Solar Theme Park For CEL

CENTRAL ELECTRONICS LIMITED
(A Public Sector Enterprise)

Ms. Alankrita Soni
16.02.2017

Sharp Developments
Delivering Sustainable Solutions

Green retrofitting of central electronic campus to make entire campus as net zero energy campus.

Preliminary Green Retrofitting Feasibility Studies.

↓

Existing Building Audits.

↓

Incorporating Energy, Water and waste Conservation Measure as per Audit Reports to make zero energy, water and waste campus.

↓

Developing Solar Demonstration Park Design Concept

Construction of Solar Theme park

↓

Green Building Certification of the Buildings (Administration and Canteen)

↓

Solar Technology Training, Research and Developments

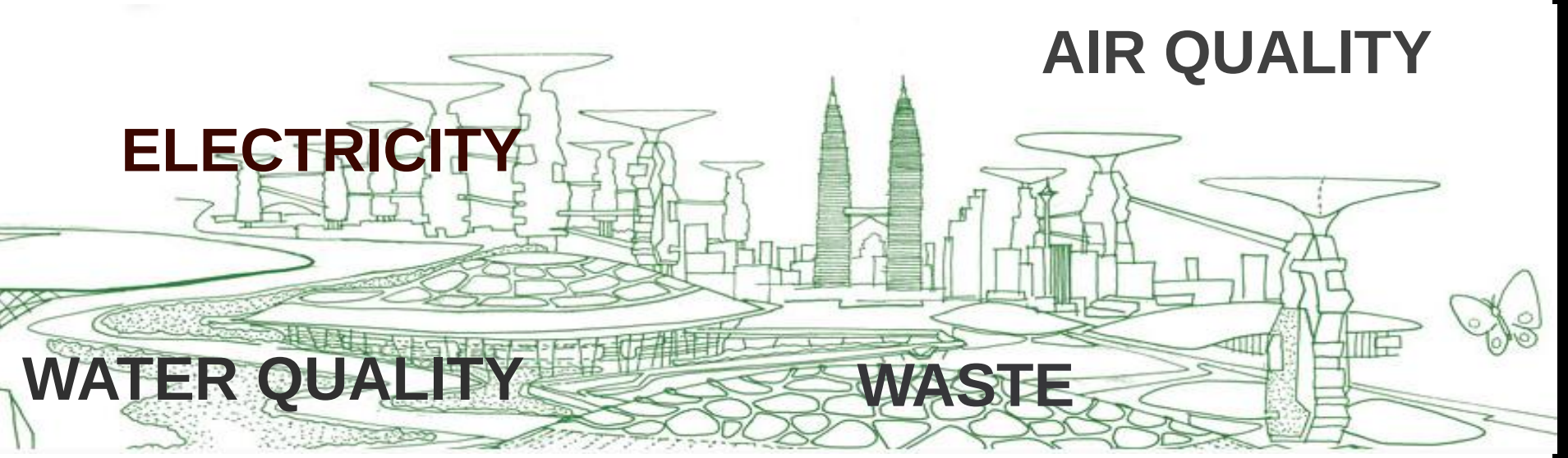
There is a growing attention to the idea of net-zero energy buildings. The reason is that if we want to achieve sustainability, the buildings can not just consume but at some point they have to give back….

TOWARDS NET ZERO ENERGY BUILDING ….

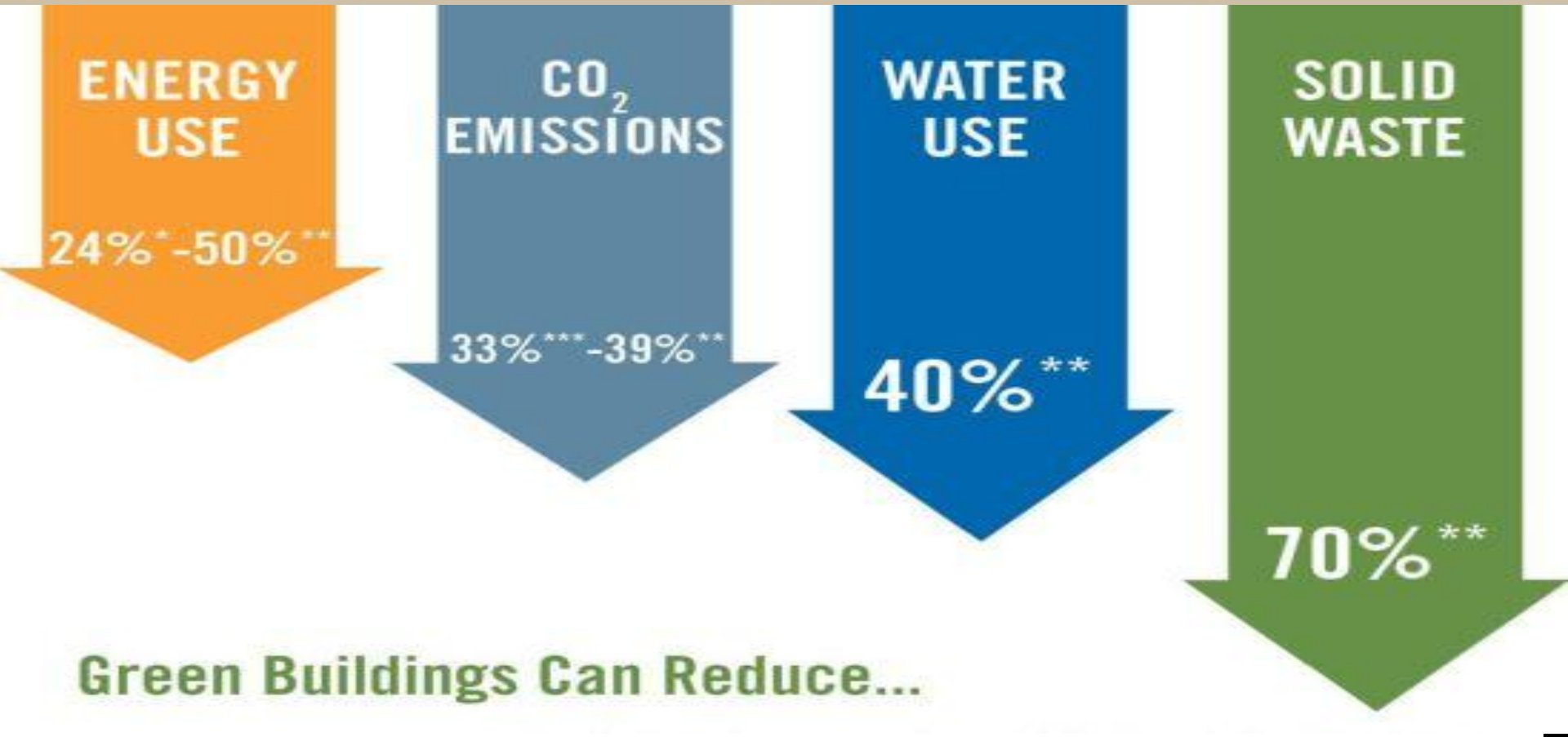
Why??

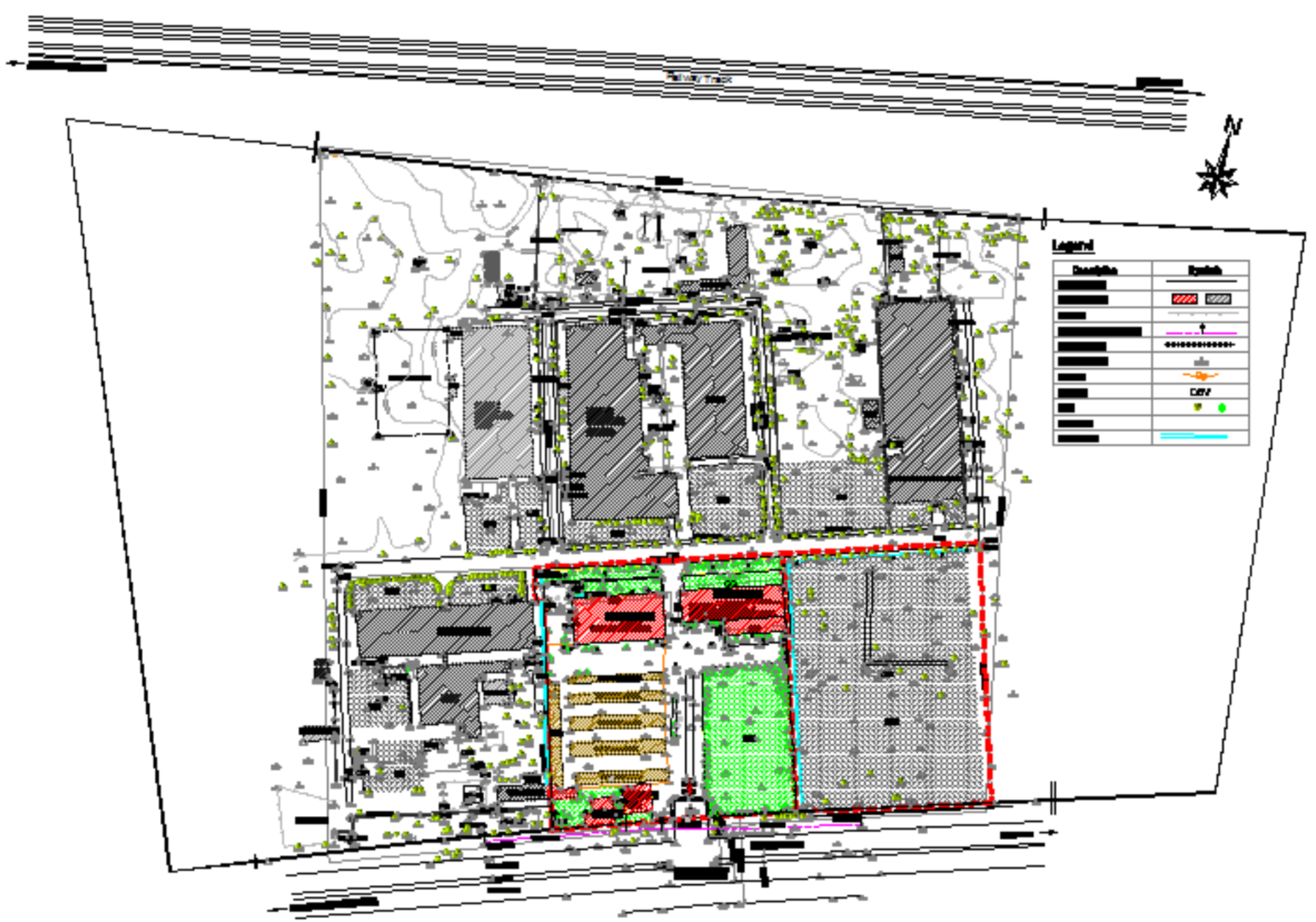
Building sector uses about **40% of the energy** and it is one of the **prime contributors to global warming** due to the emission of Green House Gas (GHG) caused by the energy used.

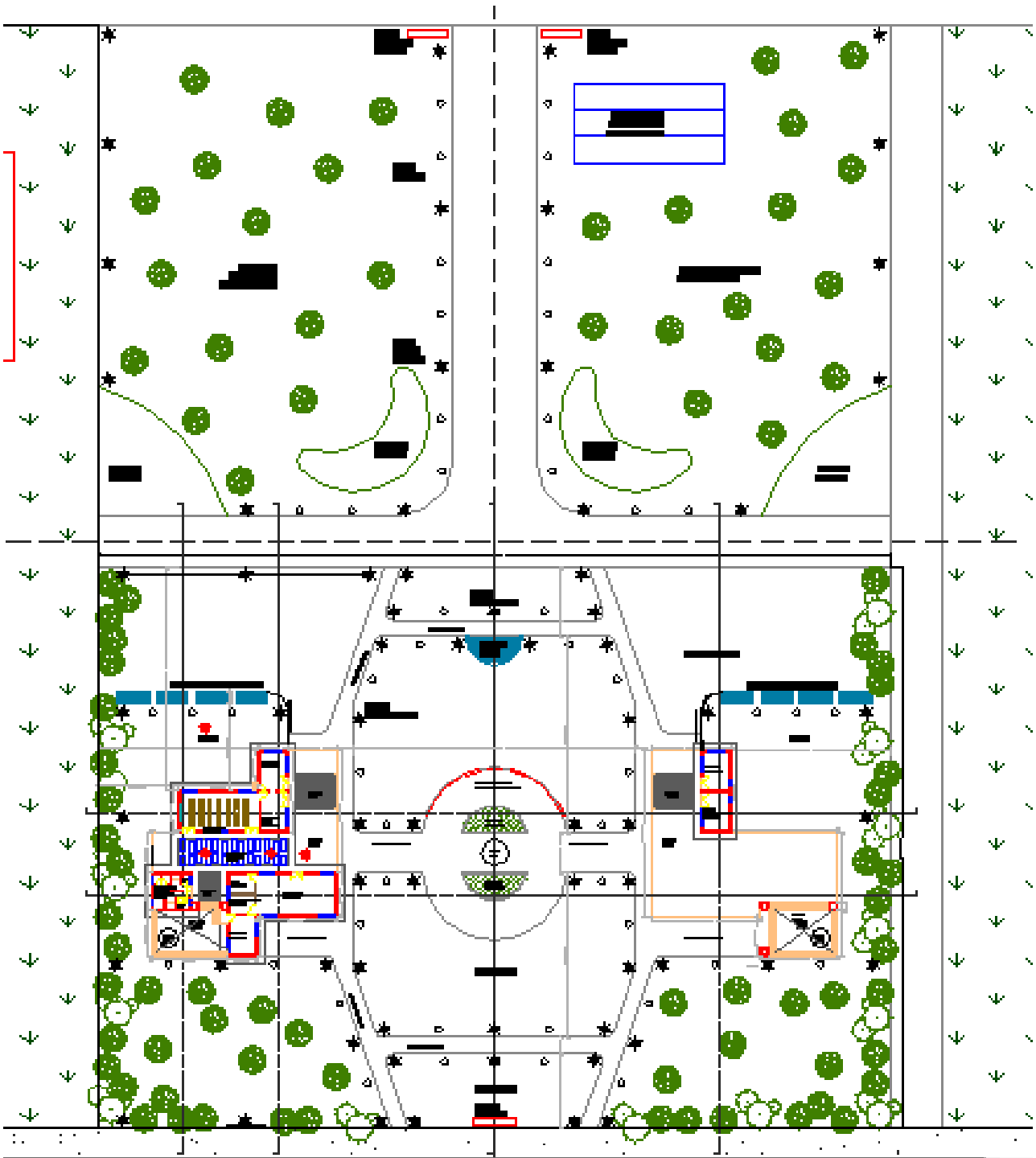
Buildings in India **consume about 20% of the country's total electricity** and have a significant impact on the environment and resources indicating the need to develop green buildings in India.

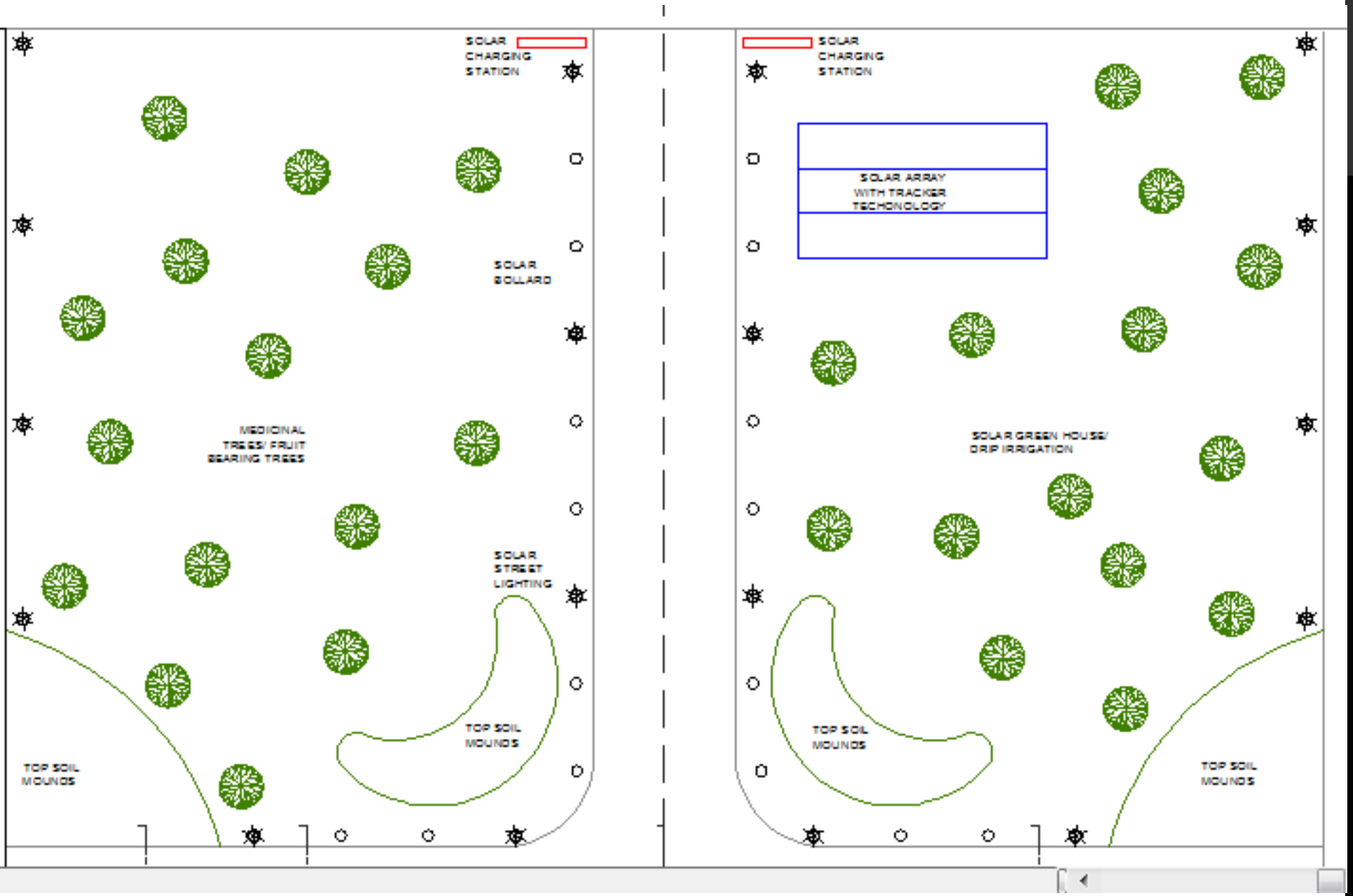


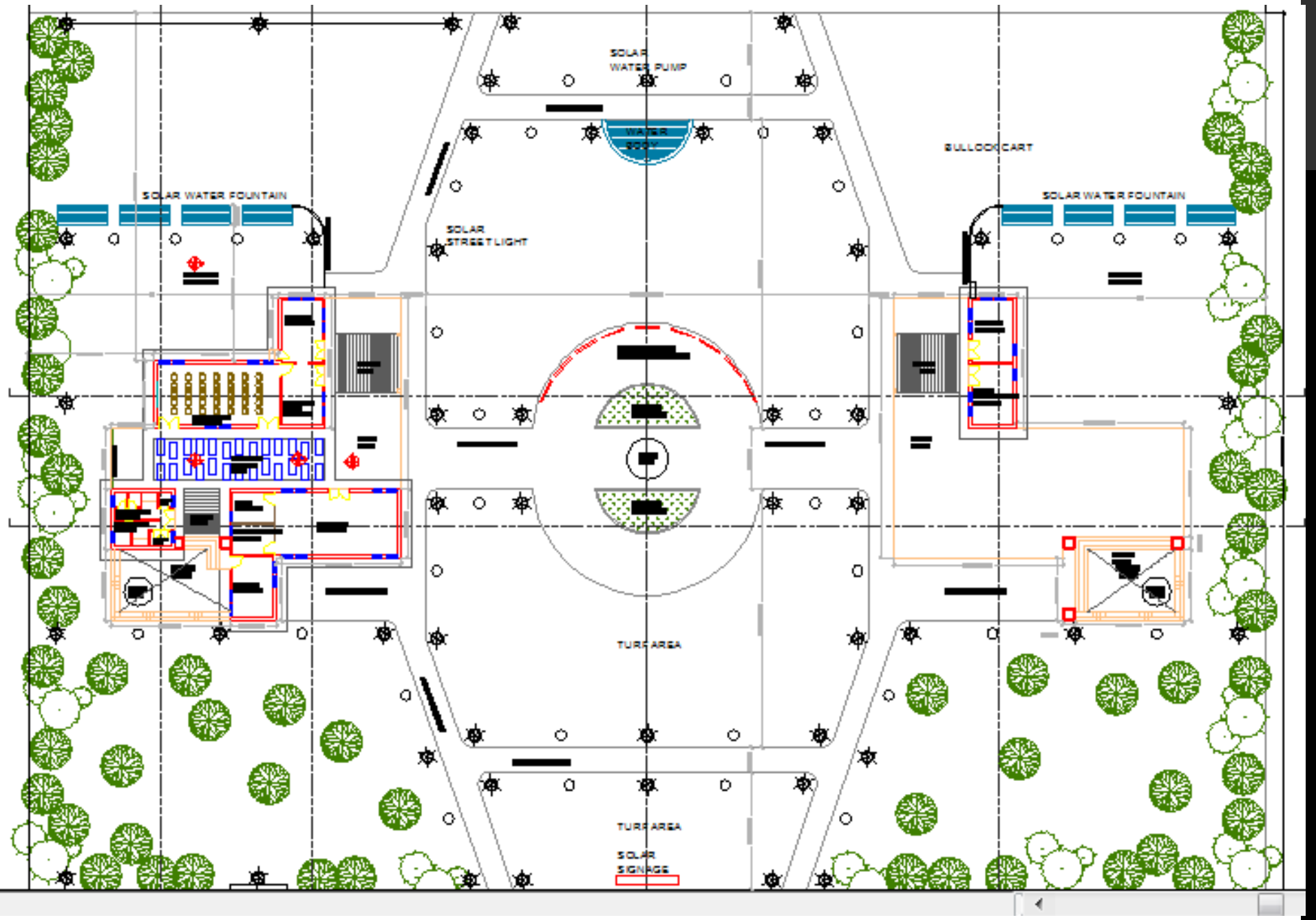
A “**Green building**” focuses on increasing the efficiency of resource use – energy, water, and materials – while reducing building impact on human health and the environment during the building’s lifecycle, through better siting, design, construction, operation, maintenance, and demolition.




Railway Track
N
Legend
Description
Symbols
CATV




SOLAR CHARGING STATION
SOLAR BOLLARD
MEDICINAL TREES/ FRUIT BEARING TREES
SOLAR STREET LIGHTING
TOP SOIL MOUNDS
TOP SOIL MOUNDS
SOLAR CHARGING STATION
SOLAR ARRAY WITH TRACKER TECHONOLOGY
SOLAR GREEN HOUSE/ DRIP IRRIGATION
TOP SOIL MOUNDS
TOP SOIL MOUNDS


SOLAR
WATER PUMP
WATER
BODY
BULLOCK CART
SOLAR WATER FOUNTAIN
SOLAR WATER FOUNTAIN
SOLAR
STREET LIGHT
TURF AREA
TURF AREA
SOLAR
SIGNAGE

OUR PROPOSITION: Solar Demonstration & Training & Research

Theme based solar demonstration and training area created with sustainable design, materials and technology - displaying innovative, up-scalable and implementable solar technologies).

- Journey of Solar
- Rural Solar Technology Display Area
- Urban Technology Display Area
- Solar Cafeteria & Shop
- Training Centre & Laboratory
- Library

- **Journey of Solar (Display of Solar Panels)**
- **Solar Water Pumping**
- **Solar Street Lighting/ High Mast**
- **Solar Bollard Lighting**
- **Solar Roof Top PV**
- **Solar Tree/ Security/ WiFi**
- **Solar Hoarding**
- **Solar Array with Tracking System**
- **Solar Charging Station**
- **Solar Water Fountain**
- **Solar Tubes**
- **Solar Flooring/ Roofing in-built**
- **Solar Water Heater**

RURAL DISPLAY

LOW COST RURAL HUT WITH GREEN TECHONOLOGIES

Target Segment/ Audience - Village Communities , Government Departments/ NGO's/ Private Organizations working is rural green habitat

Solar Solutions:

Solar Home Lighting

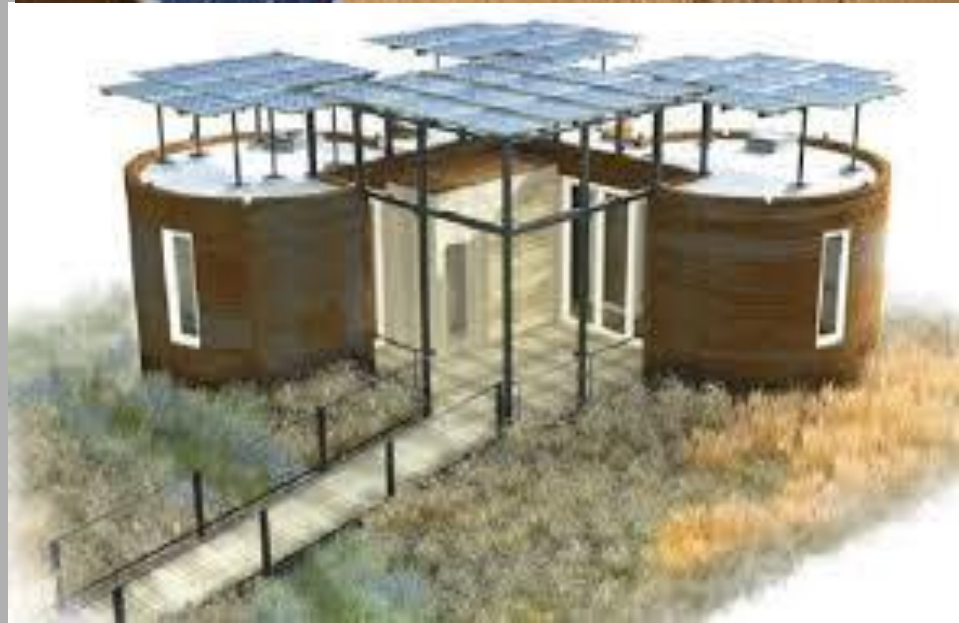
Solar Street Lighting

Solar Charging Station

Solar Lantern

Solar Water Pumping /Solar Drinking Water / Solar Irrigation

Solar Fodder Cutting/ Solar Flour Making











URBAN DISPLAY

USE OF GREEN CONSTRUCTION MATERIAL & TECHNOLOGIES, DEMONSTRATION OF SMART, INNOVATIVE AND EFFICIENT SOLAR SOLUTIONS FOR URBAN HOUSES

Target Segment/ Audience – Urban Green Habitat, Smart City Concept, Private Sector – Corporates.

Solar Solutions Proposed:

- Solar Rooftop
- Solar Water Heater
- Solar Air Conditioning
- Solar Room Heating
- Solar Lighting/ Light Tubes
- Solar Net Metering
- Solar Cooking
- BIPV

SOLAR SHOP & CAFETERIA

Target Segment/ Audience

Visitors in the Solar Park

Solar Shop: Display and sale area for all Solar Equipment's and innovative products to encourage day-to-day use of technology

- **Solar Mobile Charger**
- **Solar Lantern/ Torch**
- **Solar Panels**
- **Solar Light Tubes**
- **Solar run TV**
- **Solar run air-conditioning/ heating system**
- **Solar Charging Station**
- **Other miscellaneous innovative solar items**

Solar Café: Display solar cooking, solar refrigeration, along with promoting other sustainable ways of food chain including organic farming, solar cooking, organic waste management etc.

JOURNEY OF SOLAR

Theme based area explaining the Basics of Solar – Journey of Solar.

A special model display for training children (Solar do-it-yourself kit)

SOLAR SURROUNDINGS

Solar Solutions for a Green Urban Cityscape

- Solar Trees
- Solar Powered Street Lights
- Solar Powered Night Lamps
- Solar Rickshaw/ E-Richshaw
- Solar powered night street LIGHTING & Solar bollard

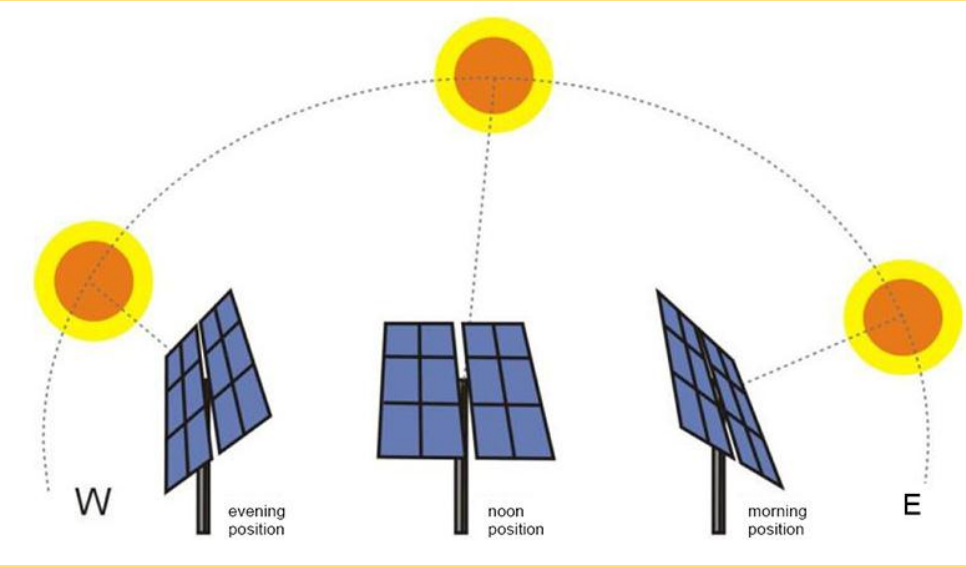
SOLAR VIDEO SURVEILLANCE

A vital tool for protecting people and property around the clock. A reliable power system for continuous and uninterrupted operation.

Suitable for places where power supply is not continuous. These systems are designed such that it can run 24*7 without any interruption.

It can run for 3 days in the absence of proper sunlight during cloudy days (based on battery).

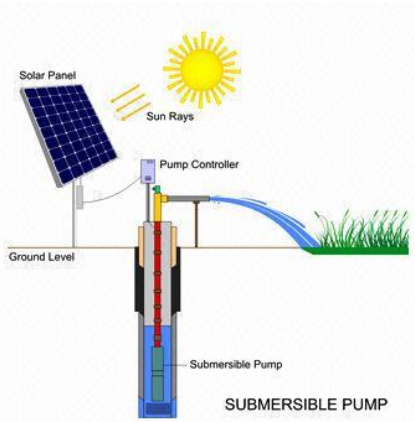
SOLAR ARRAY WITH TACKER TECHONOLOGY



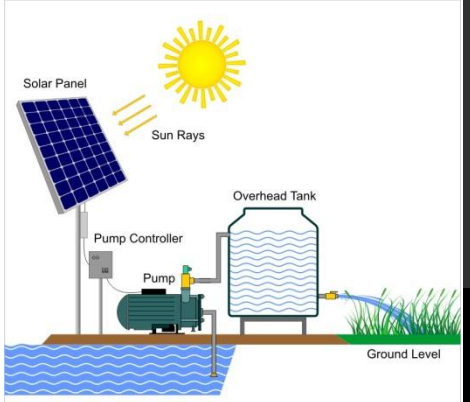
SOLAR SIGNAGE/ DISPLAY - TIME , TEMPERATURE & AIR QUALITY DISPLAY WITH LED LIGHTING

Time and Temperature Display
Air Quality Display
Latest Campus News Update LED Display
Security &Surveillance

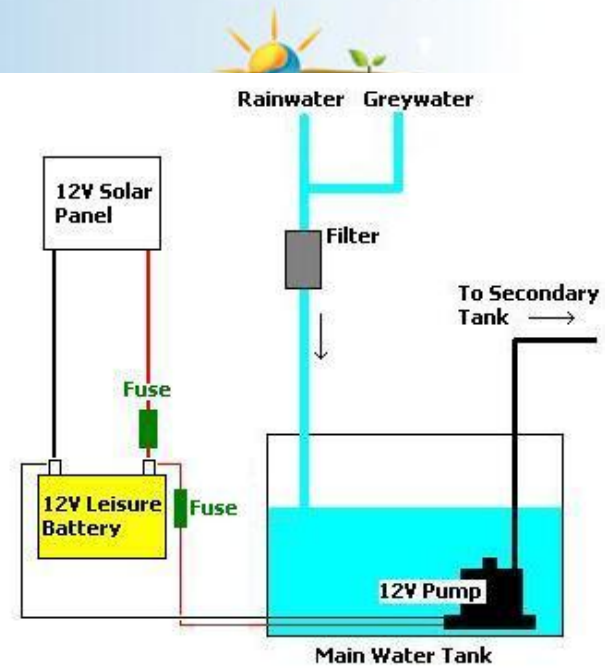
SOLAR IRRIGATION

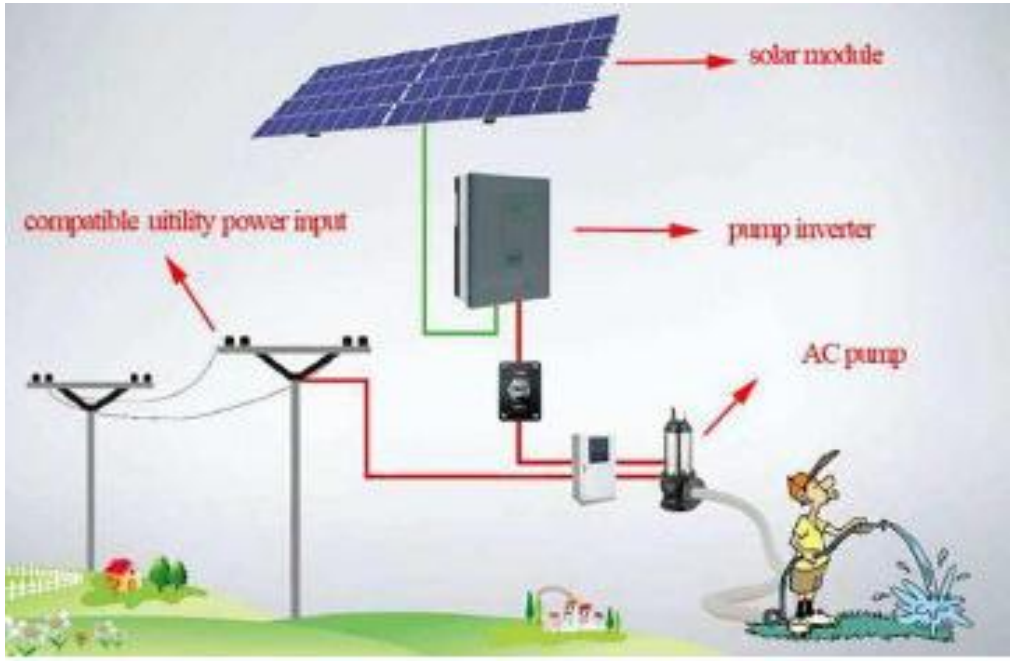


SUBMERSIBLE PUMP



SURFACE PUMP





SOLAR WATER PUMPING

SOLAR POWERED FODDER CUTTING MACHINE FOR CATTLE AND LIVE STOCK

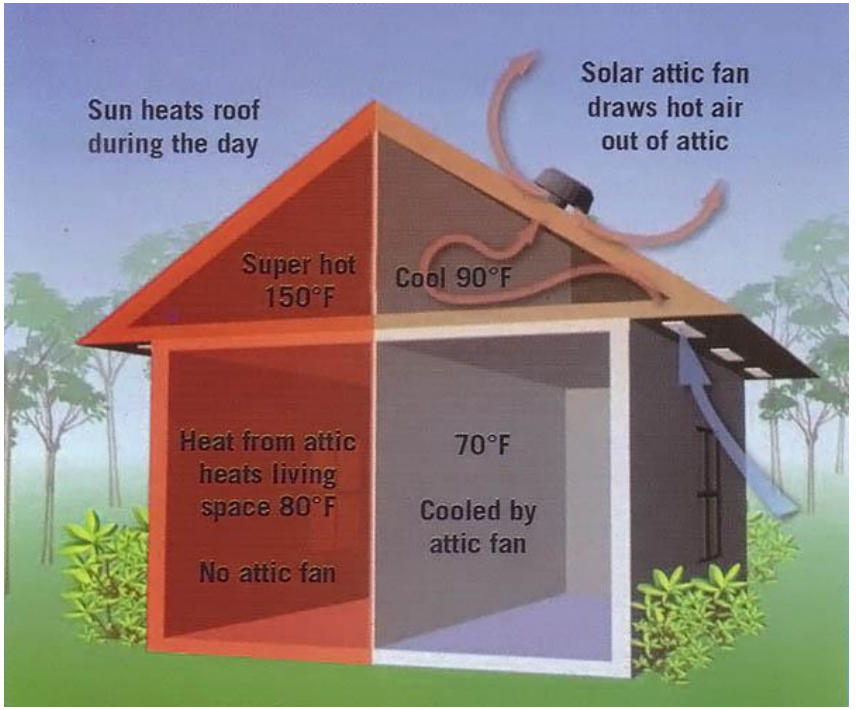
SOLAR ATTIC FAN

A "solar attic fan" is a power roof vent that runs on solar energy instead of electricity. This solar electric drives a motor that spins a fan blade and removes heat and moisture from your attic and can minimize the load on your HVAC system.

A properly installed solar attic fan could help cool your home by cooling your attic.

An attic fan reduces heat build up in attics by removing warm air through openings (attic vents) typically located on the gable ends or on the roof of the house. The air that's vented from the attic is replaced by cooler outside air drawn in through soffit vents (openings on the underside of the eaves).

It keeps roof surface cool - extending the life of roofing materials; keeps indoor temperature comfortable, reducing the load on your air conditioning system; lowers utility bills; reduces moisture build up, thereby reducing rust, rot, and build up of harmful bacteria and mold and equalizes interior and exterior temperatures differential.

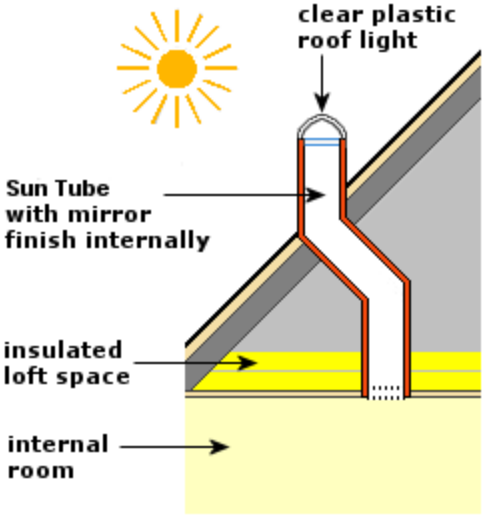


SOLAR LIGHT TUBES

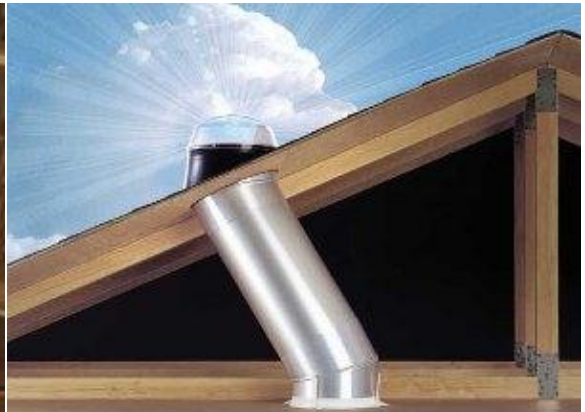
Pipes that funnel sunlight indoors

They do not contribute to heat loss or gain and illuminate the area with pure, natural full-spectrum light without consuming electricity.

The high-impact acrylic dome captures sunlight on the roof. This sunlight travels through an extremely reflective, mirror-like tube that amplifies it. It has an arced prismatic surface that bounces the light in all directions eliminating the “hot spot” effect of traditional skylights. It is able to harness sunlight even when the sun's position is low, and is designed to filter out harmful UV rays.



SUN TUBE LIGHT



WASTE MANAGEMENT

On-site Organic Composting

Category	SF Mandatory Requirement 2
Rating Criteria	Waste Collection & Disposal
Credit Points	Required
Achievable	With cost input

WASTE MANAGEMENT

Waste Segregation

Category	SF Mandatory Requirement 2
Rating Criteria	Waste Collection & Disposal
Credit Points	Required
Achievable	Low cost option

SF MANDATORY REQUIREMENT 2
WASTE COLLECTION & DISPOSAL

ECO-FRIENDLY SOLAR INTEGRATED LANDSCAPING

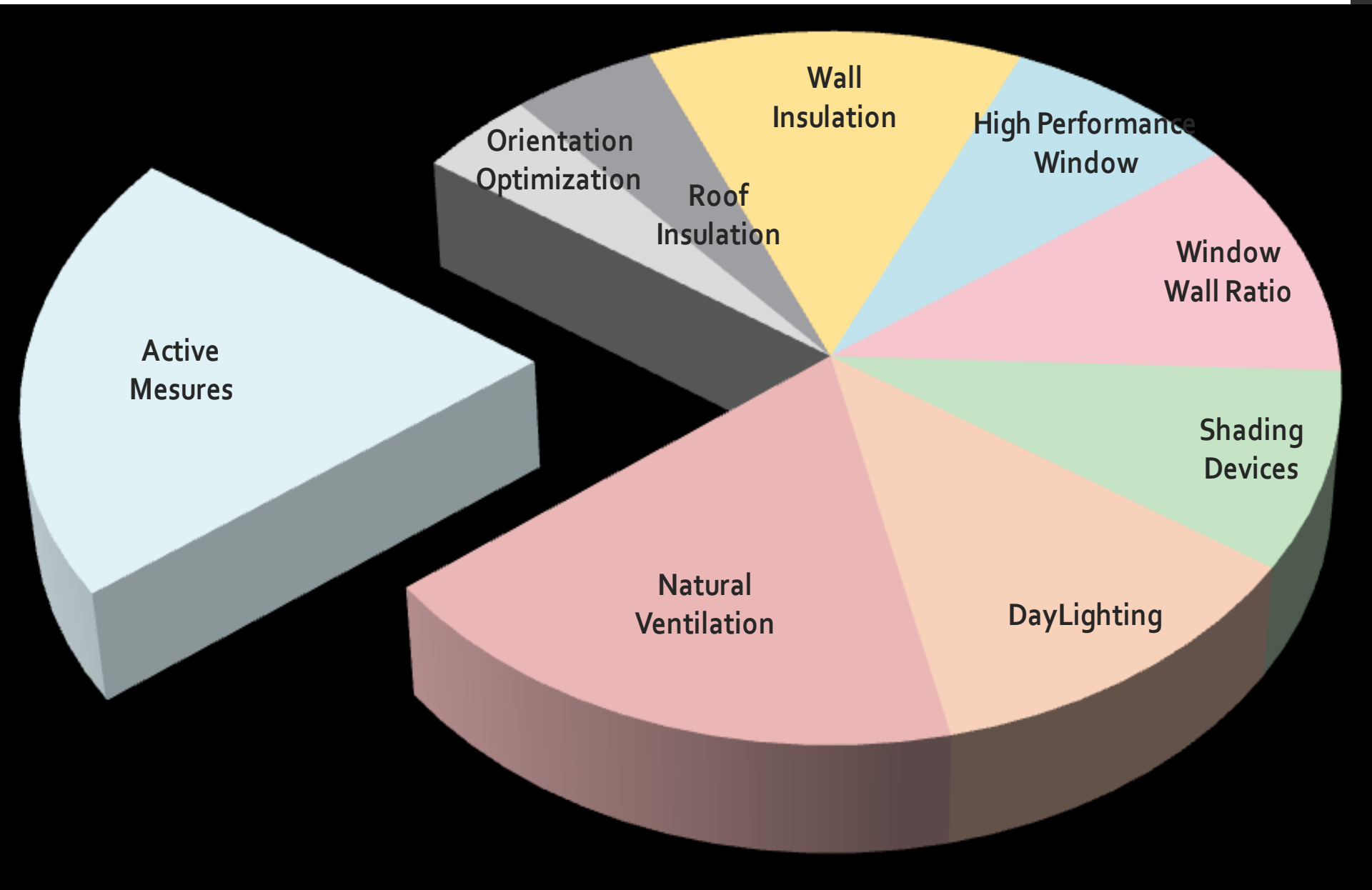
- USE RECYCLED WATER FOR LANDSCAPING
- DRIP IRRIGATION TO REDUCE WATER REQUIREMENT
- SOLAR BASED WATER PUMPING SYSTEM FOR IRRIGATION
- USE OF ORGANIC FERTILIZER
- PLANTING NATIVE SPECIES WITH ECOLOGICAL BENEFITS.
- REDUCES RELIANCE ON TURF AND FLOWER BEDS THAT REQUIRE HIGHER LEVELS OF MAINTENANCE, IRRIGATION, AND FERTILIZERS THAT MAY CONTAIN HEAVY METALS.
- FOCUS ON NATIVE PLANTS:
- FOCUS OF MEDICINAL, FRUIT BEARING AND BIRD ATTRACTING PLANTATION SPECIES.
- FOCUS ON DROUGHT TOLERANT PLANT SPECIES.
- XERISCAPING: SELECTING PLANTS THAT CAN THRIVE IN THE LANDSCAPE WITH AS LITTLE SUPPLEMENTAL WATER AS POSSIBLE. THIS MEANS CHOOSING A VARIETY OF NATIVE PLANTS, AS WELL AS OTHER WELL-ADAPTED SPECIES.

IMTIGATING HEAT ISLAND EFFECT

Plantation to provide shade on non-roof impervious surfaces on the site, including parking lots, along walkways, plazas, etc.

Open Grid pavement system for the existing paved open areas (net impervious area of LESS than 50%)

Building Design Philosophy – Mix of Passive & Active Measures



WALLING

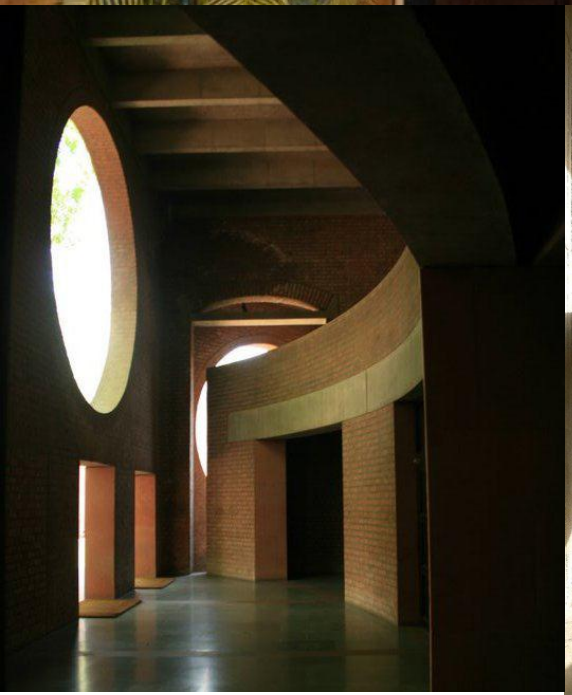
ROOFING

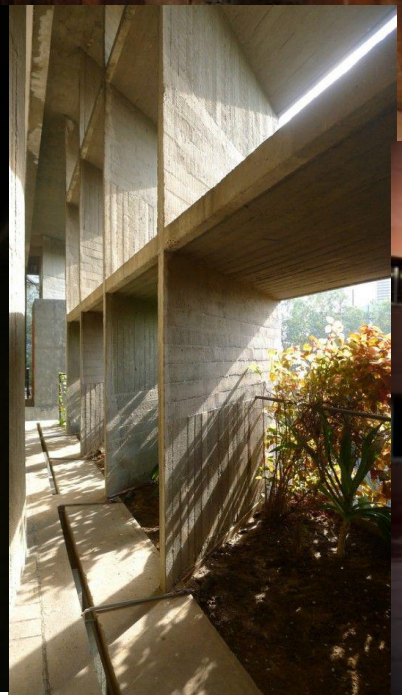
FLOORING

INSULATIONS

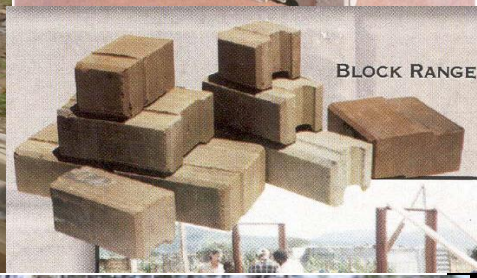
DOOR & WINDOWS

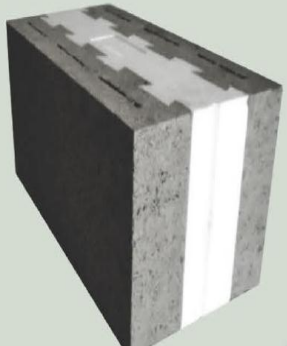
WASTE TO WEALTH





Fly Ash Interlocking Blocks



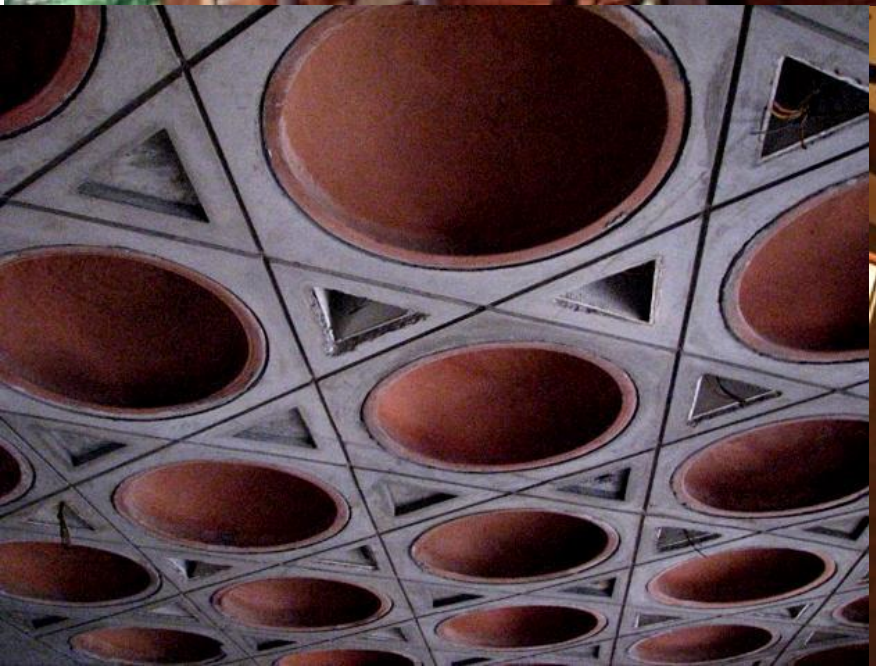
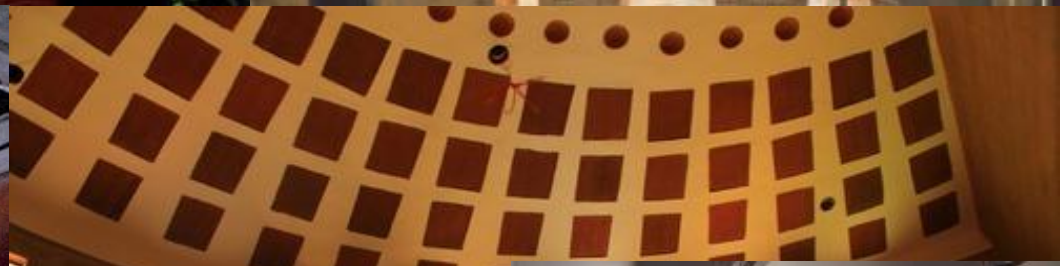


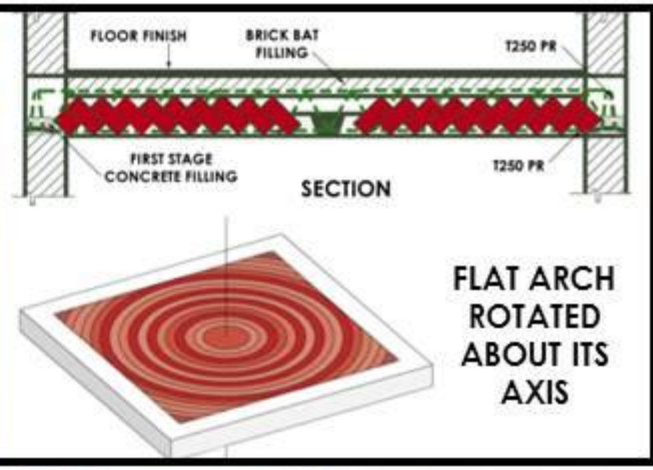
Size of Block : 400x200x200

Size of insert : 400x200x75

Density : 1150kg / cum

Weight : 16.5 kg

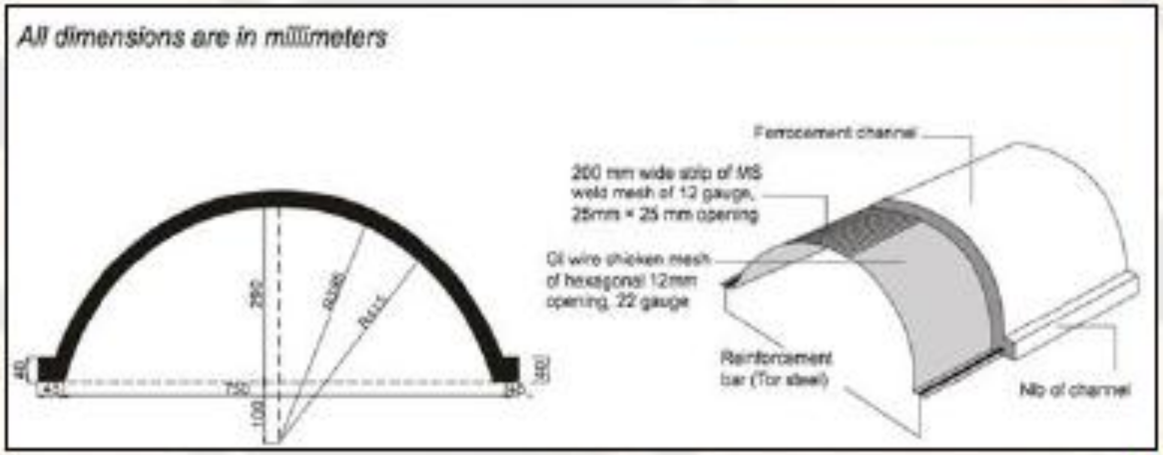






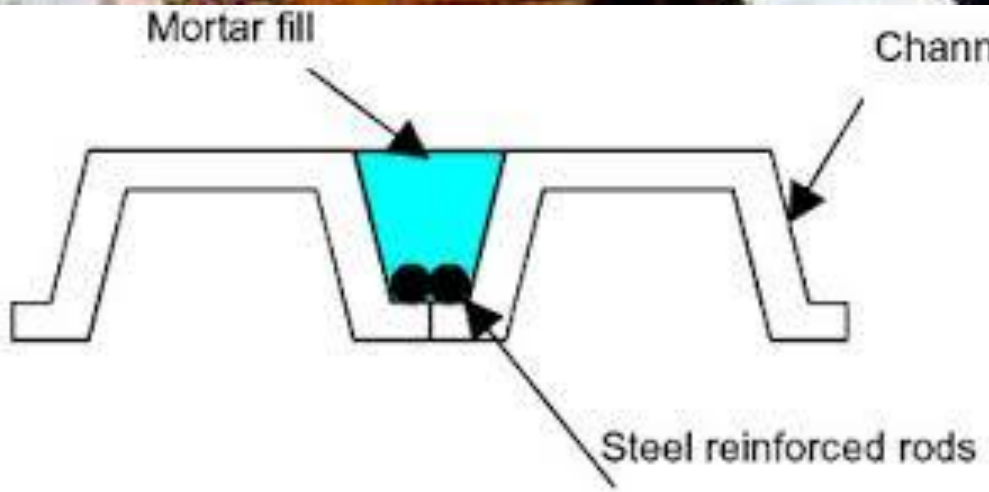
FLAT ARCH ROTATED ABOUT ITS AXIS

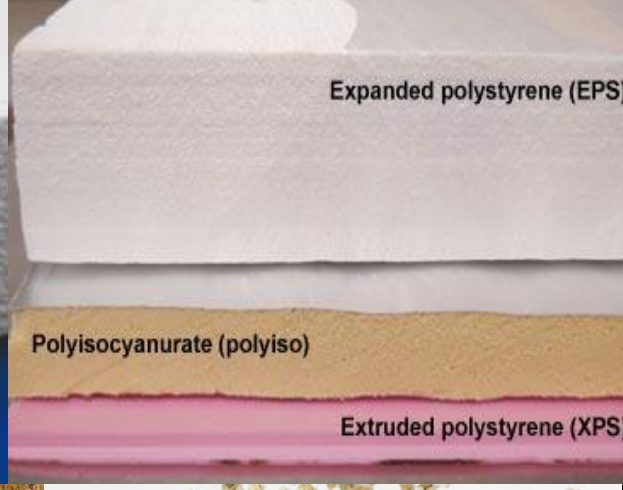
ROOFING SYSTEM - FUNICULAR SHELLS - using **no steel** in the shells

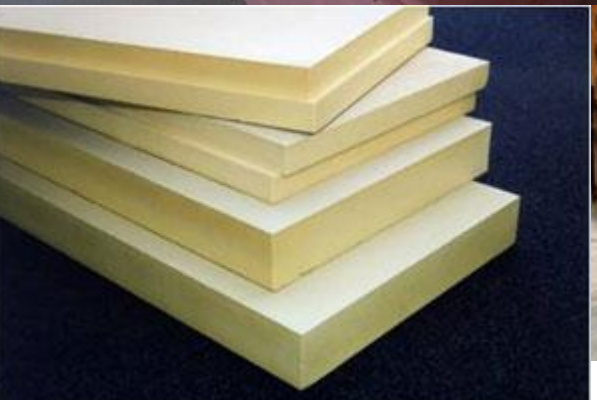
MADE OUT OF RECYCLED MATERIAL

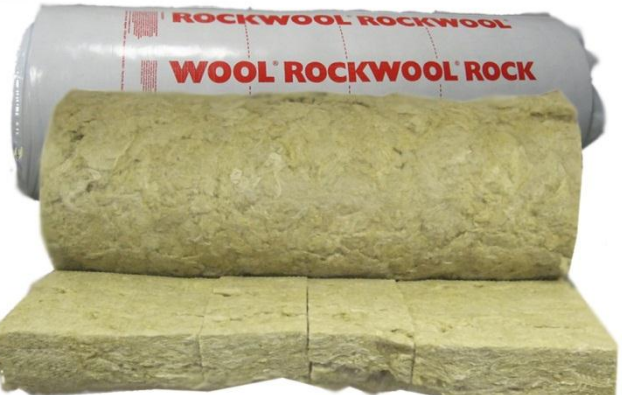


All dimensions are in millimeters
40
750
100
Ferrocement channel
200 mm wide strip of MS weld mesh of 12 gauge, 25mm × 25 mm opening
GI wire chicken mesh of hexagonal 12mm opening, 22 gauge
Reinforcement bar (Tor steel)
Nib of channel


Mortar fill
Channel section
Steel reinforced rods

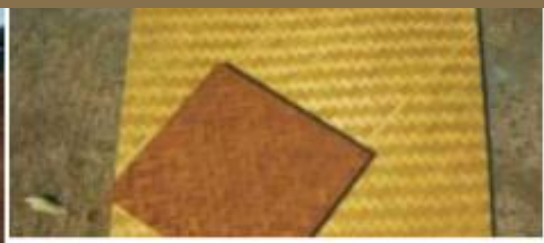

Expanded polystyrene (EPS)
Polyisocyanurate (polyiso)
Extruded polystyrene (XPS)




ROCKWOOL ROCKWOOL
WOOL ROCKWOOL ROCK

BAMBOO MAT CORRUGATED ROOFING SHEETS

BAMBOO MAT BOARD



BAMBOO PERGOLA

JUTE COIR COMPOSITE

Precast Doors - Window frames

RCC concrete door and window frames are alternatives to wooden frames, manufactured in conventional opening sizes of doors and windows. It is termite resistant and fungus-proof, at least 25% cheaper than wooden frames, highly durable, low embodied energy and can be used in conjunction with the structural system of buildings. It can be used as alternative to wooden/ steel door and windows frames for openings of conventional sizes

FLOORING

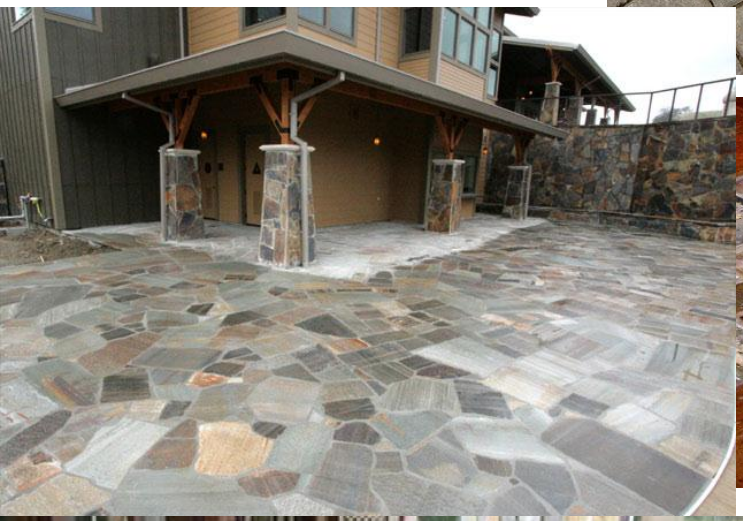
Interlocking Blocks

Local Stone

Flooring Using Waste

Brick Tile Floor

Solar Roofing



PORTABLE SOLAR OFFICE/ CLINIC

REUSING OLD CARGO CONTAINERS AS Portable Green Enclosure which is easy to install at any location;

Generally used at construction sites/ petrol pump cabins/ remote dispensaries and clinics.

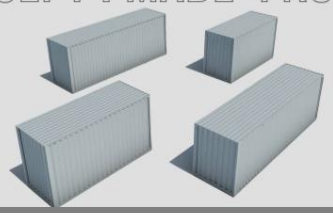
Solar Technologies Demonstrated:

Roof Top Solar

- **Solar Office - Solar Lighting/ Table Lamp//Solar Light Tubes, Solar Calculators, Solar charged/ run computers etc.**
- **Solar Clinic – Solar Lighting, Solar Refrigeration etc.**

W A S T E TO W E A L T H

CONCEPT : MADE FROM RECYCLED CARGO CONTAINERS




THE 3C COMPANY
THINK GREEN. LIVE GREEN.
Shunya
NET ZERO ENERGY HOME

WPC EXTERIOR WALL PANEL

Parameters	CLC Blocks	Burnt Clay Bricks	Concrete Blocks
Basic Raw Materials	Cement, Fly Ash, water & foam	Top agricultural soil,	Cement, sand, aggregate
Production process and set-up	Using ribbon mixer and foam generator	Processed in specially erected or central brick kilns	Mobile or stationary
Dry density (kg/m³)	600/ 800	1900	1700
Comp Strength (kg/cm2)	30 to 40	30-80	30-150
Aging	Gains strength with age (like conventional concrete)	No	Yes
Usage	Thermal insulation, partitions, non-load bearing blocks	Load bearing & non-load bearing walls	Load bearing & non-load bearing walls
Sound insulation	Superior	Normal	Better
Eco friendliness	Pollution free; No primary energy consumption; Consumes fly ash (an hazardous industrial waste material)	Creates smoke; high energy consumption; wastes agricultural land; Soil Erosion Banned in more countries	low energy; no smoke
Thermal conductivity (W/mK)	0.09 – 0.12 (depending on density)	0.4	2.1
Block size and shape	Any size, shape given by mould/cut	Typically shape and size	Typically size
Water absorption capacity	CLC is a light weight block where water absorption is less as compared to red brick and fly-ash brick	Red bricks and fly ash brick absorb more water than CLC blocks	Concrete block absorb more water than CLC blocks

Parameters	CLC Blocks	AAC Blocks
Basic raw materials	Cement, fly ash, water and foam	Cement, lime, specially grinded sand, aeration compound, high primary energy input
Production process and set-up	Using ribbon mixer and foam generator	Produced only in well established plant, equipped with steam boiler and high pressure auto-claves
Dry density kg/m³	600/ 800	400/ 700
Compressive Strength kg/cm2	30-40	20-40
Usage	Thermal insulation , partitions, non-load bearing blocks	Non-load bearing panels and blocks
Aging	Gains strength with age (like conventional concrete)	No aging Loses strength, if not protected against humidity
Thermal conductivity (W/mK)	0.09 – 0.12 (depending on density)	0.09-0.15 (depending on density)
Eco friendliness	• Pollution free • No primary energy consumption • Consumes fly ash (an hazardous industrial waste material)	* Pollution free * High energy consumption

Final review and finalization of material

S.No	Option 1	Option 2	CBRI Recommendation
Foundation	To be decided in consultation with Structural Engineer/ CBRI		**Conventional Foundation 4'-6" deep**
Wall	**Fly- Ash Interlocking Blocks**	Thermo Insulated Blocks	Fly-ash interlocking ; Translucent Concrete
Roof	**Filler Slab**	**Conventional RCC Slab**	100 Thk. RCC with Insulation (40-50mm) or Filler Slab
Flooring	**Customized Waste Solar panel embedded flooring**	Local Delhi Stone Flooring	
RCC Door & Window Frames (BMTPC/ CBRI)	Concrete	UPVC	
Door Shutter	Ferro cement / Rubber Wood Door Panels	UPVC+ Glass	
Windows	**UPVC with High performance glass**	Wood with High performance glass	
Pathways	**Pavers Block from C&D Waste (Burari Plant, Delhi) OR Customized Waste Solar panel embedded flooring**		
Space Frame	**Combination of Bamboo; Metal & Solar Panels**		
Green Wall	One wall panel each on outer side off east and west wall		

REDUCING – RECYCLING - REUSING

SOLAR INTEGRATED LANDSCAPE SYSTEMS & USE OF WASTE TO WEALTH

Waste metal plates - Wall mural

Green Building Rating System – Key Areas

A whole-building approach to sustainability by recognizing performance in key areas.

Site & Facility Management

Water Efficiency

Energy Efficiency

Health & Comfort

Innovation In Design

IGBC CREDIT RATINGS

Certification Level Points Recognition		
Certified	50-59	Best Practices
Silver	60-69	Outstanding Performance
Gold	70-79	National Excellence
Platinum	**80-100**	**Global Leadership**

Available Credits		
Site & Facility Management	Maximum Points	18
Water Efficiency	Maximum Points	26
Energy Efficiency	Maximum Points	30
Health & Comfort	Maximum Points	14
Innovation Category	Maximum Points	12
Total Credits Available		**100**

“In the end, we will conserve only what we love. We will love only what we understand. We will understand only what we are taught.”

– Baba Dioum

THANK YOU