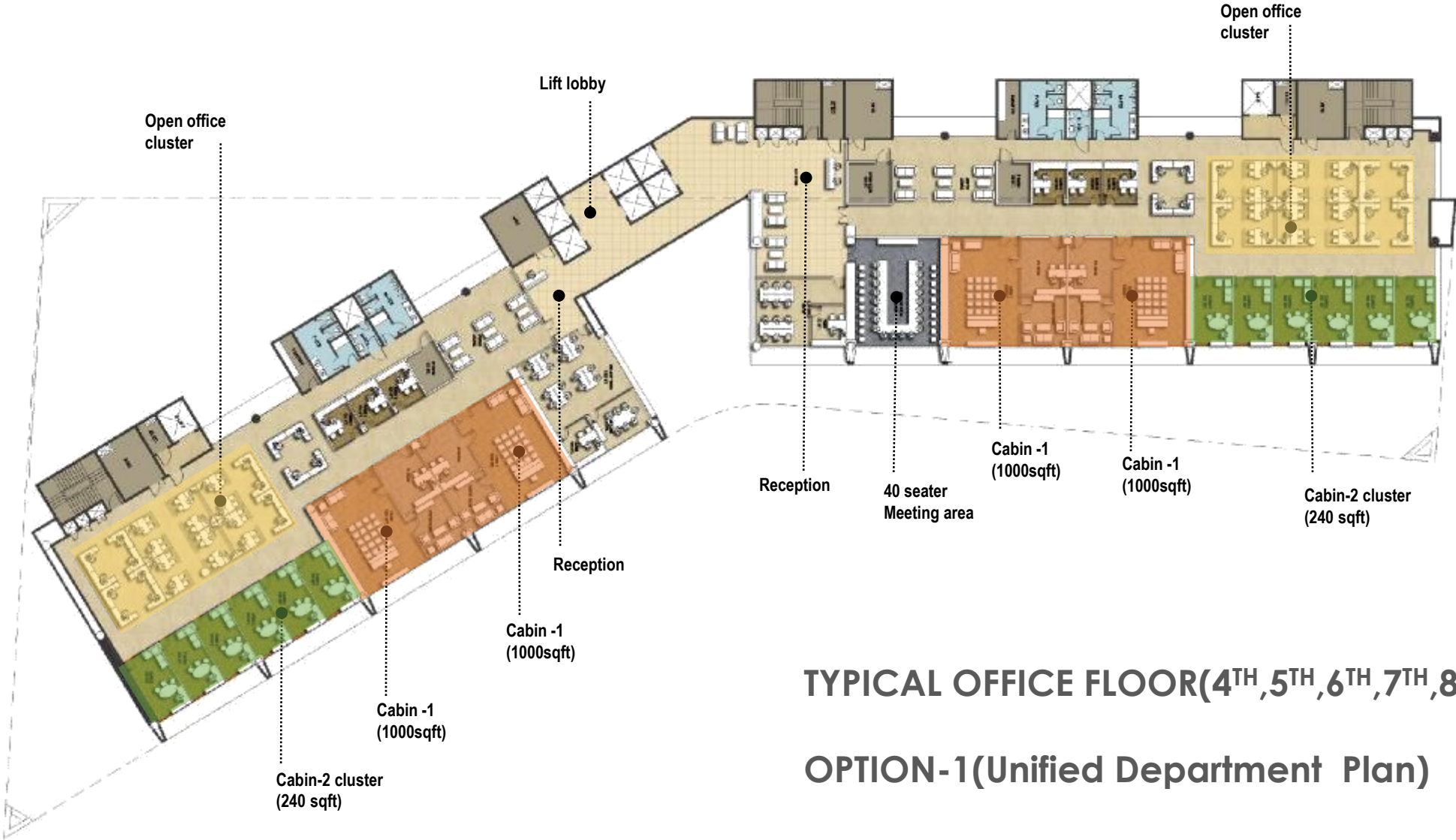
DESIGN PROCESS



MASTERPLAN



DESIGN PROCESS



TYPICAL OFFICE FLOOR(4TH,5TH,6TH,7TH,8TH)

OPTION-1(Unified Department Plan)



BUILDING ENVELOPE

ELEMENT	PROPOSED CASE		ECBC CASE	CONVENTIONAL BUILDING	
WALL	200mm outer wall AAC block + 200mm Glasswool / Rockwool / XPS insulation + 200mm inner wall AAC block	U-value = 0.10 W/m2-K	U-value = 0.44 W/m2-K	230mm FPS/Clay brick with internal and external plaster	U-value = 1.3 W/m2-K
ROOF	150mm RCC slab + 150mm PUF spray insulation + Thermocrete / PCC + Heat Reflecting Tiles or Broken China Tiles	U-value = 0.10 W/m2-K	U-value = 0.409 W/m2-K	150mm RCC slab with brick batt coba	U-value = 1.3 W/m2-K
GLAZING	DGU high performance. External 6mm solar reflective low-E + 12mm air gap + Internal 6mm clear float.	U-value = 1.8 W/m2-K SHGC = 0.20, VLT = 45-50%	U-value = 3.3 W/m2-K SHGC = 0.25 (if WWR<40%)	SGU 6mm clear float glass	U-value = 5.6 W/m2-K SHGC = 0.56

DAYLIGHTING

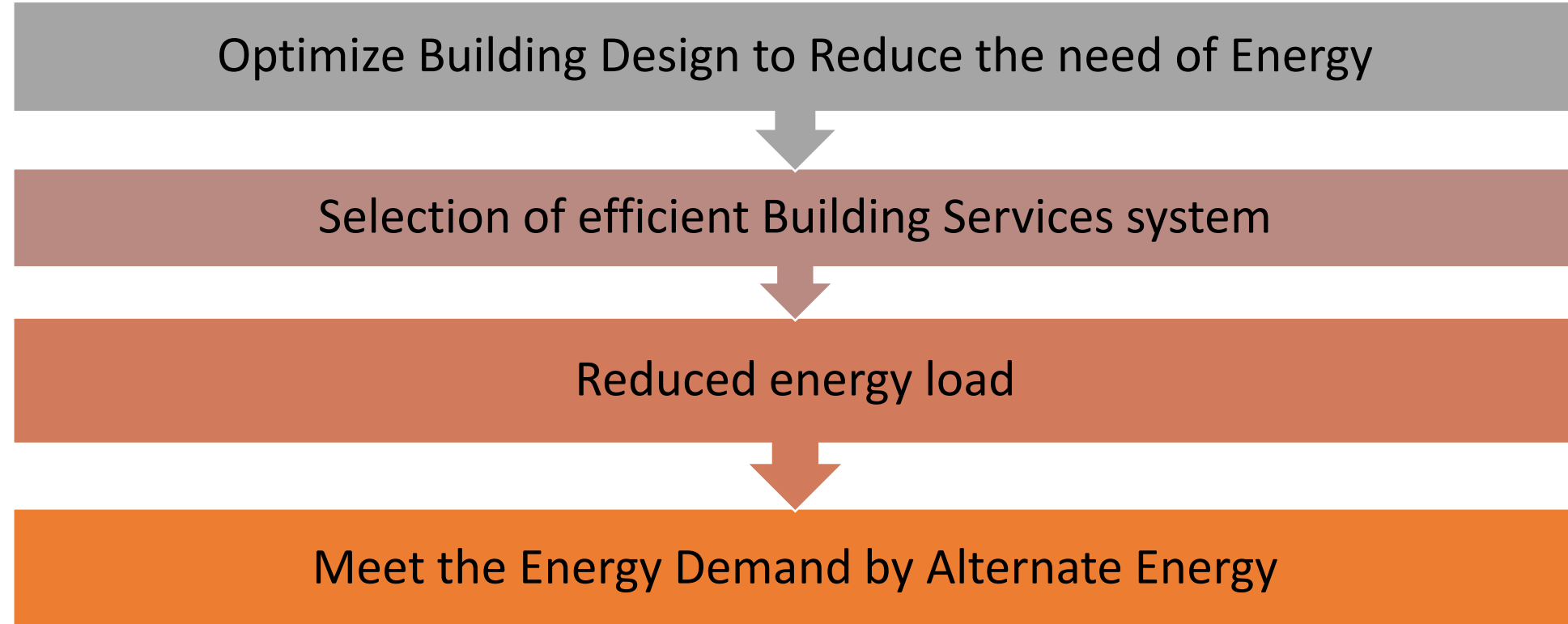
90 % Of the Floor Plate Area has sufficient **Glare Free Day Light** during the working hours.



STRATEGIES FOR BUILDING SYSTEMS



DESIGN PROCESS



SELECTION OF EFFICIENT BUILDING SERVICES SYSTEM

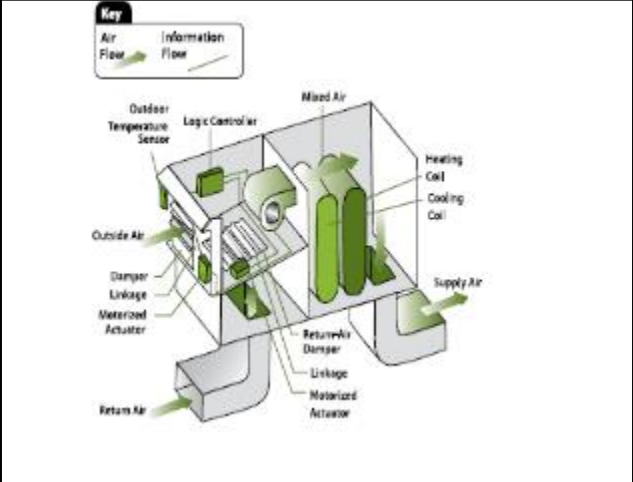


Water Cool Chillers



Variable Speed Drive

For cooling towers and closed circuit fluid coolers

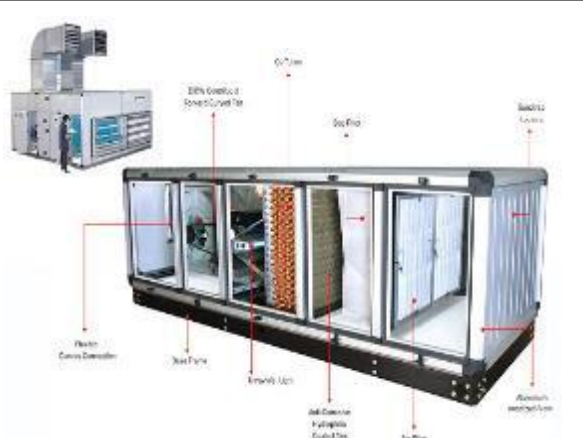


Use of Economizer

It allows outdoor air to cool the building when the outside temperature is cooler than that inside.

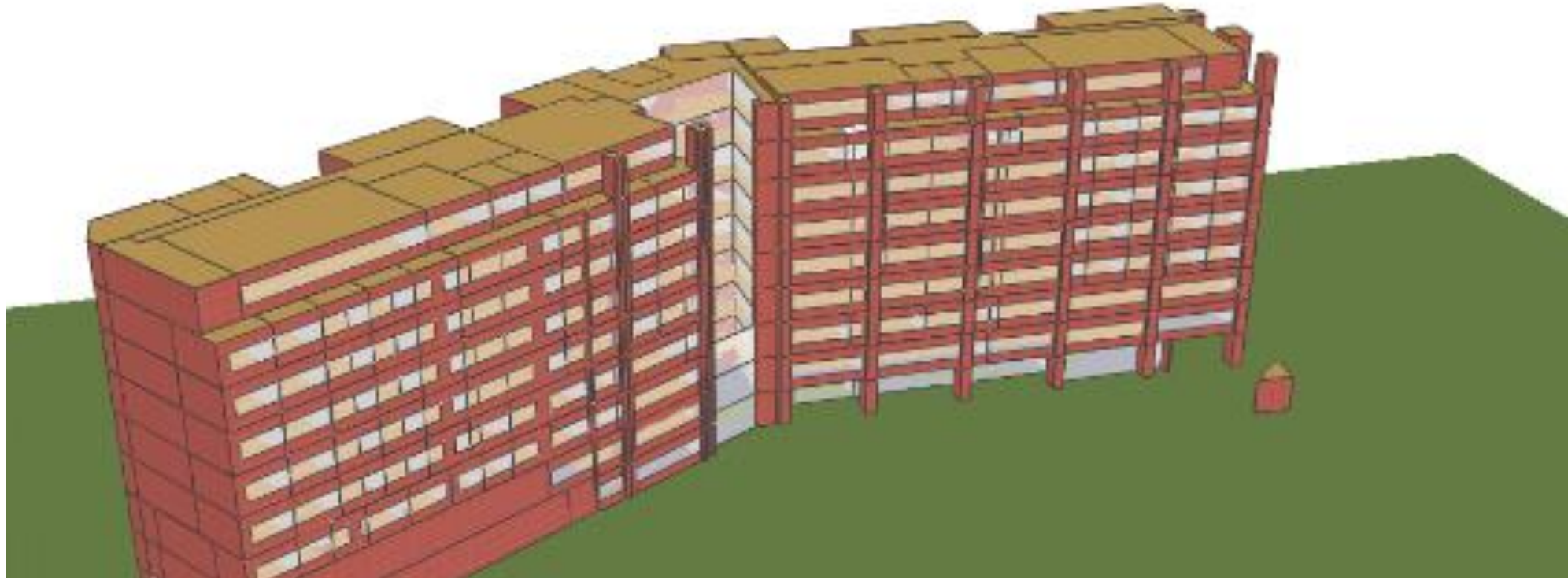


Chilled Water pumps & Condenser Pumps



Air Handling Unit

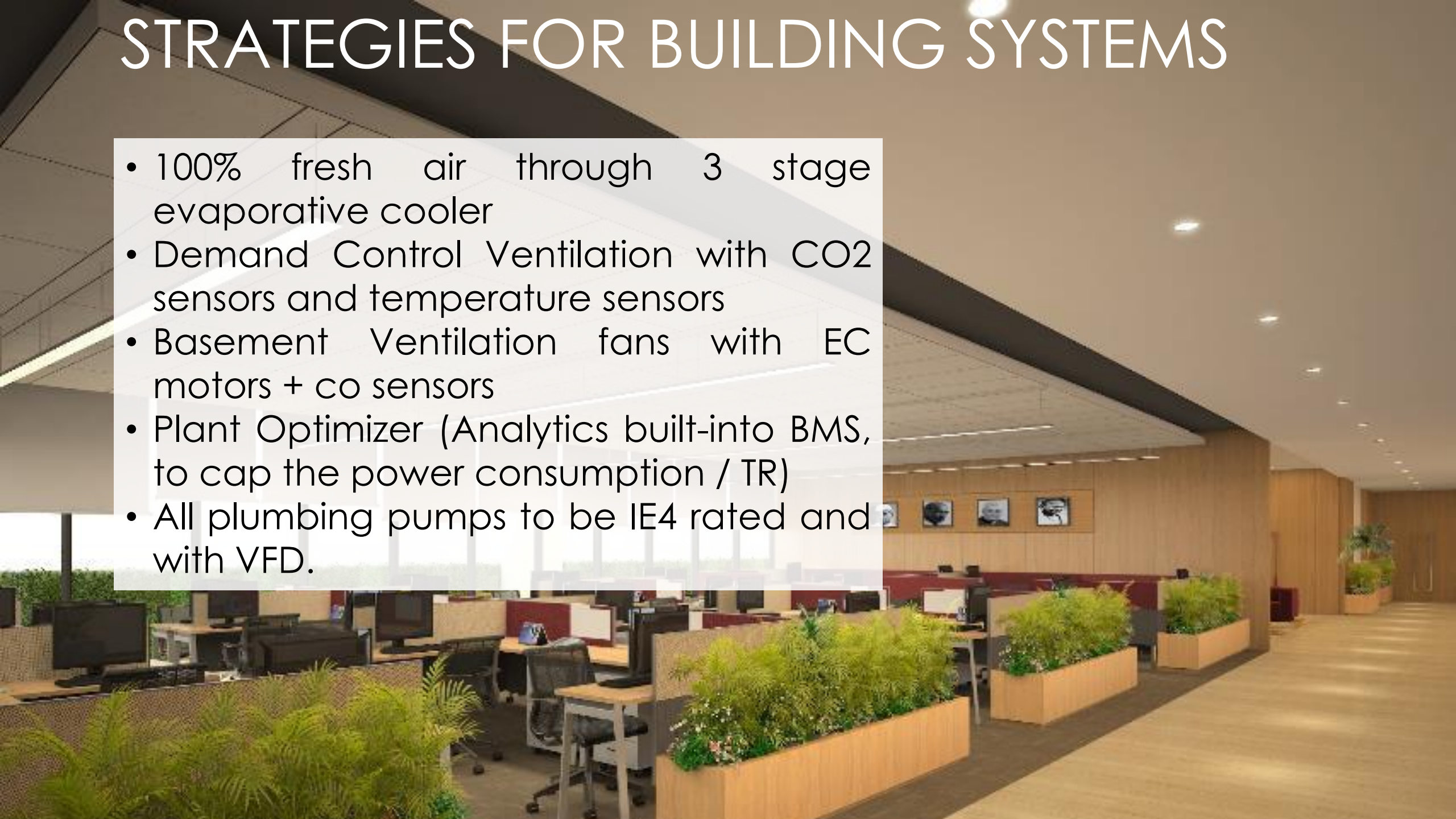
STRATEGIES FOR BUILDING SYSTEMS



- Central plant and radiant cooling
- One 15 TR chiller for radiant and one 215 TR chiller for conventional.
- CTI certified cooling towers to minimize losses in cooling towers
- Heat Recovery Wheel based Fresh Air System with DUAL-COIL (HIGH-TEMP & LOW-TEMP) COIL & EC motor
- Heat Pump for hot water generation during winter heating requirement.

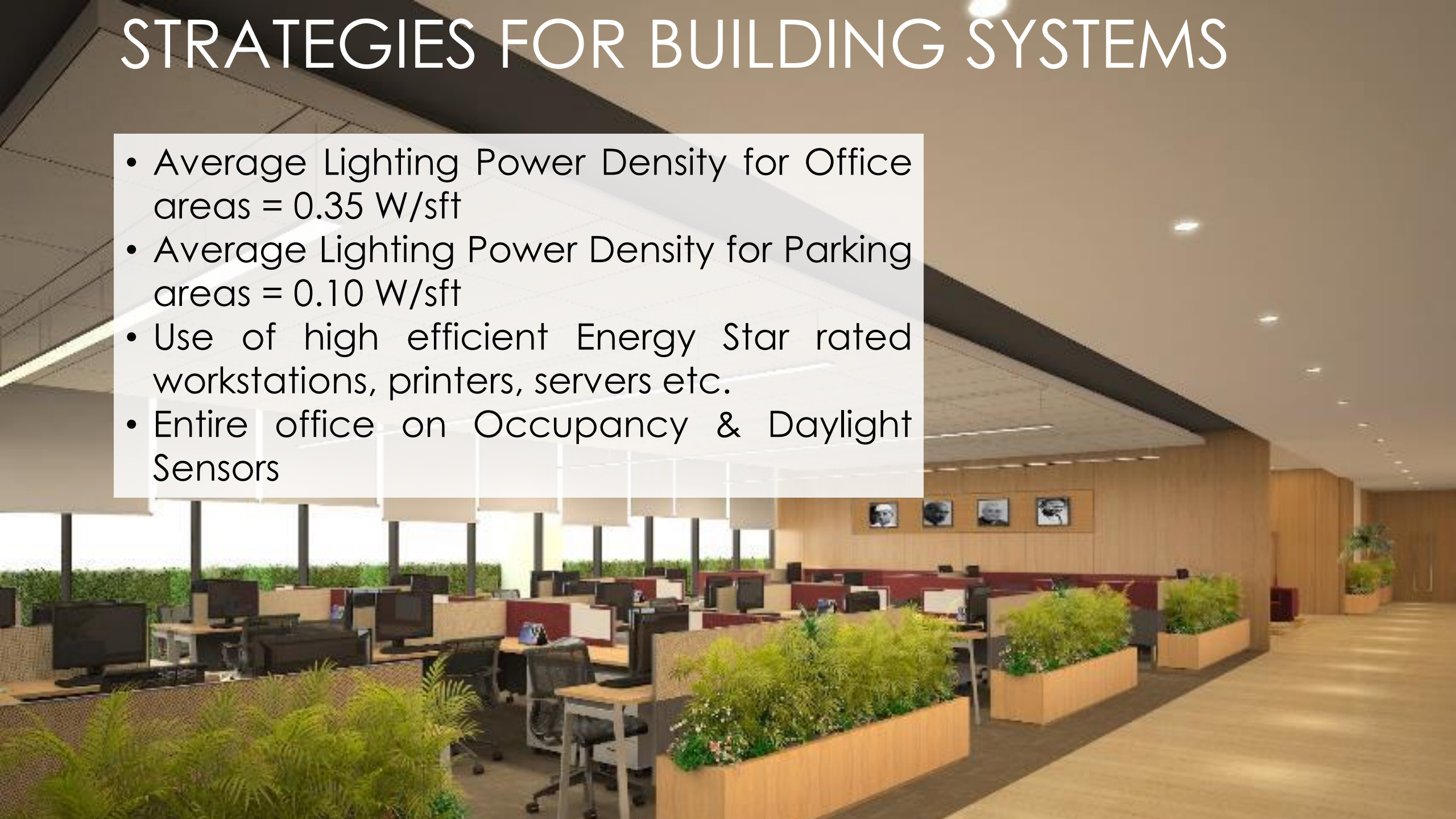
STRATEGIES FOR BUILDING SYSTEMS

- 100% fresh air through 3 stage evaporative cooler
- Demand Control Ventilation with CO2 sensors and temperature sensors
- Basement Ventilation fans with EC motors + co sensors
- Plant Optimizer (Analytics built-into BMS, to cap the power consumption / TR)
- All plumbing pumps to be IE4 rated and with VFD.



STRATEGIES FOR BUILDING SYSTEMS

- Average Lighting Power Density for Office areas = 0.35 W/sft
- Average Lighting Power Density for Parking areas = 0.10 W/sft
- Use of high efficient Energy Star rated workstations, printers, servers etc.
- Entire office on Occupancy & Daylight Sensors



STRATEGIES FOR BUILDING SYSTEMS

Area for PV solar available	7413 sqm
Space / kW-p Solar PV	7 sqm
Solar PV Installation Potential	1059 kWp
Daily Power Generation potential per kWp installed	5 units
Daily AVERAGE Generation Potential	5295 kW-hr

Daily Average Energy Consumption
5126.6 kW-hr



Daily Average Solar Power Generation Potential
5295 kW-hr





CLIENT FEEDBACK ON THE WINNING ENTRY



DESIGN PROCESS FOR NZE



DESIGN PROCESS FOR NZE

28.05.2019

GREEN CONVERSATIONS: MNRE HQ

35



DESIGN CONSTRAINTS



DESIGN CONSTRAINTS



KEY ELEMENTS FOR A SUCCESSFUL NZE DESIGN



KEY ELEMENTS FOR A SUCCESSFUL NZE DESIGN



What

Who

Where

When

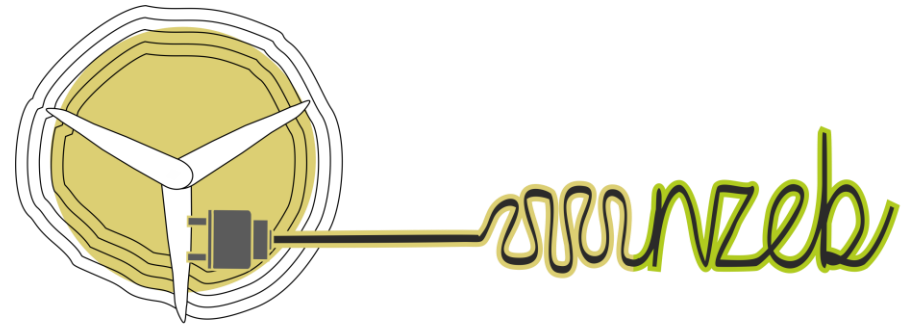
How

Why

?

END OF WEBINAR





K N O W L E D G E S E R I E S

M a y | J u n e | J u l y 2 0 1 9

THANK YOU !

<http://www.nzeb.in/>

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Implementing Partner