



# PASSIVE DESIGN STRATEGIES FOR ARCHITECTS

**Presented By:**

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UIA SDGS COMMISSION MEMBER

**Date : 13 May 2023**

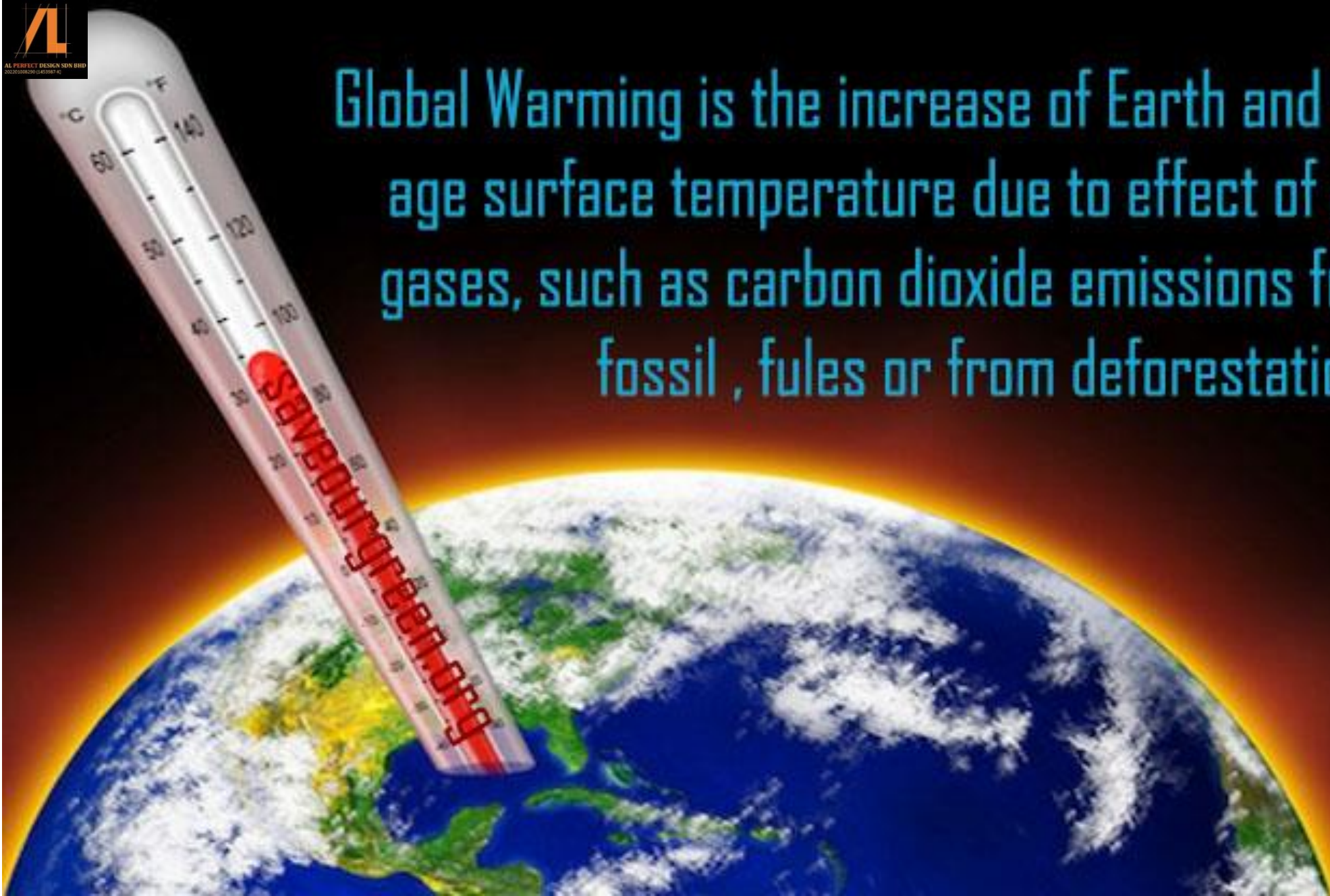
# GLOBAL WARMING



WHAT IS  
GLOBAL  
WARMING ?



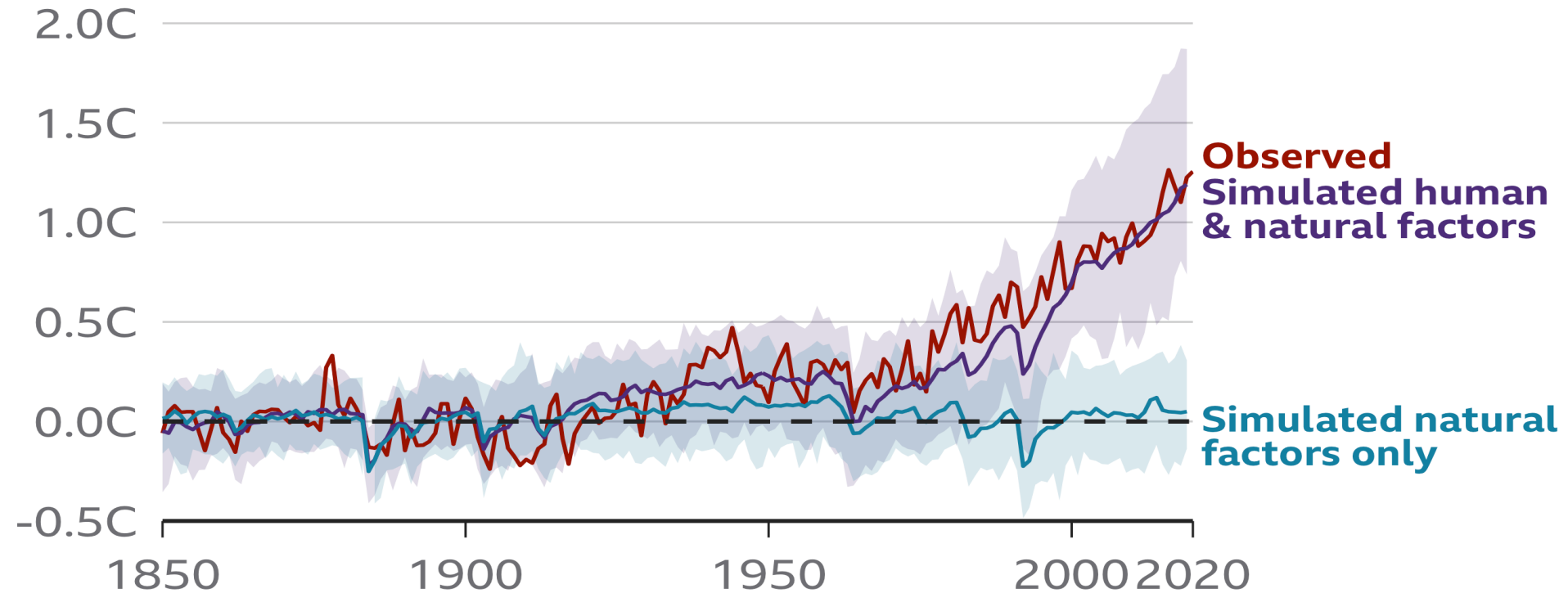
Global Warming is the increase of Earth and Ocean's average surface temperature due to effect of greenhouse gases, such as carbon dioxide emissions from burning fossil , fules or from deforestation.



# GLOBAL WARMING

## Human influence has warmed the climate

Change in average global temperature relative to 1850-1900, showing observed temperatures and computer simulations



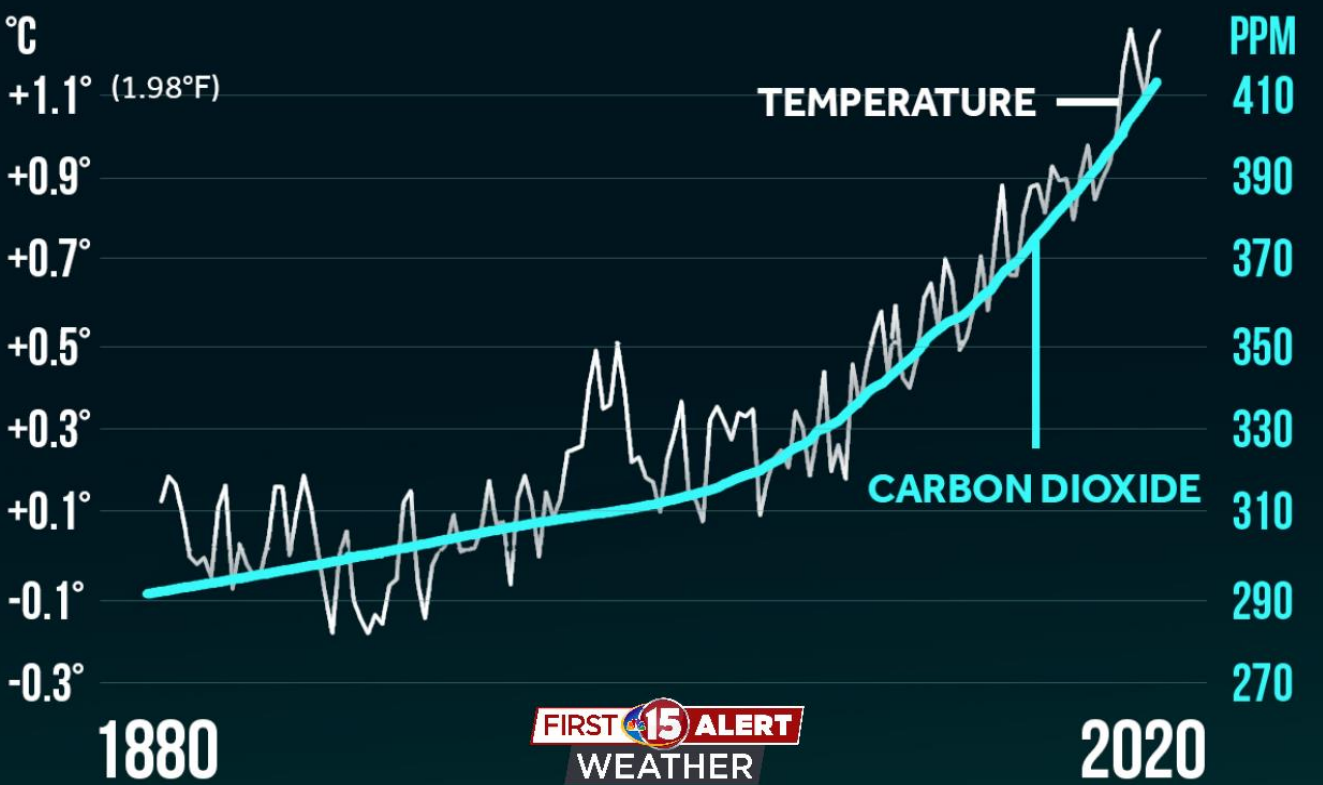
Note: Shaded areas show possible range for simulated scenarios

Source: IPCC, 2021: Summary for Policymakers



# GLOBAL WARMING

## GLOBAL TEMPERATURE & CO<sub>2</sub>



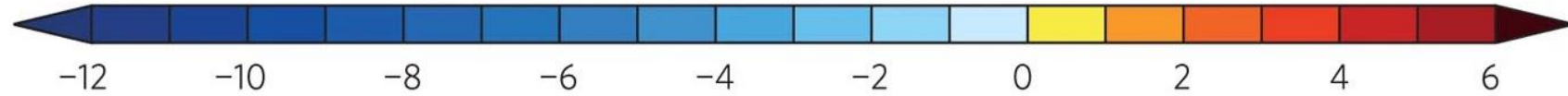
Global temperature anomalies averaged and adjusted to early industrial baseline (1881-1910)  
Global annual average carbon dioxide  
Source: NASA GISS, NOAA NCEI, ESRL



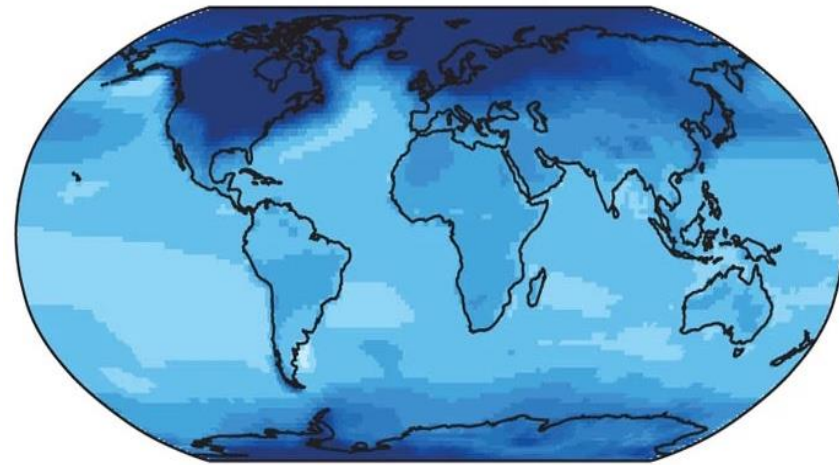
CLIMATE CENTRAL

# GLOBAL WARMING

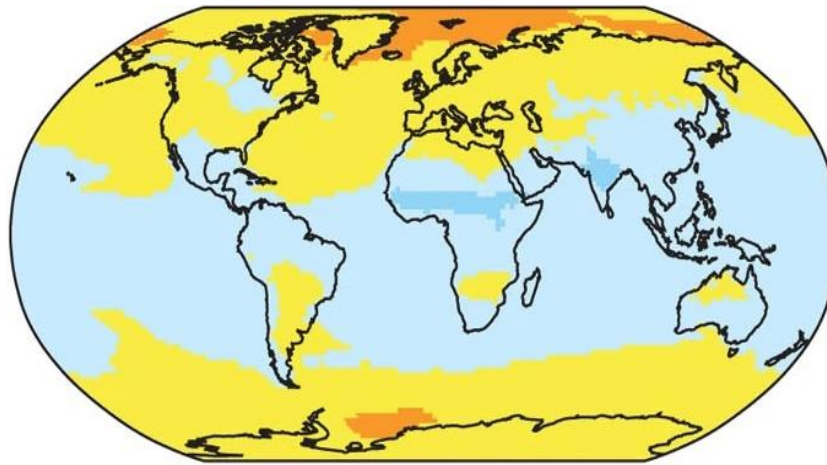
Change in surface temperature from present (°C)



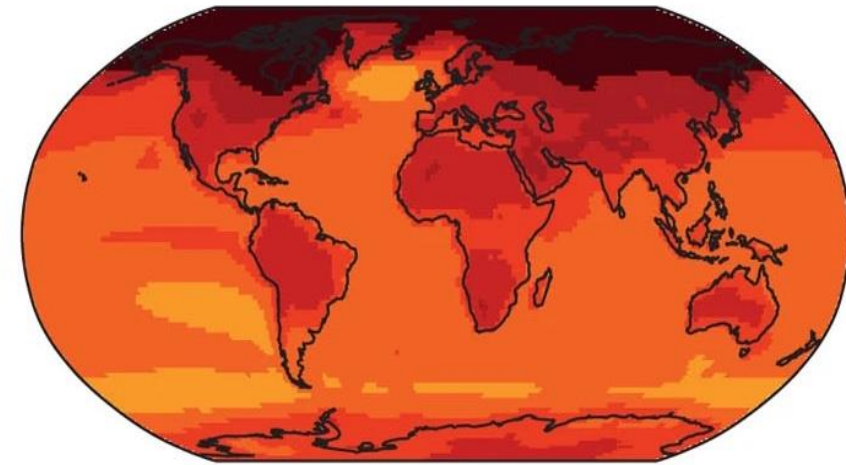
21,000 years ago



6,000 years ago



2071–2095 (RCP8.5)





# GLOBAL WARMING

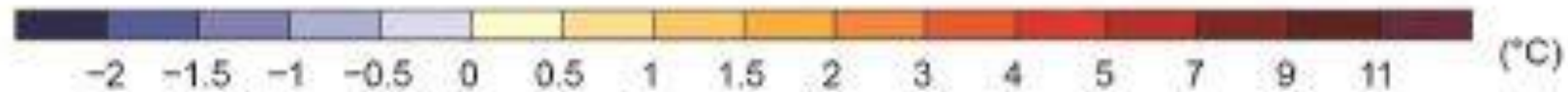
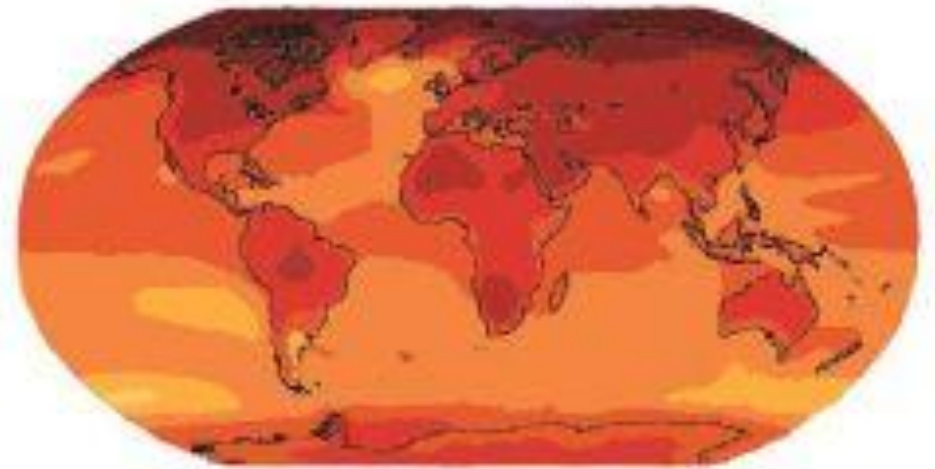
## Predicted temperature increases under two scenarios

Rise in average surface temperature by 2081-2100\*

Lowest scenario (RCP 2.6)



Highest scenario (RCP 8.5)



\*Predicted change from period 1986-2005

Source: IPCC







Tell me  
again...

**WHAT IS  
CLIMATE  
CHANGE?**



How climate change  
will affect generations  
in the future

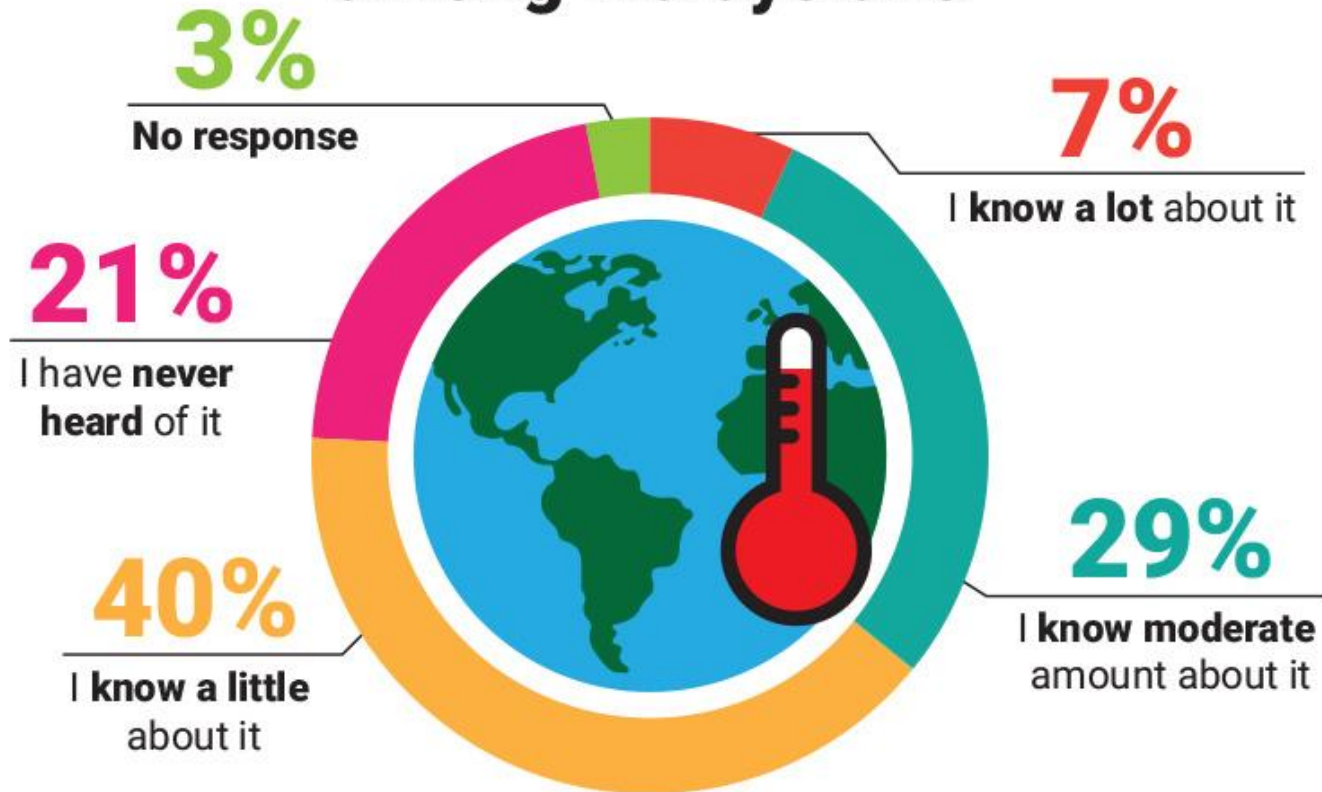
# CLIMATE CHANGE





# CLIMATE CHANGE

## Knowledge on climate change among Malaysians



Source:  
International Public Opinion on Climate Change,  
2022 by Yale Programme on Climate Change Communication

TheStar graphics



**GLOBAL CLIMATE CHANGE**  
Vital Signs of the Planet



FACTS

NEWS

SOLUTIONS

EXPLORE

NASA SCIENCE

MORE



## Understanding our planet to benefit humankind

### Carbon Dioxide

↑ **420** parts per million (current)

+

### Global Temperature

↑ **1.1** °C since preindustrial

+

### Arctic Sea Ice Minimum Extent

↓ **12.6** percent per decade since 1979

+

### Ice Sheets

↓ **427** billion metric tons per year

+

### Sea Level

↑ **4** inches since January 1993

+

### Ocean Warming

↑ **345** zettajoules since 1955

+



## CLIMATE CHANGE INFOGRAPHICS

Hendrerit in vulputate velit esse molestie consequat, vel illum feugiat nulla facilisis at vero eros et accumsan et iusto qui blandit praesent luptatum



34%

### SEA LEVEL

Lorem ipsum dolor sit amet consectetur adipiscing baram sun rakuda ya



62%

### POLLUTION

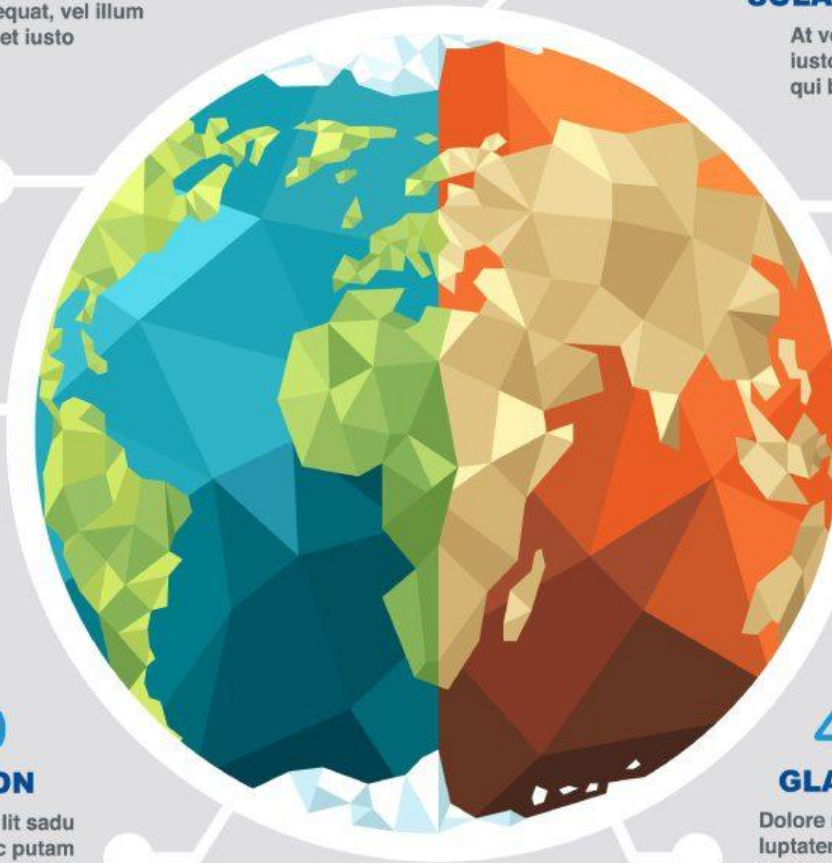
Typi trahabent clarita insitam usus legen dolor amet da mara



2,330,000

### VEGETATION

Mirum est notare quam lit sadu gothica quam nunc putam iusto odio dignissimos



69%

### SOLAR RADIATION

At vero eos et accusamus iusto odio dignissimos du qui blanditiis praes



845,000

### GENETIC DIVERSITY

lum est notare quam litter gothica quam putam parum qui seba daram



28%

### TEMPERATURE

Lorem ipsum dolor sit consectetur adipiscing quam nunc putam parum



47%

### GLACIERS

Dolore magnam aliquam luptatem enim ad veniam, quis consectetur adipiscing





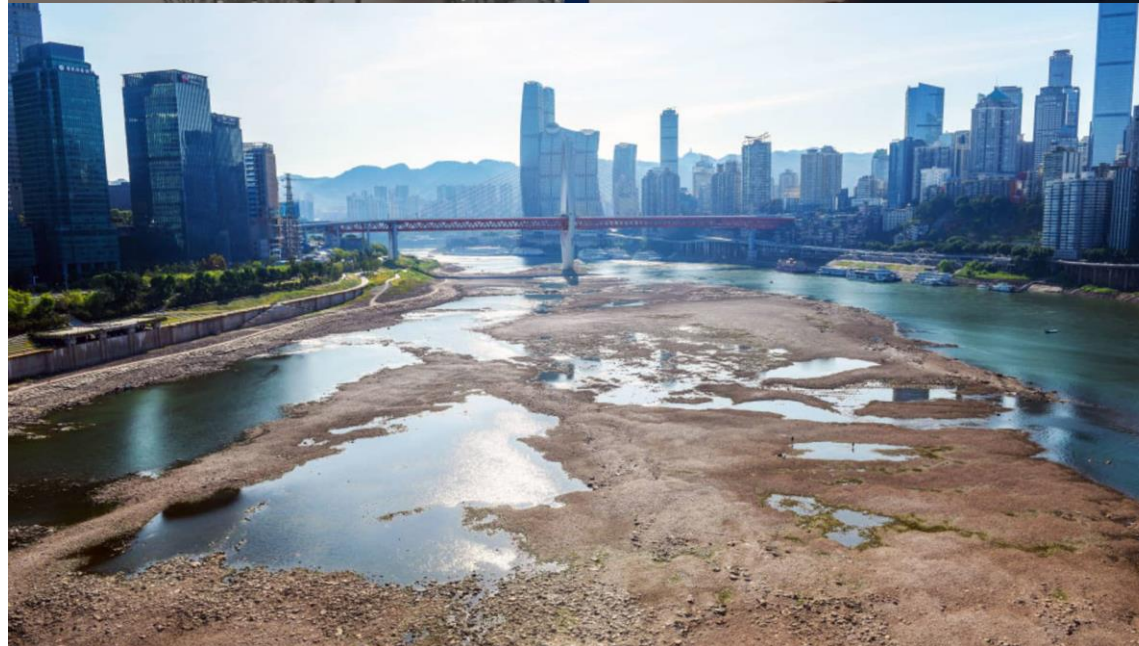
# Extreme weather events





# Extreme weather events

August 2015



China drought  
causes Yangtze  
to dry up,  
sparking  
shortage of  
hydropower

August 2022

# CLIMATE CHANGE

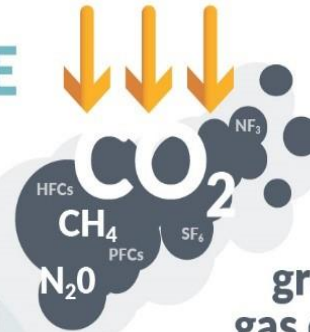
## CLIMATE CHANGE AND THE ROAD TO NET-ZERO



### RESPONDING TO CLIMATE CHANGE

#### THE PARIS AGREEMENT

A global  
treaty  
adopted  
by over  
**190**  
nations



Designed to  
collectively  
**reduce**  
greenhouse  
gas emissions

The goal is to keep  
global emissions  
to a maximum of  
**2°C**  
above pre-industrial  
levels, and ideally,  
to limit temperature  
rise to 1.5°C



A reduction of greenhouse  
gas emissions by

**50%**  
by 2030  
and a further  
**50%**  
before 2050



to reach  
**NET ZERO**



# To keep to 1.5°C

co2 emissions would  
have to decline by  
**45%** before **2030**



renewable energy will  
need to supply  
**70-80%** of power  
by **2050**



By **2100**, global sea level rise would be 10cm lower with global warming of 1.5°C, compared with 2°C





The Sustainable Development Goals (SDGs) aim to transform our world.



# SUSTAINABLE DEVELOPMENT GOALS



NO ONE LEFT BEHIND

# ESG

## ENVIRONMENT



## SOCIAL



## GOVERNANCE





# ESG

## Environmental

- Waste and pollution
- Resource depletion
- Greenhouse gas emission
- Deforestation
- Climate change

## Social

- Employee relations and diversity
- Working conditions
- Local communities
- Health and safety
- Conflict

## Governance

- Tax strategy
- Executive remuneration
- Donations and political lobbying
- Corruption and bribery
- Board diversity and structure

# PASSIVE DESIGN STRATEGIES FOR TROPICAL CLIMATE





## Site Analysis (Context, Topography and Climate Data)

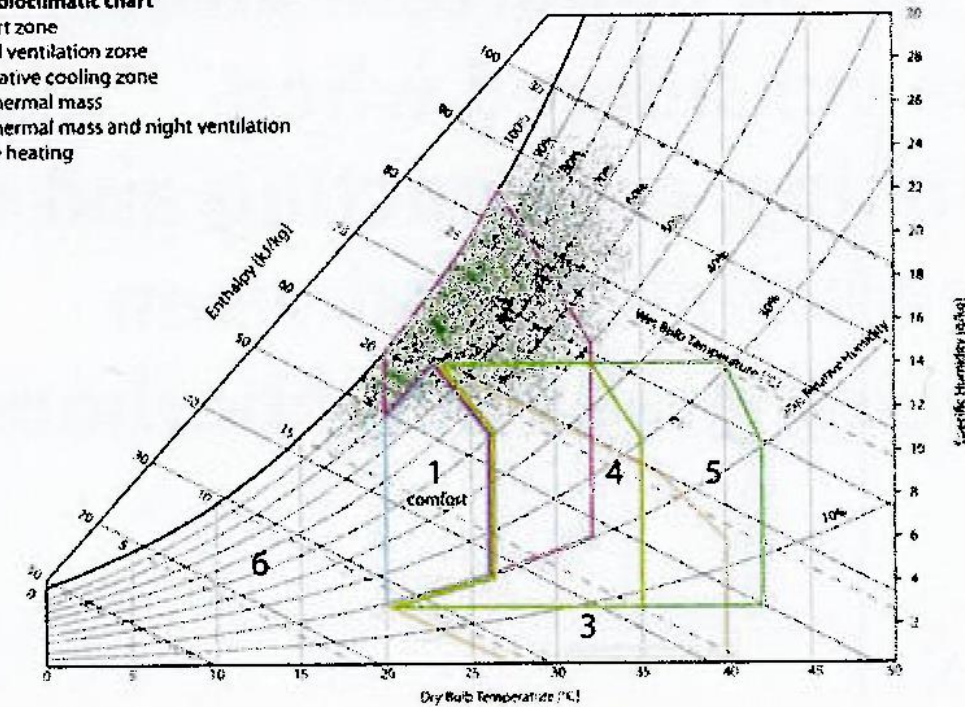
- Retrofit existing poor buildings and give preference to brownfield sites over underdeveloped green fields.
- Assess the local context including the topography of the site.
- Collect data on temperature, relative humidity, wind's speed and direction, precipitations over at least one year and solar path and radiation.
- Establish the bioclimatic chart for the location using data of temperature and relative humidity.

Location: DAR ES SALAAM, TANZANIA

Climatic zone: HOT HUMID

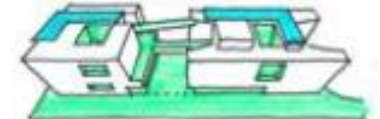
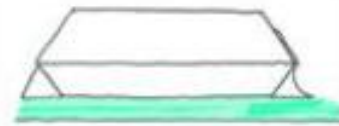
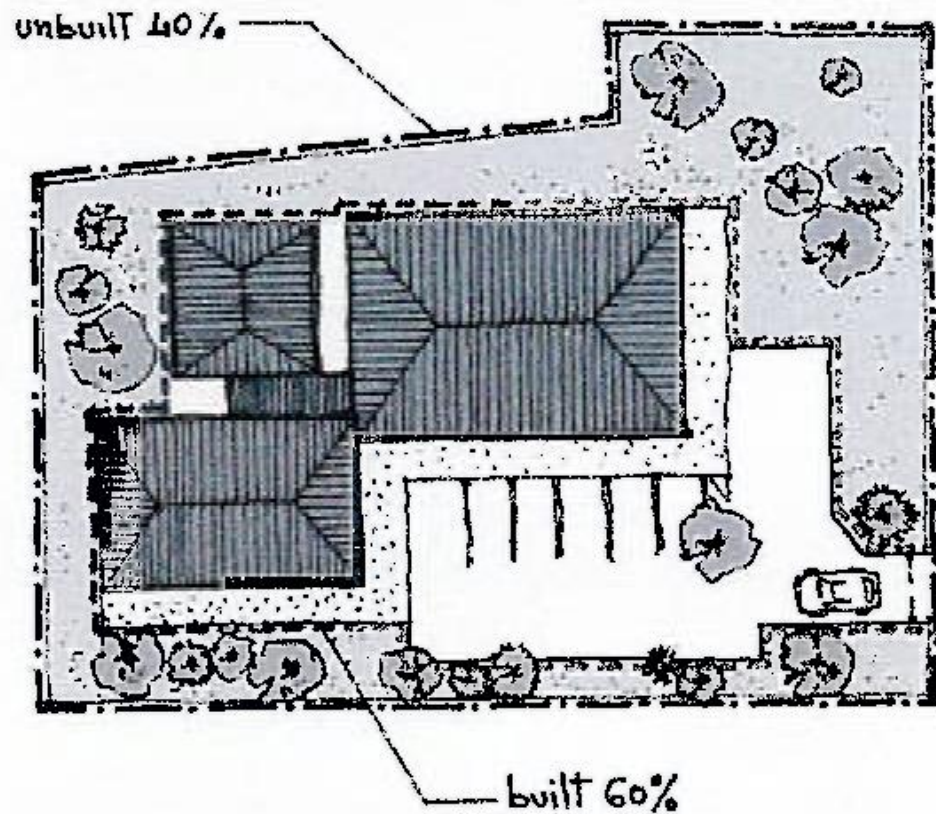
Givoni's bioclimatic chart

1. Comfort zone
2. Natural ventilation zone
3. Evaporative cooling zone
4. High thermal mass
5. High thermal mass and night ventilation
6. Passive heating



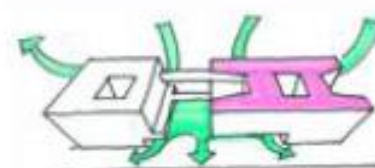
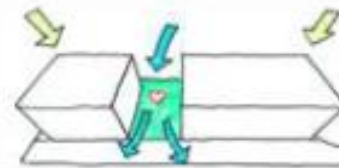
# Building Footprint

- Conform to the permitted ground coverage and should ideally cover not more than 60% of the plot.



outward frontage

green interface



permeable

public realm/connectivity

green



Courtyards/place-making

promenade: elevated



# Building Orientation

- Design the long axis of building to be along East-West to minimize direct solar radiation penetration in the building and reduce heat gain.
- Always indicate the North direction in all plans.

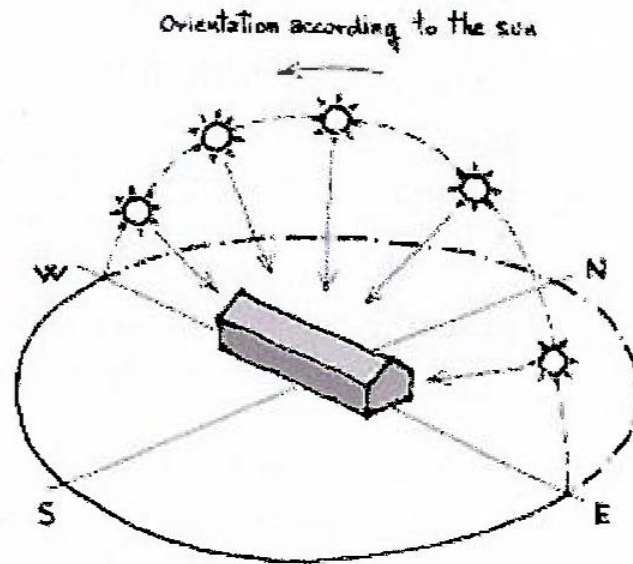
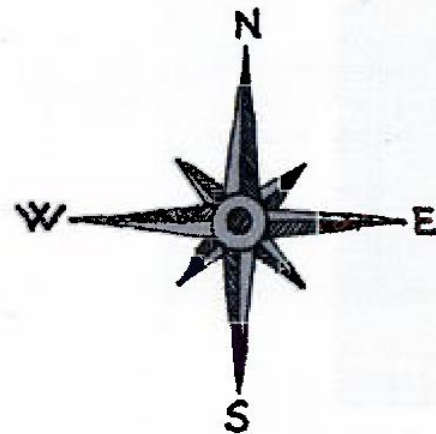


Figure 1.5 plan of the Deck House

Source: (Archdaily, 2013)

**The Deck house** orientated based on the sun orientation. Brick wall are used on the east-west facade to minimize the area that exposed to the direct solar radiation, therefore reduce the heat gain. The longer facade facing north which have more opening allow in direct sunlight bright up the interior and provide thermal comfort.

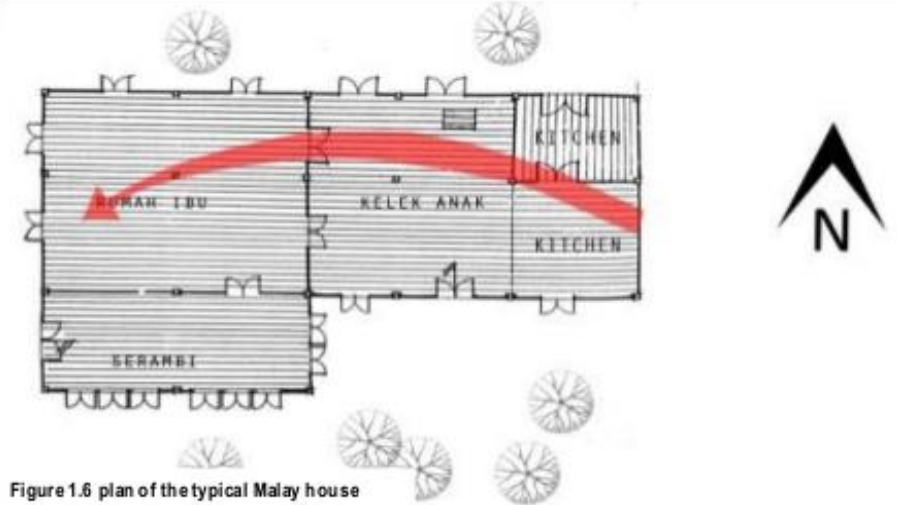


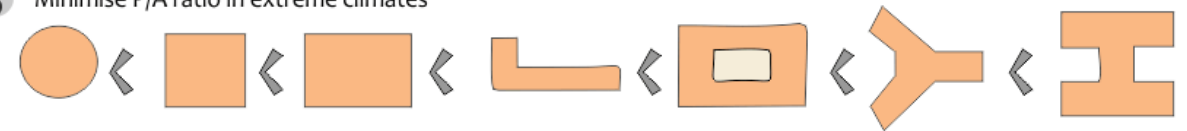
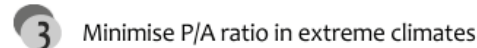
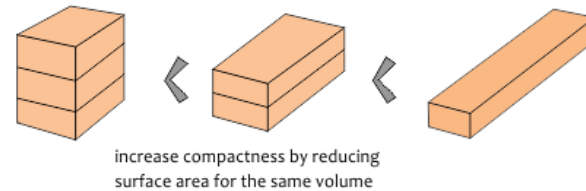
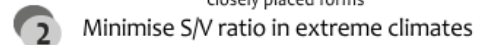
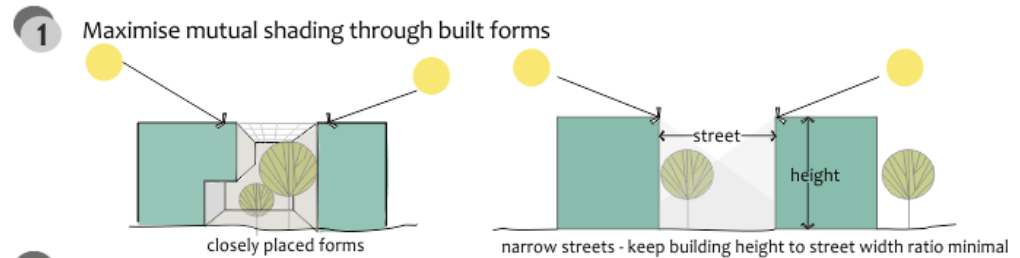
Figure 1.6 plan of the typical Malay house

Source: (Anzasca, 2002)

**Traditional Malay houses** are often oriented to face east-west direction for religious reasons. The east-west orientation minimizes areas exposed to solar radiation. This orientation also suits the wind patterns in Malaysia (north-east and south-west).

# Building Form / Shape

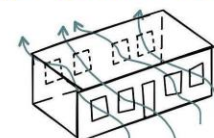
- Design according to climate zone.
- For hot-humid region, use narrow plans to maximize natural light, cross-ventilation and minimize heat gain.
- For hot-arid regions, use compact forms with courtyards to retain cold air in the building and minimize heat gain.
- Give preference to multi-story building to increase density and maximize resources.



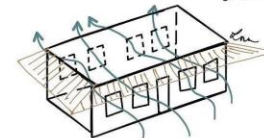
## HOT-HUMID CLIMATE



LIGHT MATERIALS,  
LIGHT COLORS. MINIMIZE  
THERMAL MASS.



MAXIMIZE OPENING  
& CEILING HEIGHT. PROVIDE  
CROSS-VENTILATION.



PROVIDE AS MUCH  
SHADE AS POSSIBLE.

## HOT-ARID CLIMATE



COMPACT FORMS W/  
SMALL SURFACE AREA.  
LIGHT COLORS.



MINIMIZE OPENING  
SIZES.



SHADE ALL  
OPENINGS.

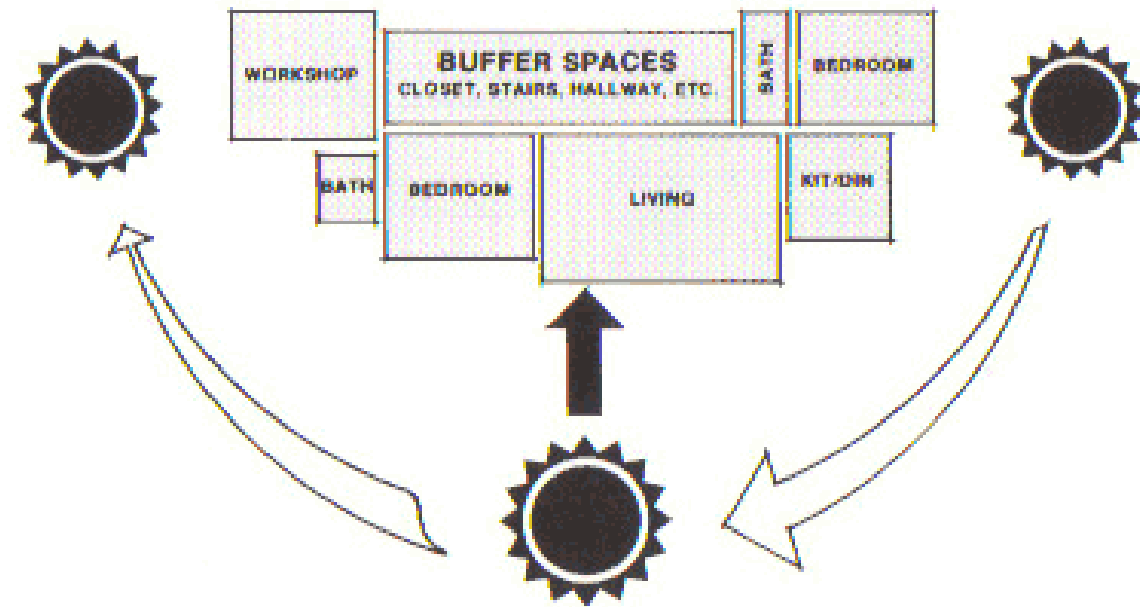
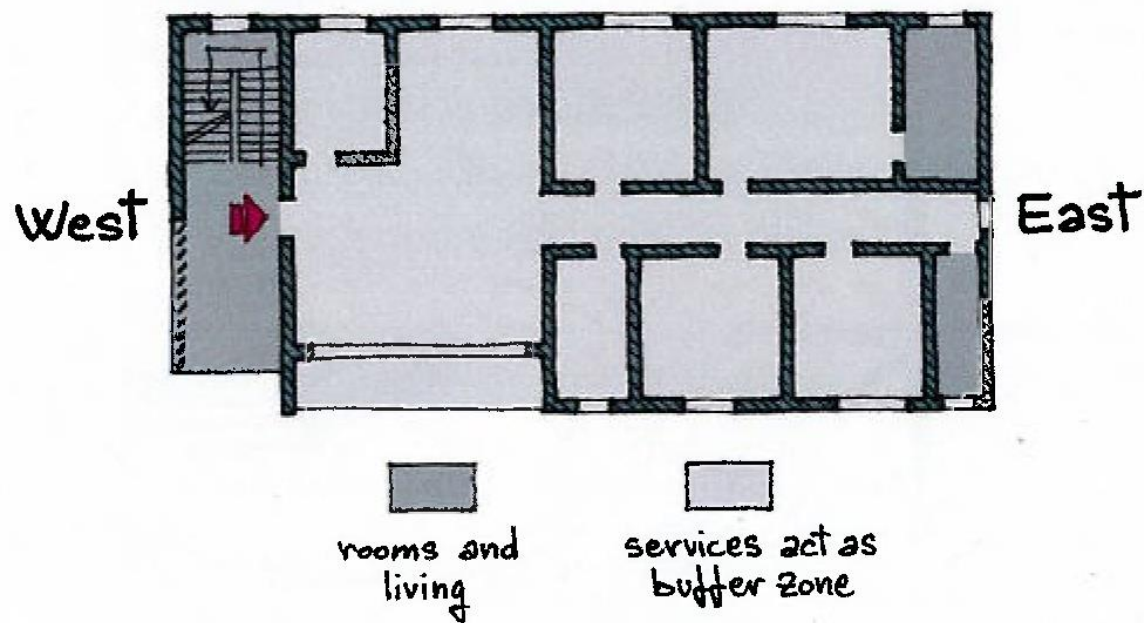


MAXIMIZE THERMAL  
MASS.



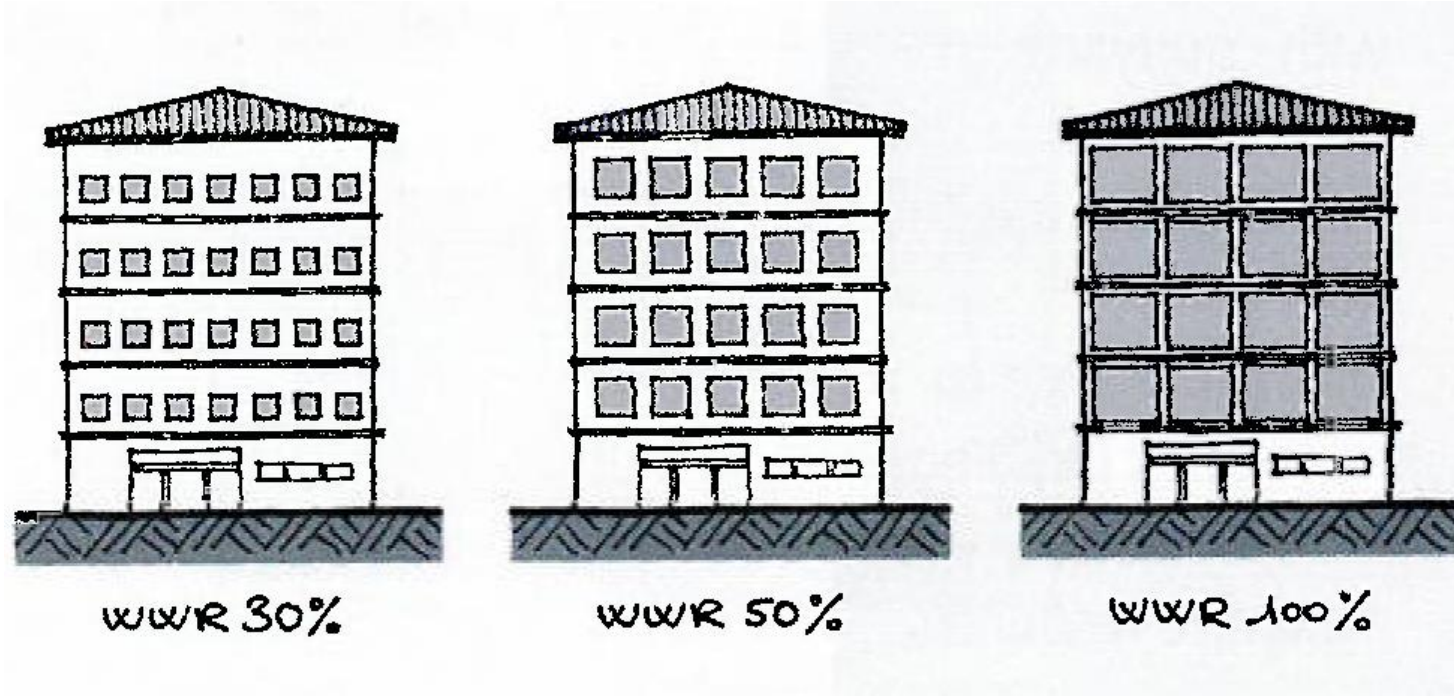
## Allocation Of Spaces Within The Building

- Services e.g. toilets, staircases, lifts, lobbies, kitchens etc. to be located on the East and West facing walls to act as buffer zones against heat gain but benefiting from day lighting.



## Openings

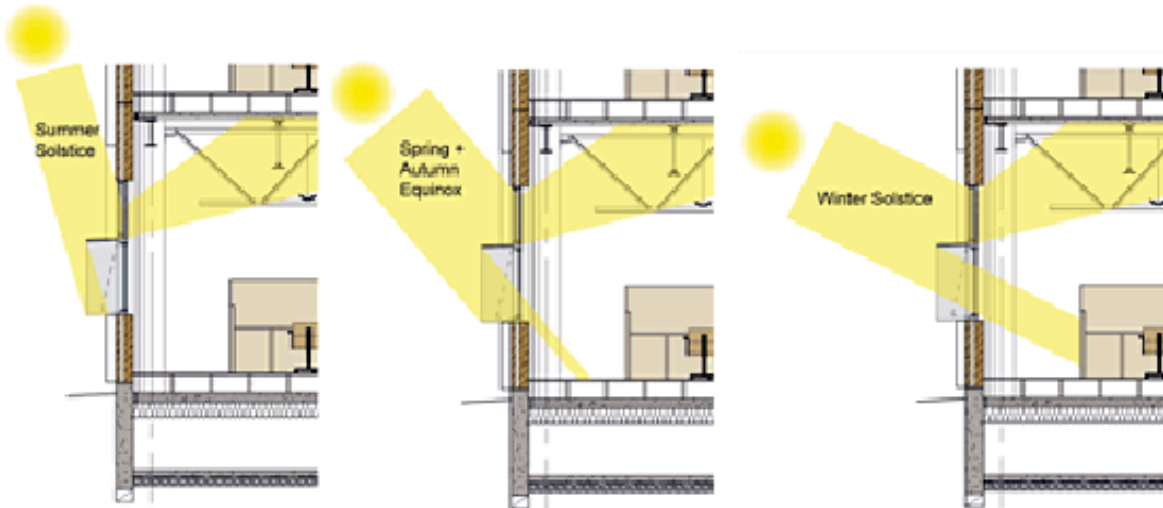
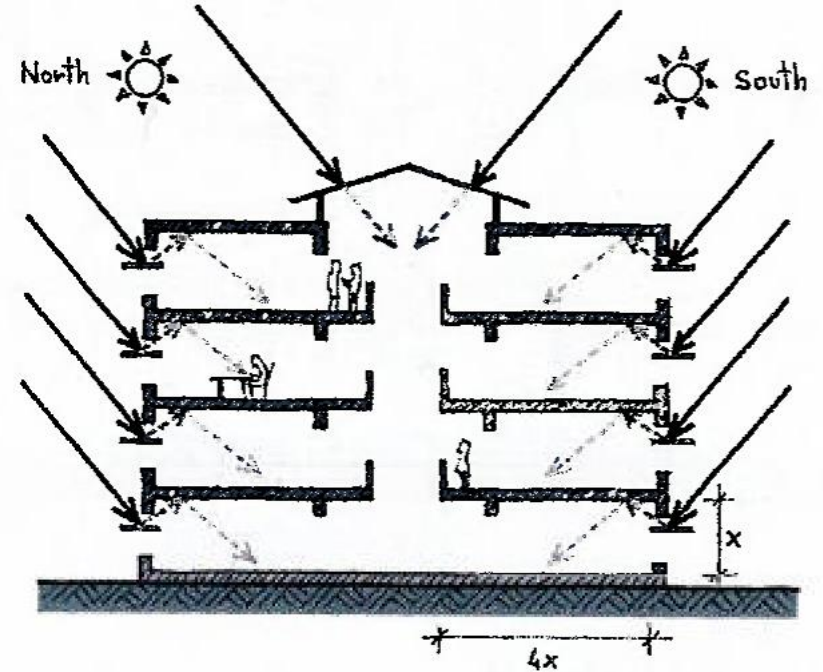
- Window sizing to be designed according to prevailing climatic conditions, and placement preferably on North and South walls; wall to windows ratio should not exceed 40%
- Gazing walls should be avoided, unless using special treated walls / special treated glass.





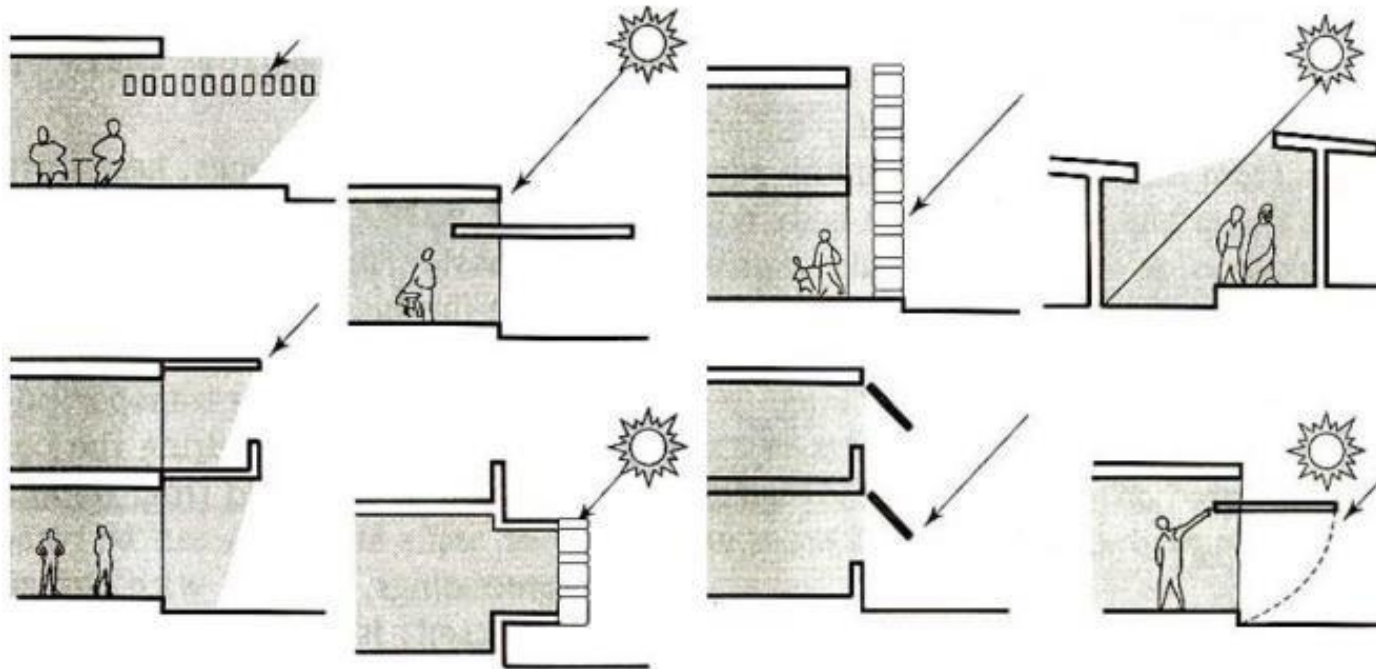
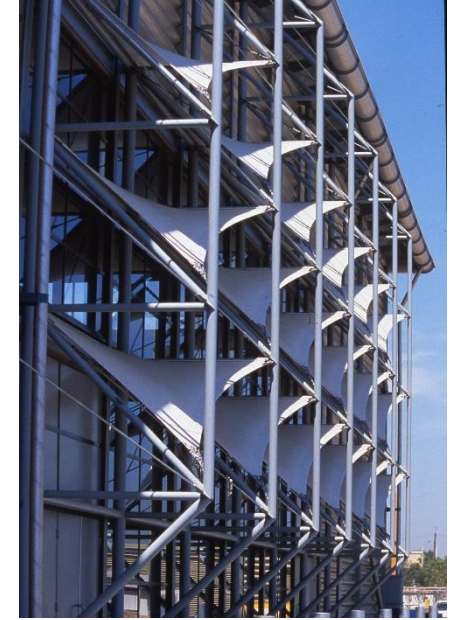
# Daylighting

- Design buildings according to climatic region, with openings on North and South walls, narrow plans to maximize daylighting, use clerestories & light shelves in deep spaces; staircases, toilets & kitchens to be day-lit.
- Window area should be at least one tenth of the floor area.
- The depth of the room should not exceed 2.5 times the window-head height.



## Solar Protection / Shadings

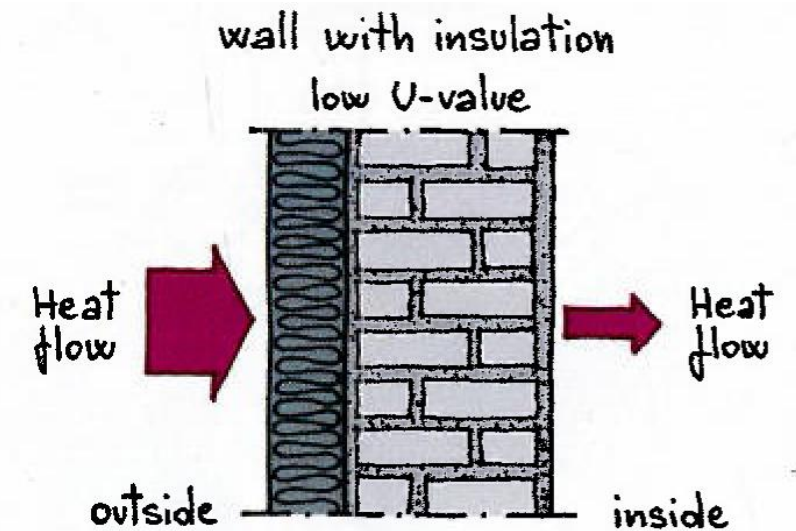
- Use sun shading devices e.g. roof overhangs, vertical & horizontal shading elements, balconies, screens, & vegetation (green walls) to minimize heat gain.





## Building Envelope and Materials

- Always consider the carbon footprint content while choosing building materials
- Give preference to locally available building material that are more appropriate with low energy content
- Consider recyclable and re-usable materials with low toxic emissions
- Give preference to envelopes (wall and roofs) with low U-value or low heat transmittance properties.



# ROOF SOLAR HEAT GAINS

## Roof thermal resistance



**1S Factory**  
**70%**



**4S Shop-Off**  
**40%**



**30S Office**  
**3%**



**SSTH**  
**75%**



**DSTH**  
**50%**



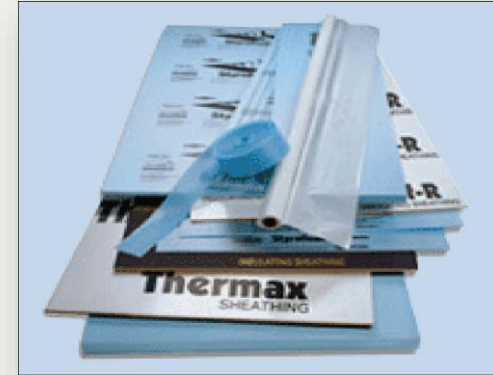
**5S Flat**  
**40%**



# CONCEPT OF ROOF U-VALUE

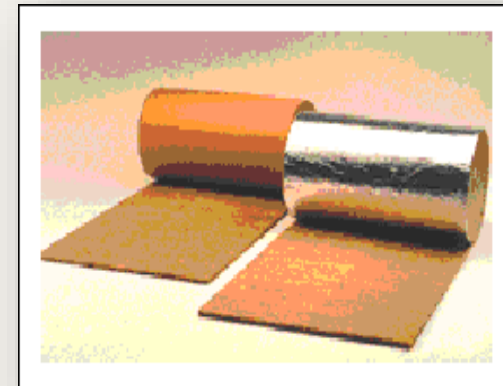
## 1. Mass Insulation

- mass, thickness and low  $k$ ;
- high thermal resistance to slow down heat transfer



## 2. Reflective Insulation

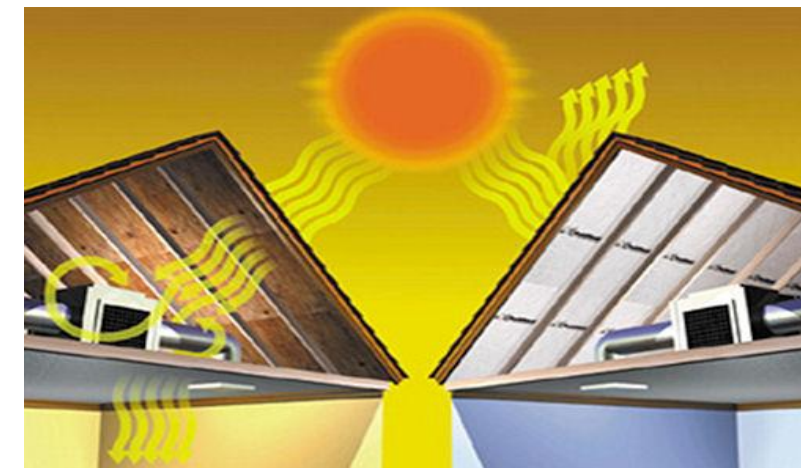
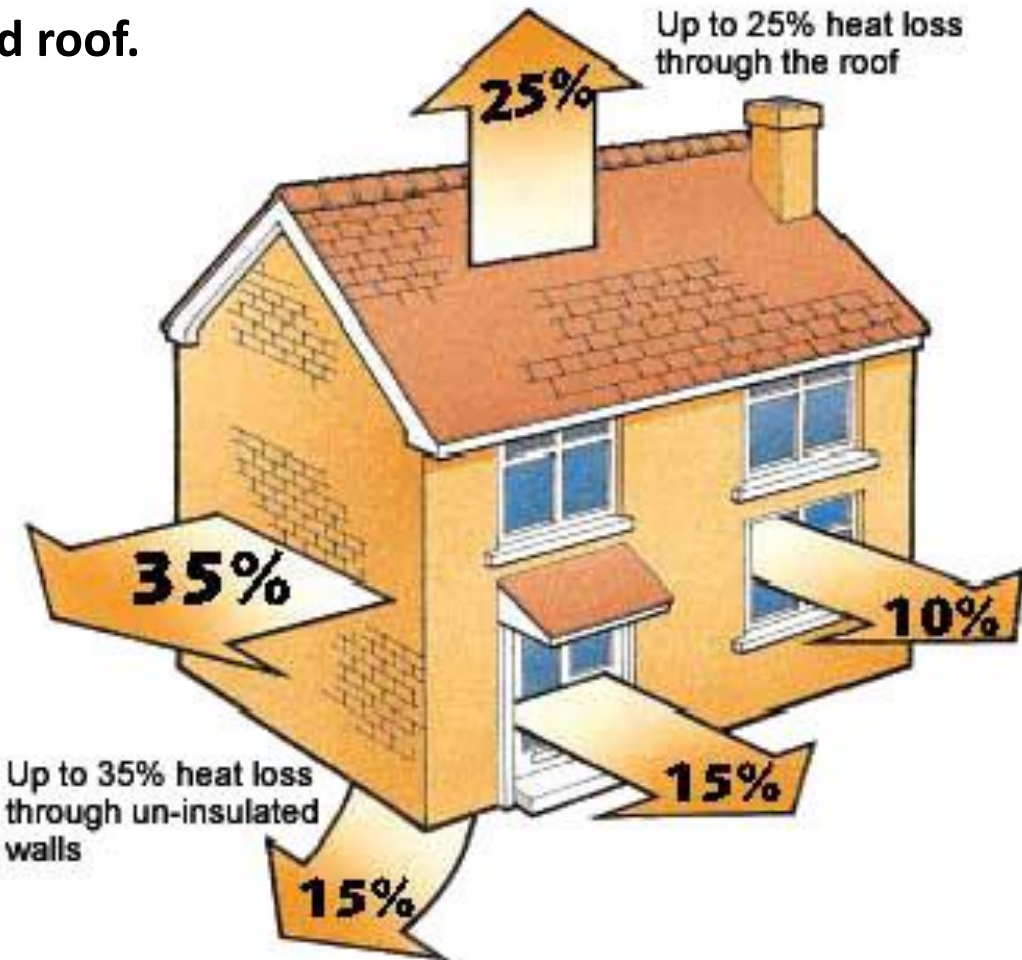
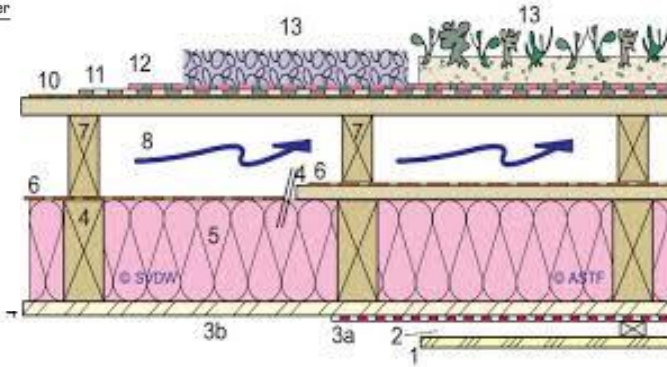
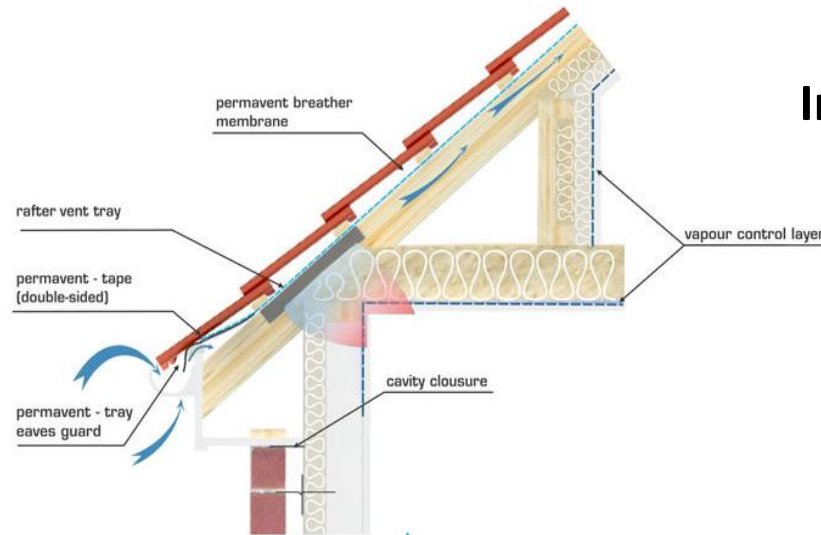
- reflect radiant heat;
- low thermal emissivity;
- air gap



# Thermal Insulation

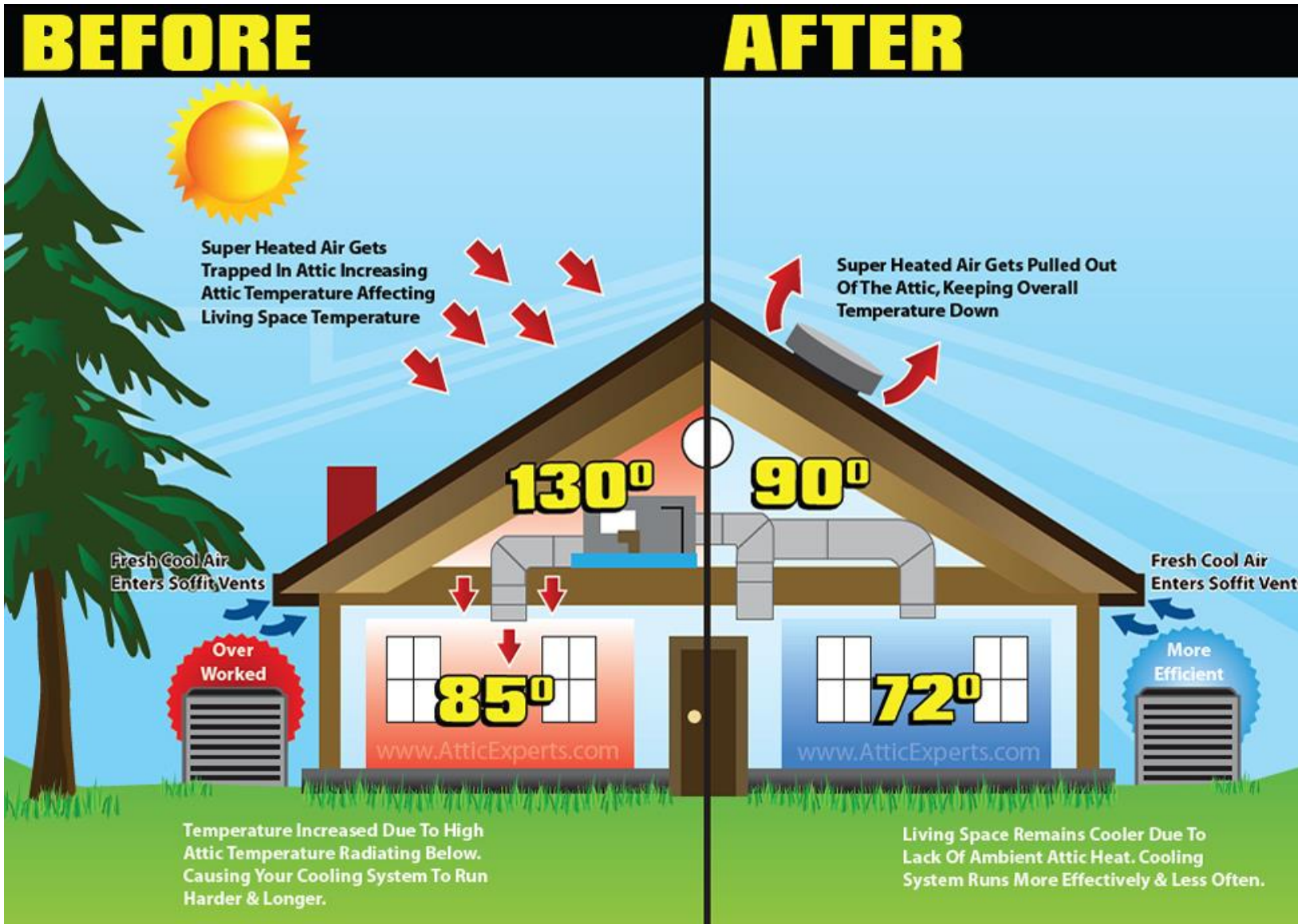
## Insulation

Insulation provides defense against solar heat gain through the walls and roof.

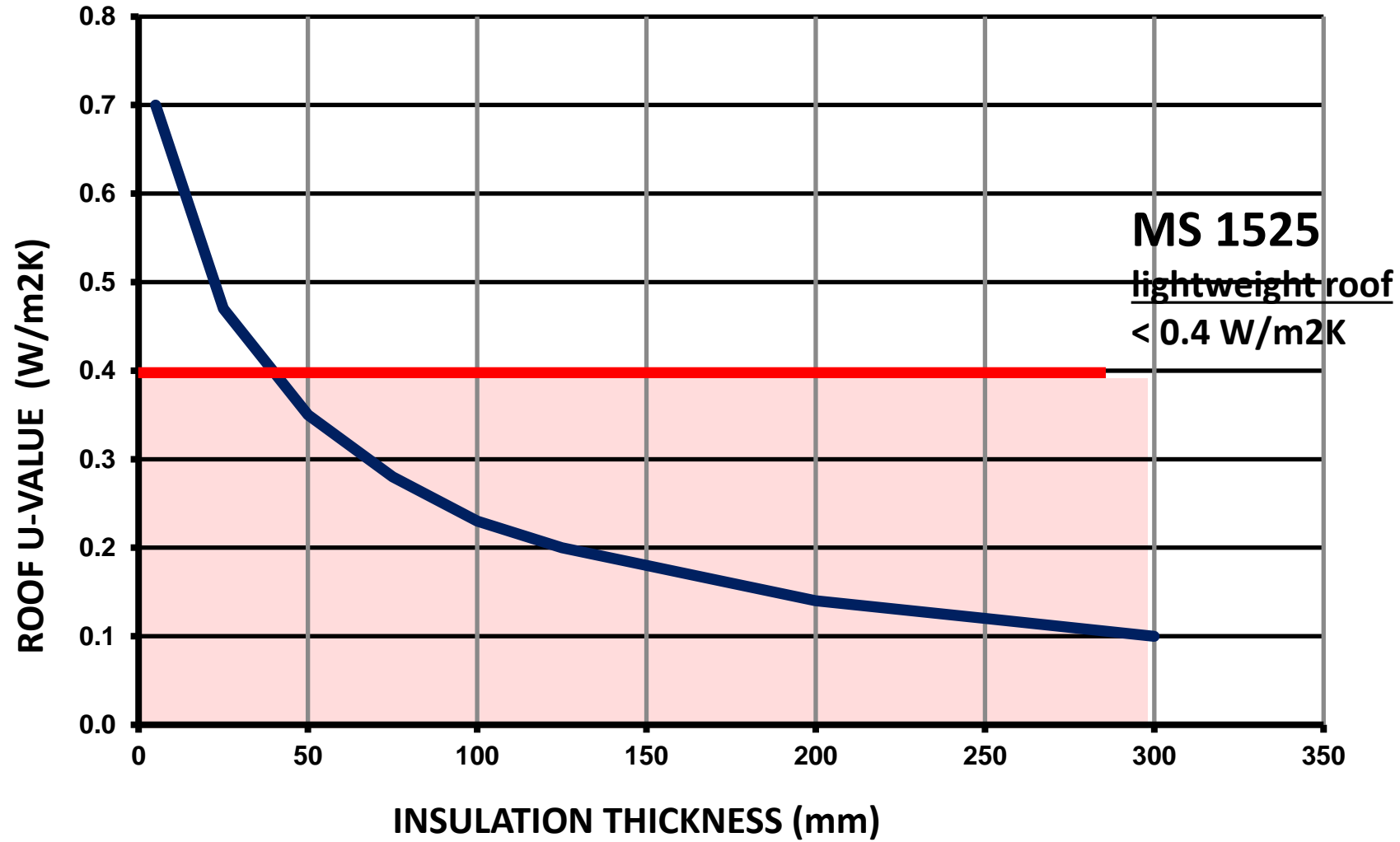




# Well Ventilated Space VS Poor Ventilated Space

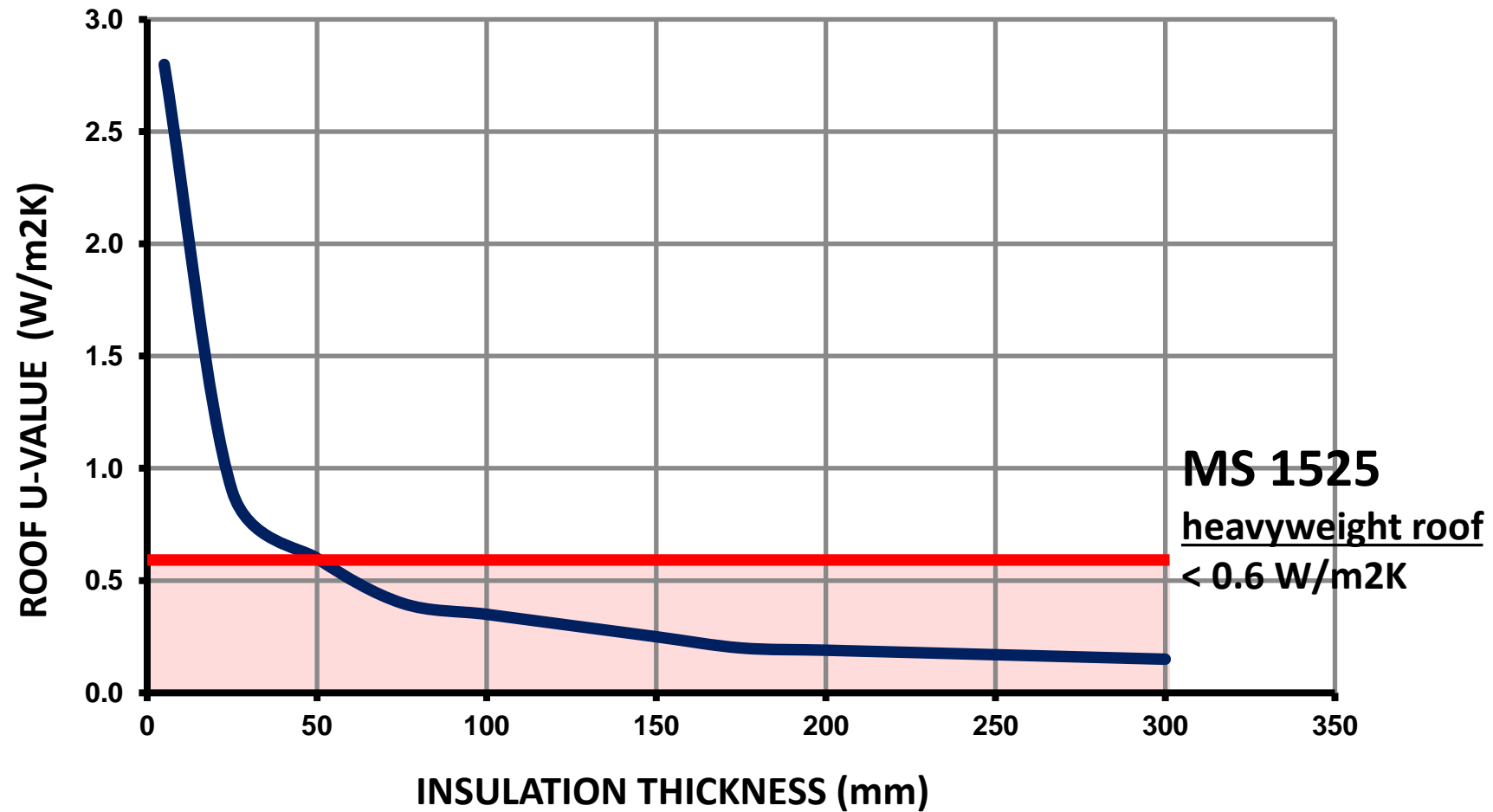


# CONCEPT OF ROOF U-VALUE



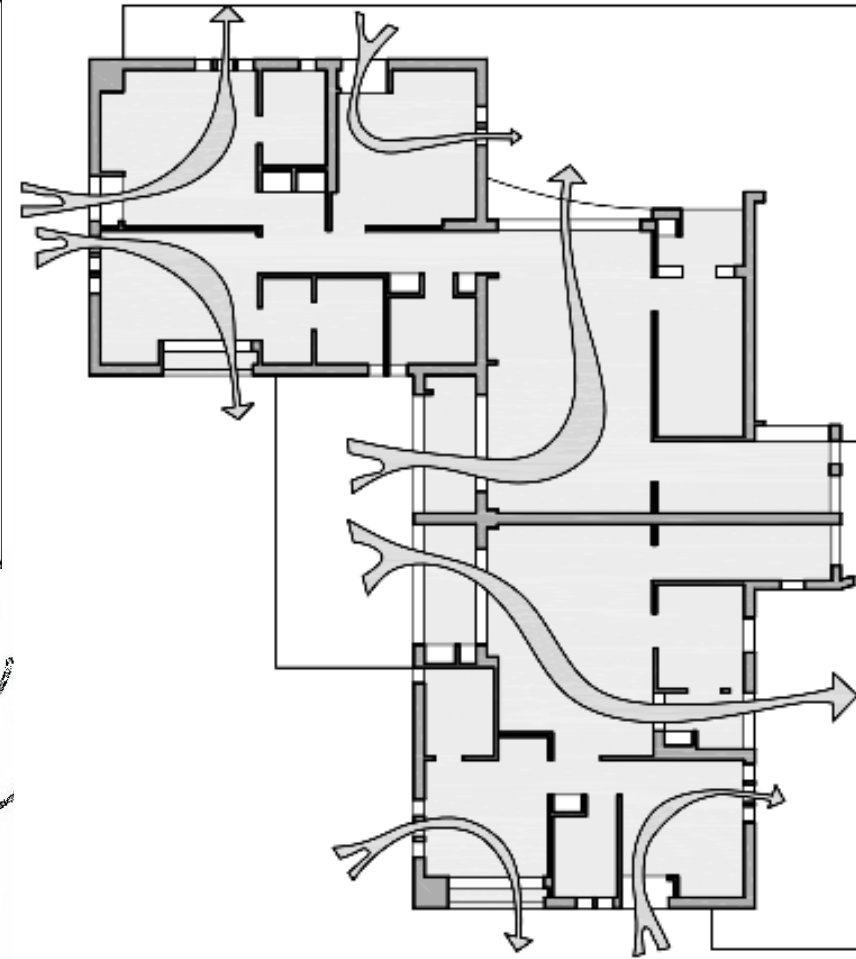
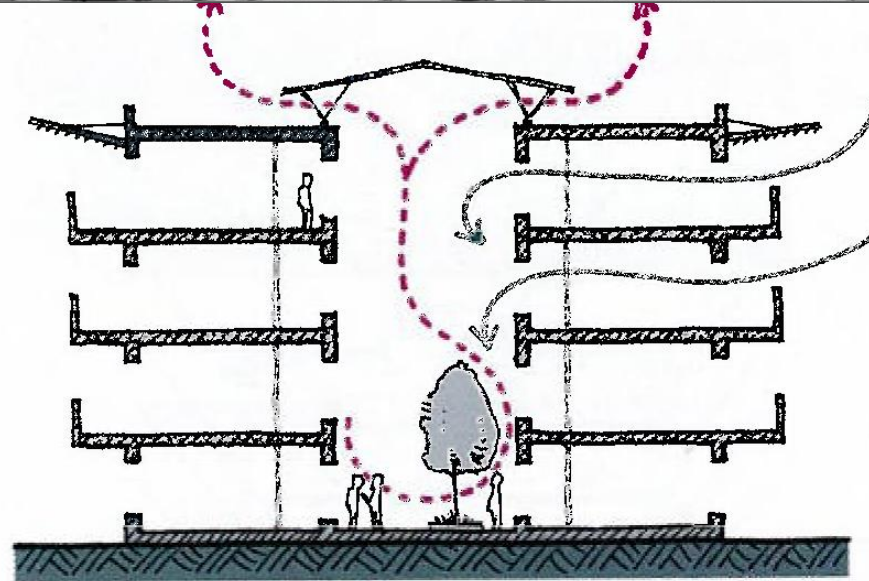
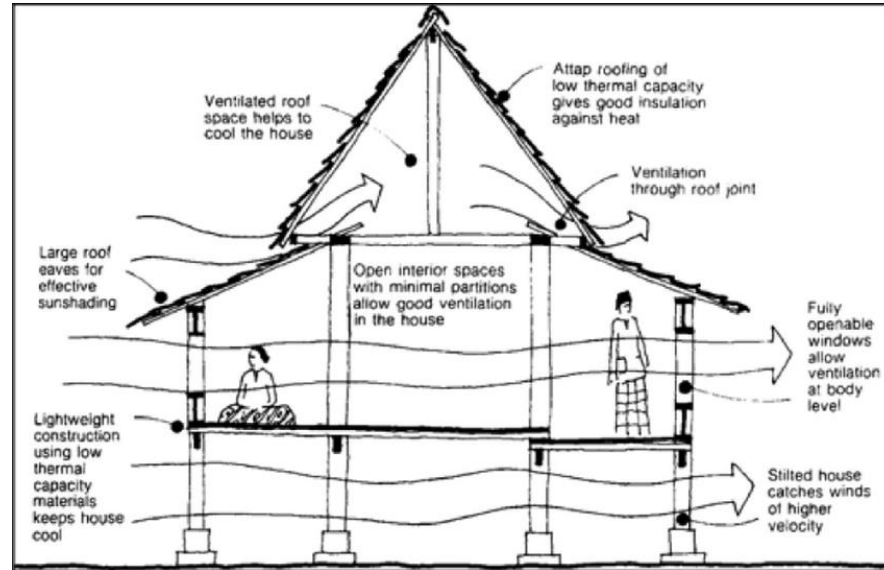


# CONCEPT OF ROOF U-VALUE



## Natural Ventilation

- Ensure that both cross and stack ventilation are provided by the openings.
- Make use of roof vents and openings, thermal chimneys and clerestory windows.
- Make use of insulation materials under the roof sheet and design ventilated roofs.

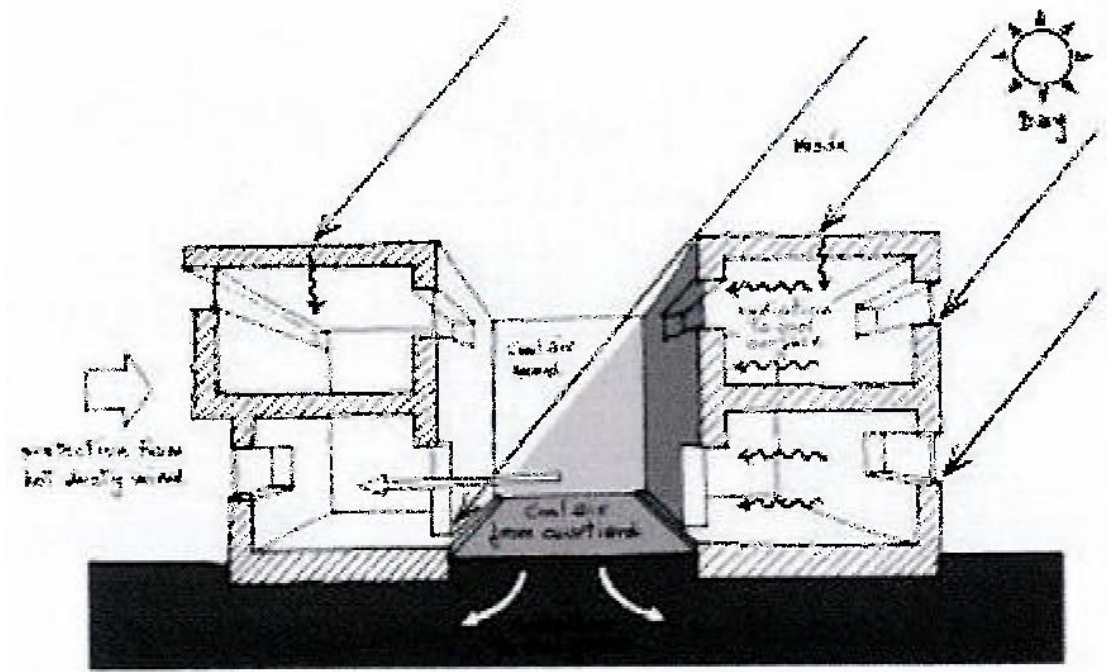


**CROSS VENTILATION**



## Cooling

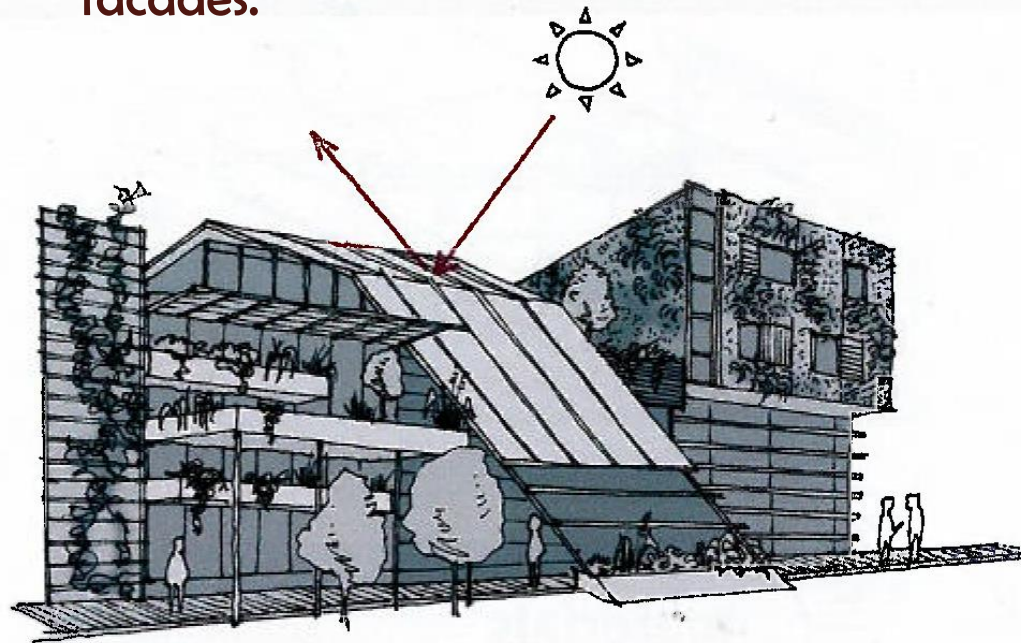
- Integrate passive cooling systems by designing water bodies and features for evaporative cooling in hot and arid regions.
- Ensure that buildings using air conditioning appliances are well insulated to limit heat gain and reduce energy.





## External Finishes

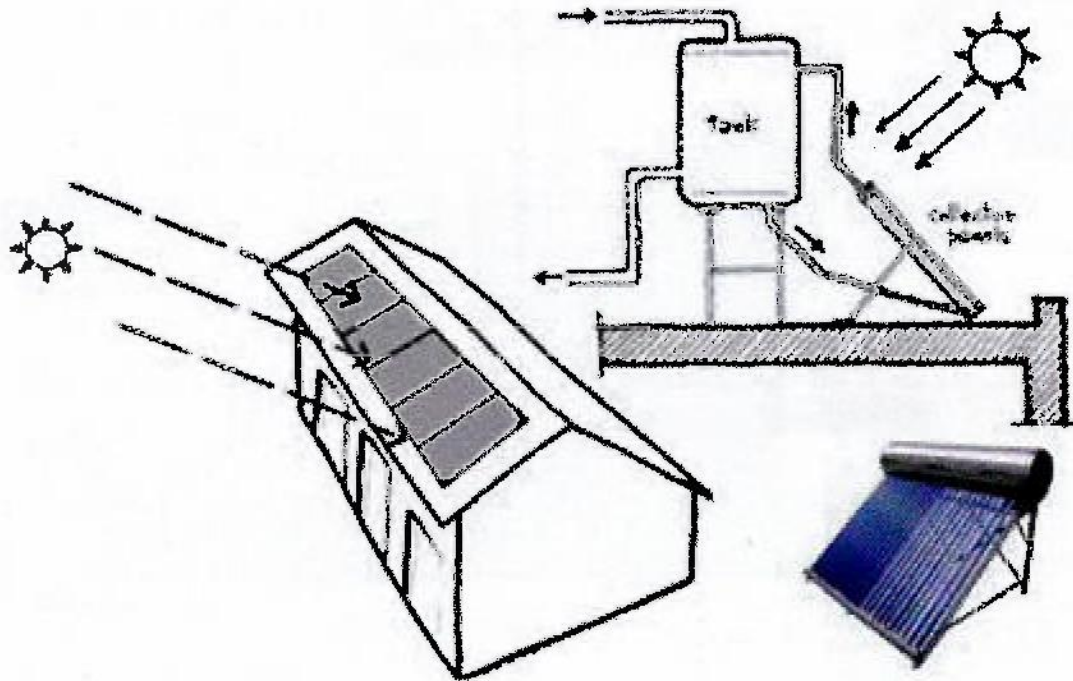
- Make use of light-coloured materials on facades and roofs to reflect excessed solar radiation, while also incorporating green and living walls, vertical gardens provided with vegetation that grows on the facades.





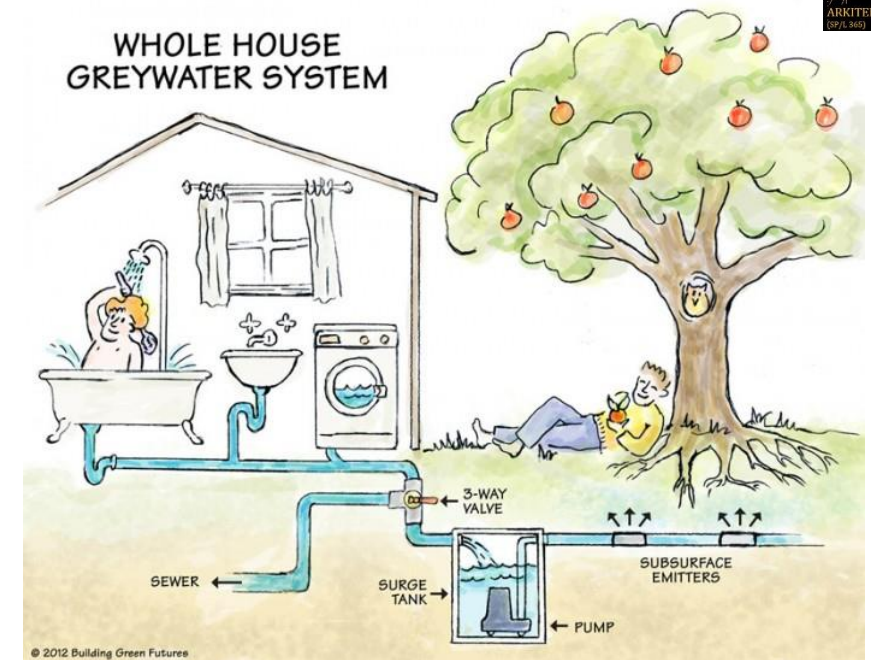
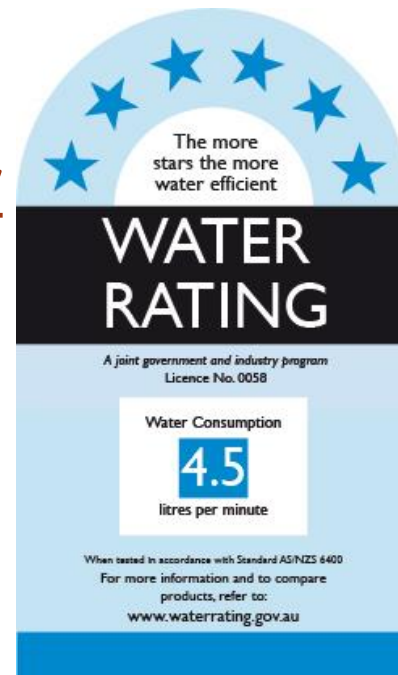
## Renenerable Energy

- Integrate solar energy (thermal & electricity) such as photovoltaic and solar water heaters; wind energy, biogas and other available renewable energy systems into the building design.



# Water Conservation and Efficiency

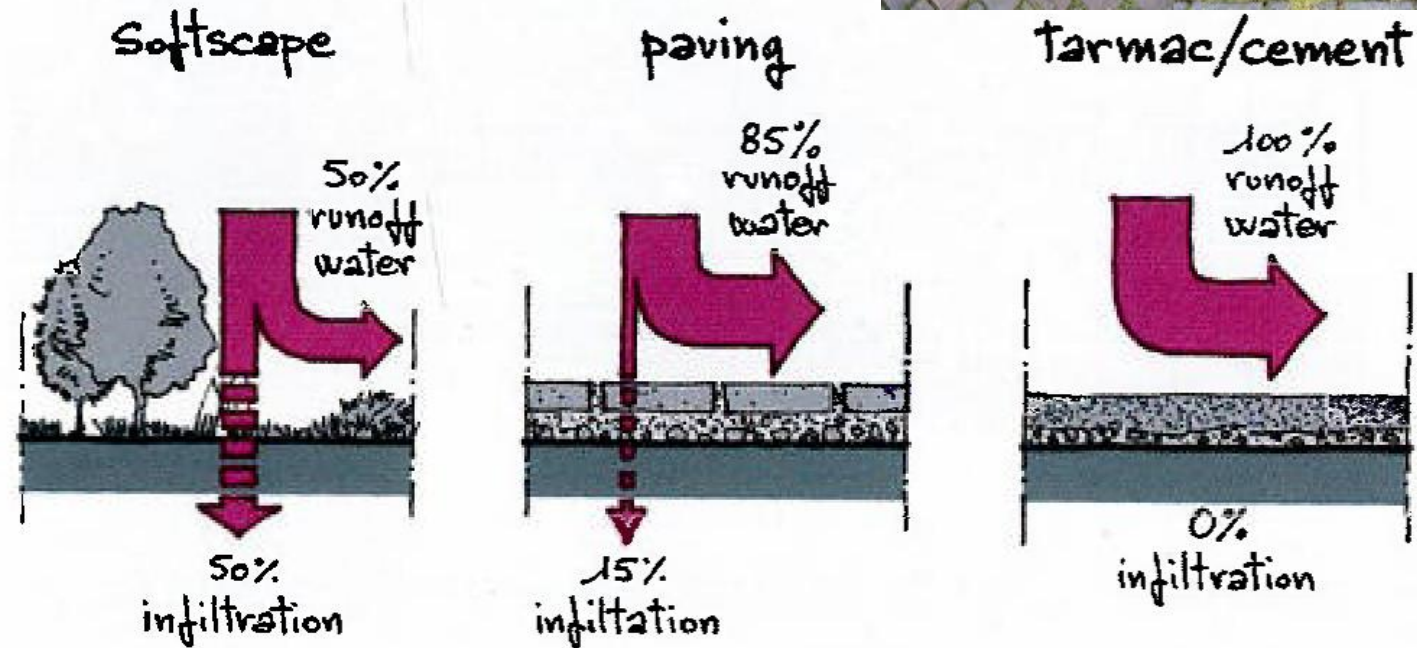
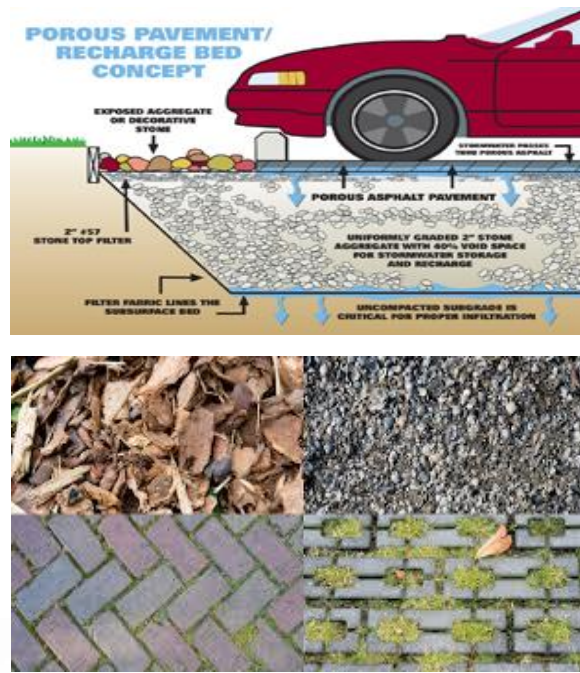
- Design rainwater harvesting systems
- Recycle grey water
- Use water efficient appliances and water-saving fixtures.



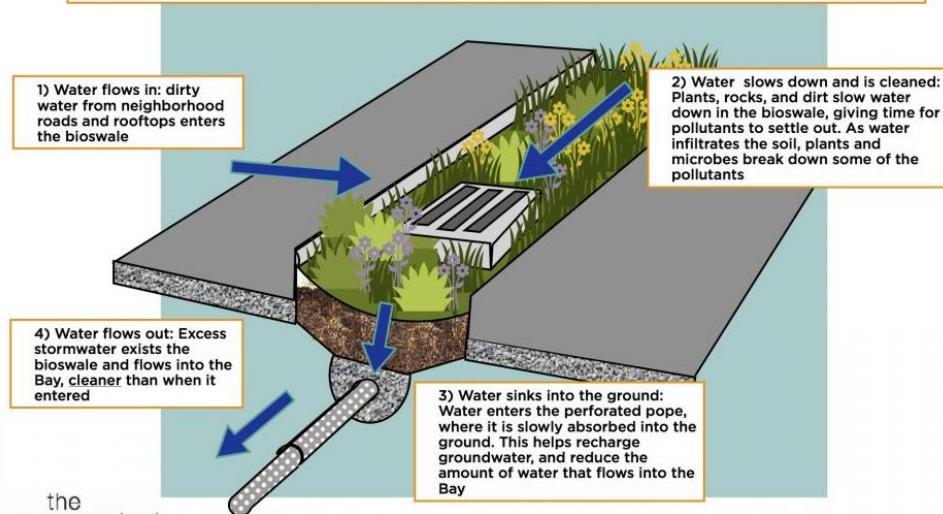


## Drainage

- Provide appropriate drainage technique to mitigate storm water run-off and facilitate replenishment of water table through rainwater infiltration.



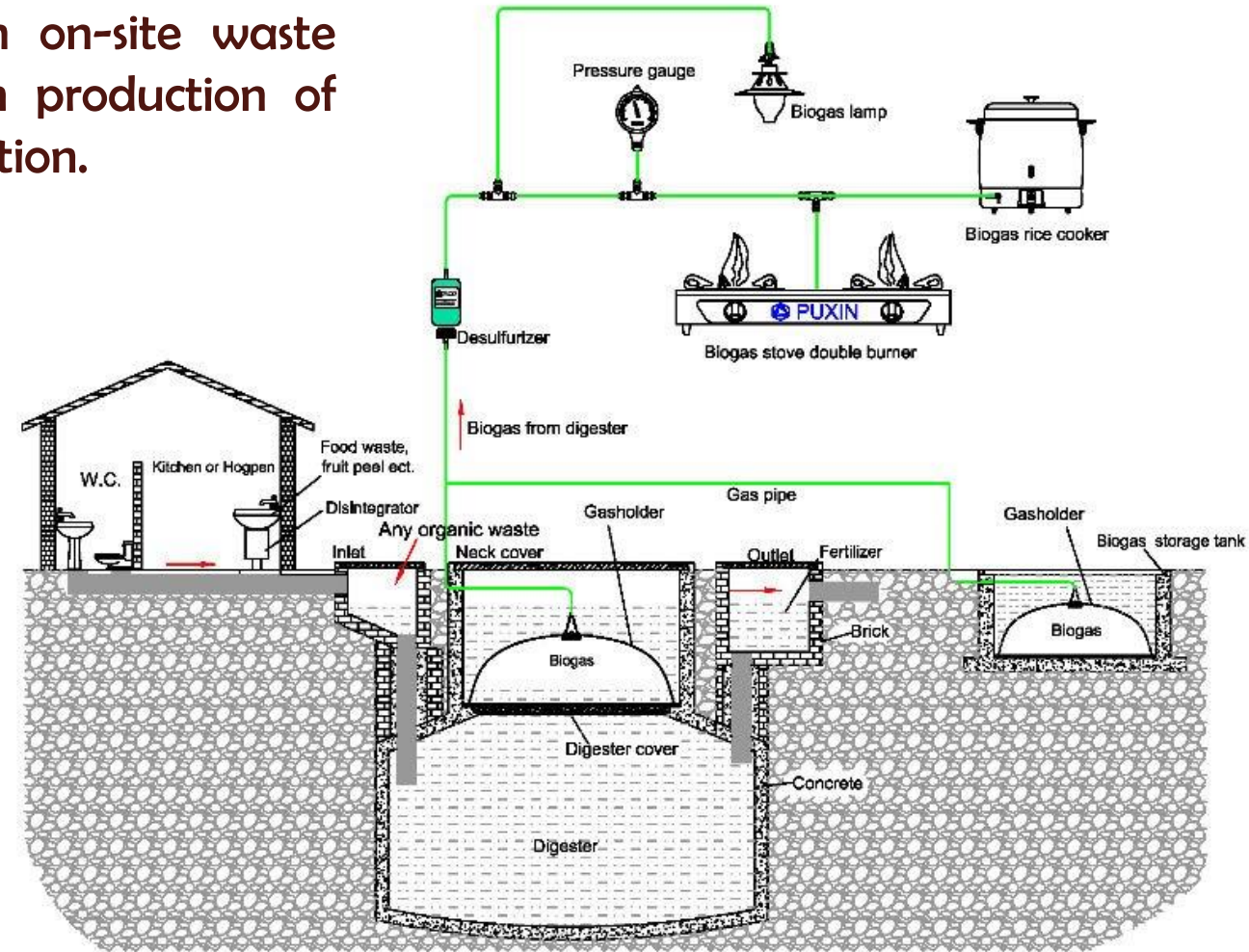
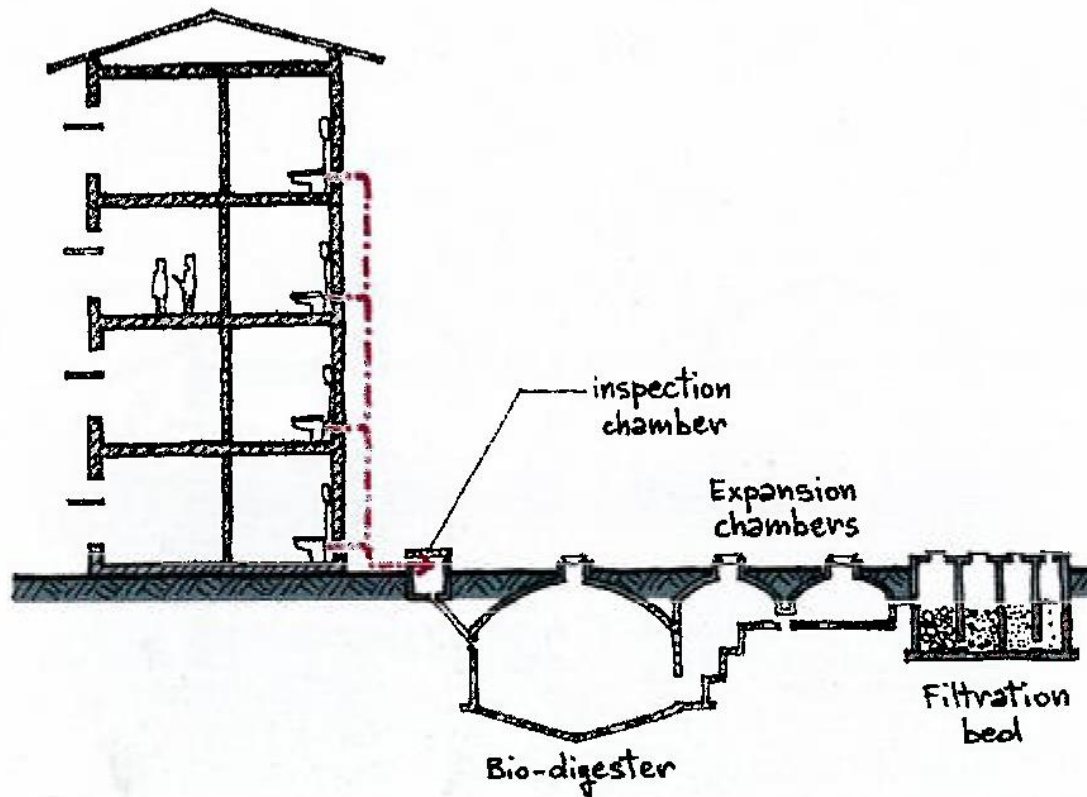
With community input and volunteer assistance, The Watershed Project is creating bioswales along the Richmond Greenway. The bioswale captures the stormwater and slows it down, keeping the water from flooding homes, the Greenway path, and nearby streets, where it creates potholes. The bioswale helps clean the water before it enters the San Francisco Bay as well. The native plants in the bioswale also create habitats for birds and butterflies.





# Sanitation

- In the absence of municipal sewage, design on-site waste water (black water) treatment systems with production of biogas, compost and re-used of water for irrigation.

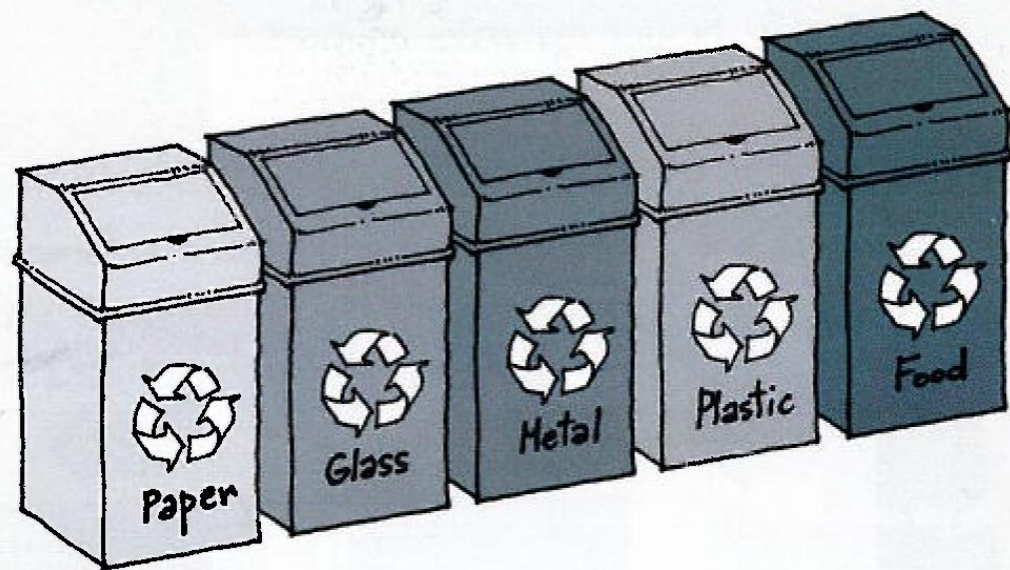


A 10M<sup>3</sup> Family size PUXIN biogas system for two family



# Solid Waste Management

- Design provisions for waste separation with on-site sorting facilities. Introduce innovative systems that encourage the 3R actions: Reduce and Reuse.



## ORGANICS (GREEN CART)

### ALL FOOD WASTE INCLUDING

- Meat, fish and bones
- Egg shells
- Tea bags and coffee grounds
- All fruits and vegetables
- Cooking oil and fat grounds

### SOILED AND/OR WET PAPER INCLUDING

- Tim Horton/ Paper Coffee Cups (lids removed and placed in blue bag)
- Pizza boxes
- Waxed boxes (pie shells, etc.)
- Paper Towels
- Napkins
- Waxed paper
- Non-metallic gift wrap paper (tape removed)
- Leaves, garden waste, plants, or weeds
- Sawdust, wood chips, or grass clippings

Absolutely NO plastic bags, metals or glass are to be put in your compost.

Biodegradable bags **MUST** bear this logo to be accepted:



Biodegradable Products Institute US Composting Council



## RECYCLABLES (BLUE BAG)

Beverage Containers (excluding milk) may be taken to your local ENVIRO-DEPOT™ for a 5 cent refund.

### PAPER/FIBRE PRODUCTS

- Newspaper
- Paper Egg Cartons
- Cardboard (To be flattened and tied into bundles no more than 2 ft. x 3 ft.)
- Boxboard (eg. Cereal boxes)
- Tissue Boxes
- Phone books
- Catalogues
- Paper, flyers and magazines
- Softcover books
- Hardcover books (Interior pages only; covers & bindings to be disposed of in garbage)
- Empty paper towel/toilet paper rolls
- Cigarette packages (foil liner goes in clear bag)

### BEVERAGE CONTAINERS

- Glass jars & bottles
- Beer & liquor bottles
- Pop & water bottles
- Juice & milk cartons
- Tim Horton/ Paper Coffee Cups (lids removed and rinsed clean; or recycle lid and compost cup)

### ALL PLASTICS

- Grocery Bags
- Clean plastic food bags
- Shampoo bottles
- Plastic tubs & lids
- Cleaning fluid bottle

### TIN / ALUMINUM

- Steel tin food cans
- Aluminum foil/pie plates

**ALL** recyclables should be clean and dry to avoid rejection. Please use **BLUE BAGS** for all your recyclables.



Paper can be left on cans, windows in envelopes, and plastic sleeves on Kleenex boxes.

## GARBAGE (CLEAR BAG PROGRAM IN EFFECT)

Any non-compostable or recyclable materials

- Pet litter/waste
- Empty coffee pods (coffee in compost)
- Styrofoam™ (meat trays, etc.)
- Toothpaste tubes
- Empty motor oil containers (lids on)
- Wallpaper/ taped gift wrap
- Pet food bags (plastic lined)
- Strawberry/Clementine boxes (stapled)
- Empty, dry paint cans (lids removed)
- Chocolate bar wrappers (mix of plastic and aluminum)
- Frozen juice cans (aluminum attached to cardboard)
- Broken glass/ceramic (Put in box marked "broken glass" and tape it up.)
- Small appliances (can opener, tea kettle, mixers, etc.)
- Disposable Diapers
- Hardcover Books (covers & bindings)
- CD's & DVD's
- Potato chip bags
- Broken toys
- Soiled straws/stir sticks
- Empty aerosol cans
- School binders
- Rusted tins/cans

Bait boxes and bags from lobster/longline bait, can be placed in a clear bag and put out with your regular collection items.

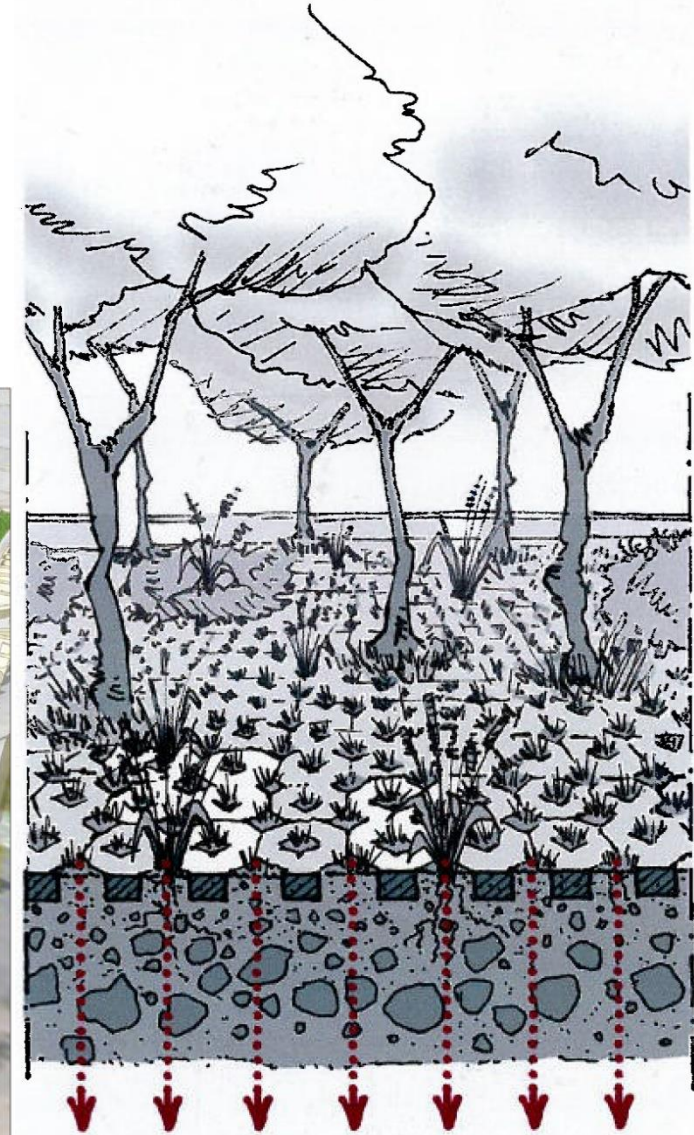
- Absolutely No organics or recyclables are to be placed in your garbage bags.
- Clear bags (not white) are to be used to ensure sorting has been completed.
- Do not use feed bags, dog food bags, or other such bags for garbage.



# Landscaping

- Design soft landscaping (greening site) with indigenous plants that require minimal irrigation and hard landscaping with paving materials that allow rainwater permeability.
- Limit paved areas around the building to reduce heat island effects.

- Captures and cleans stormwater runoff
- Reduces the urban heat island effect
- Sequesters carbon
- Reduces potable water use
- Cleans the air
- Increases social value of space









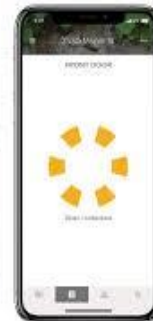
# Energy-efficient Appliances and Energy Demand Management

- Incorporate energy saving appliances in the building design.
- Make use of energy-saving bulbs, light level sensors, occupancy & motion sensors.
- Encourage behavior change.
- Ensure that energy demand management principles are given top priorities by the building occupants.



The Energy Efficient Appliances Database  
Reduce your electricity bills by choosing the right appliance

|   |  |   |   |  |
|---|--|---|---|--|
| <b>Lights</b><br>Tubelights, energy saver CFLs, LEDs, etc.: find out which will save you up to 80% electricity.<br><a href="#">More</a> |    | <b>Air Conditioners</b><br>Which brands use 30% less electricity than the generic ACs on the market? Click to find out.<br><a href="#">More</a> |   | <b>Fans</b><br>Pedestal, ceiling, or desktop... all fans cool more efficiently than ACs. Find out which brands perform better.<br><a href="#">More</a> |
|    | <b>Washing Machines</b><br>Front-loading, top-loading, automatic, etc.: see all brands and models compared here.<br><a href="#">More</a> |    | <b>Refrigerators</b><br>Which fridges save you 70% or more electricity? Compare refrigerator brands and deep freezers here.<br><a href="#">More</a> |   |



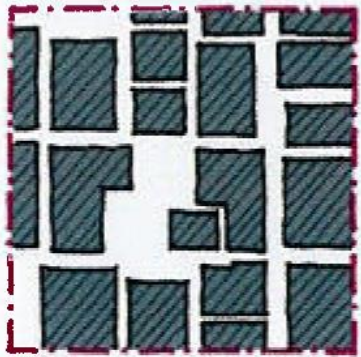
# URBAN WELL BEING



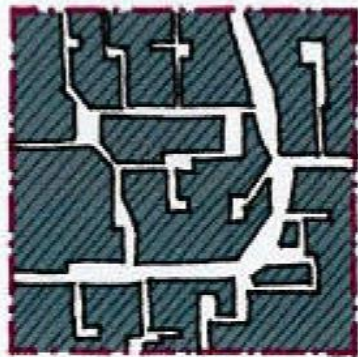


## Well Balanced Public Spaces

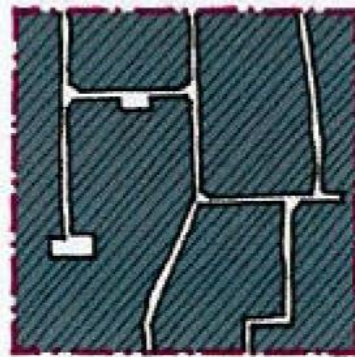
- 50% of spaces should be allocated to streets, roads, public spaces, gardens and parks (30% for streets, 15% open space).



Public space: 40%



Public space: 13%



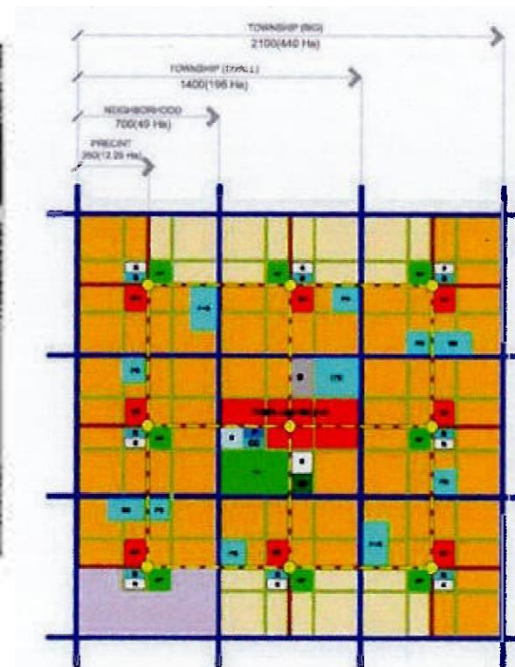
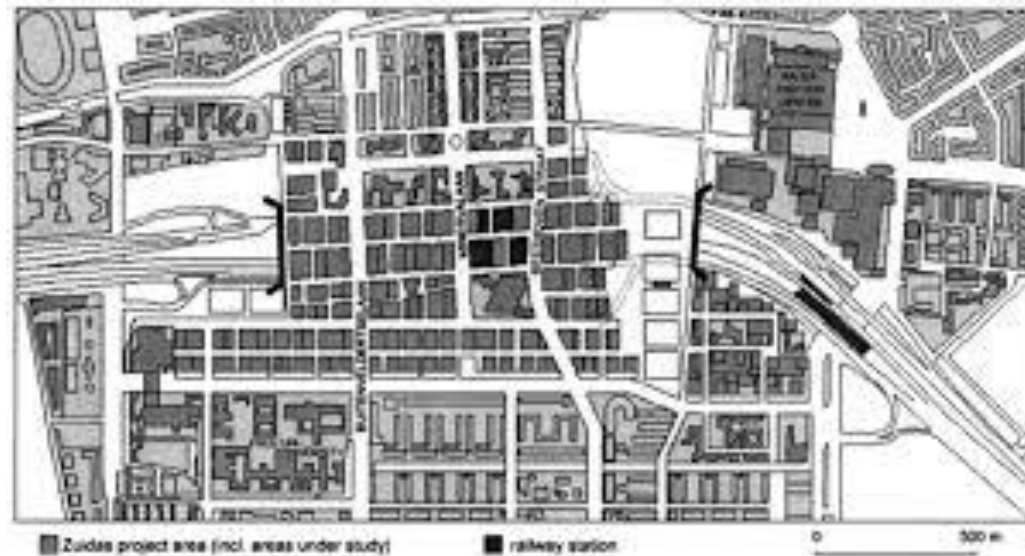
Public space: 10%





# Mixed Land Use

- Avoid zoning by combining economic, administrative and residential activities.
- This reduces the need to travel and ensures the use of public space.



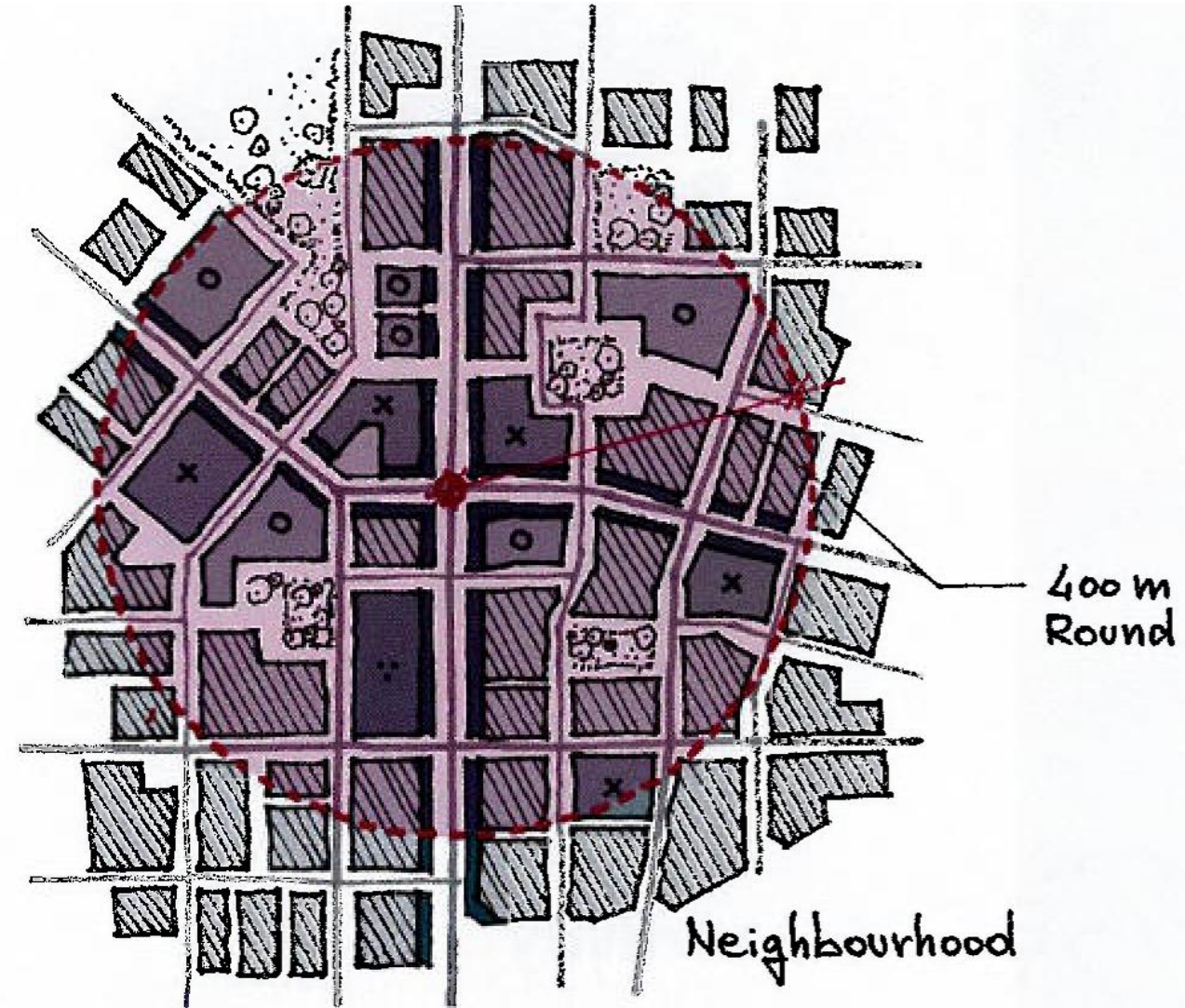
## Legend

|                          |  |                 |  |           |  |
|--------------------------|--|-----------------|--|-----------|--|
| Residential              |  | School/College  |  | Civic     |  |
| Commercial               |  | University      |  | Mixed use |  |
| Office                   |  | Health facility |  | Vacant    |  |
| Lake / road / playground |  |                 |  |           |  |



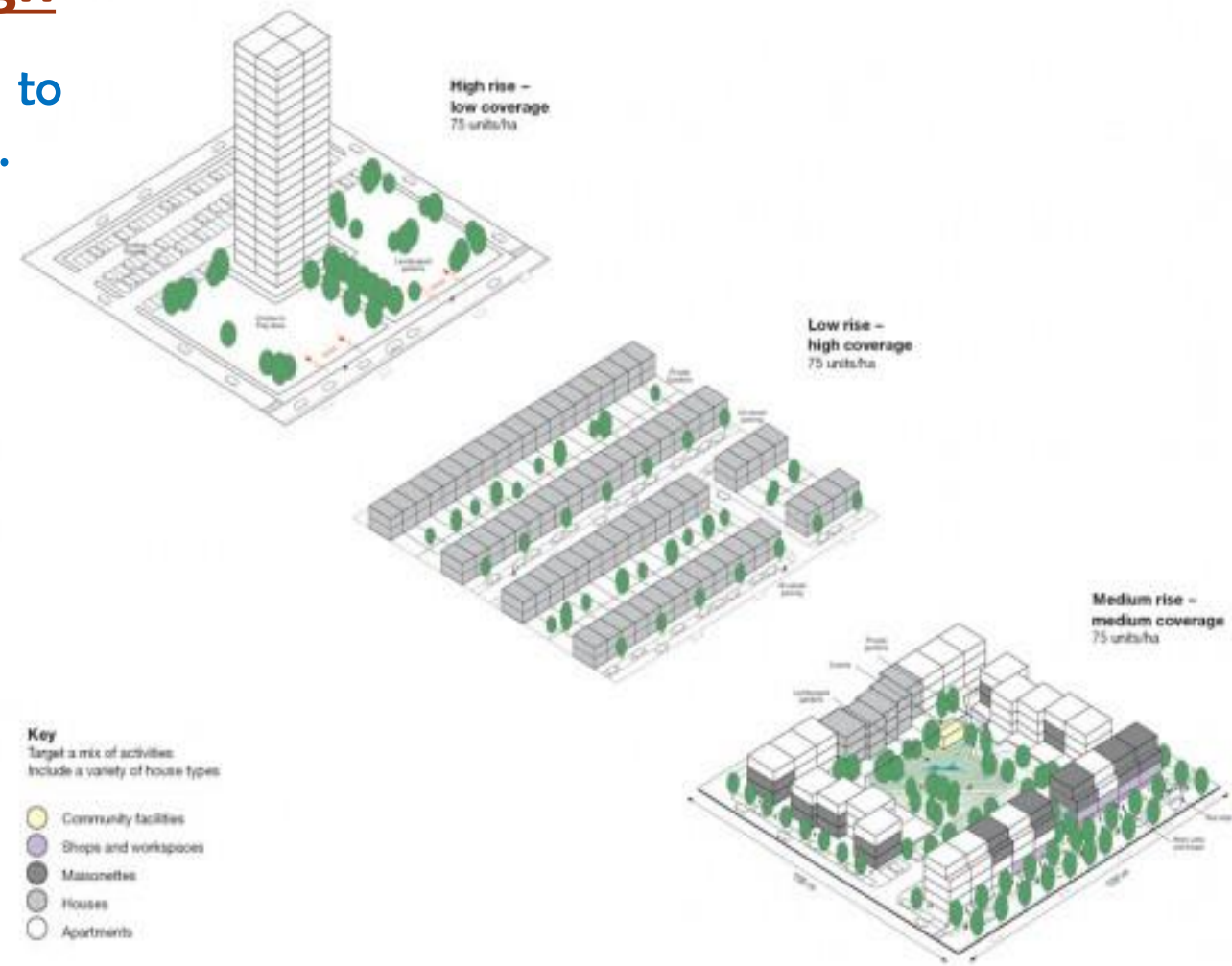
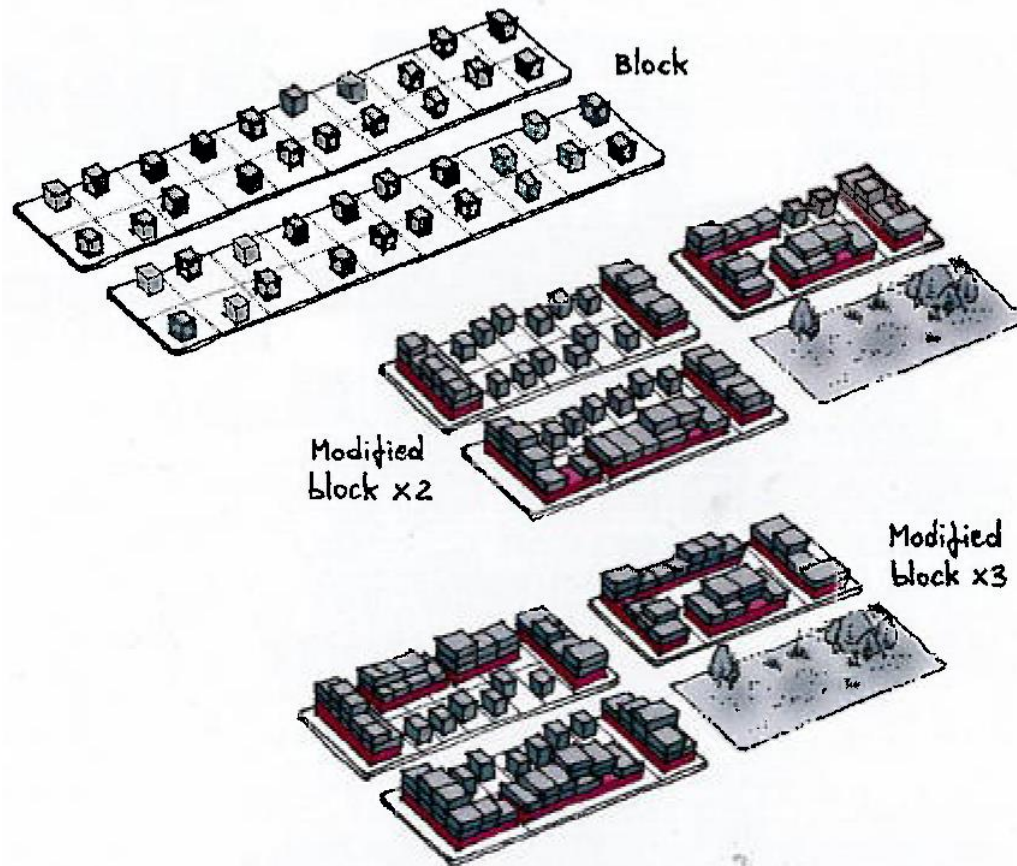
## Mixed Social Structure

- Promote social integration and diversity.
- Encourage cosmopolitan values and the need to live together and avoid gated communities.
- 20% - 50% of residential space should be allocated to affordable housing.



# Adequate Density & Compact Design

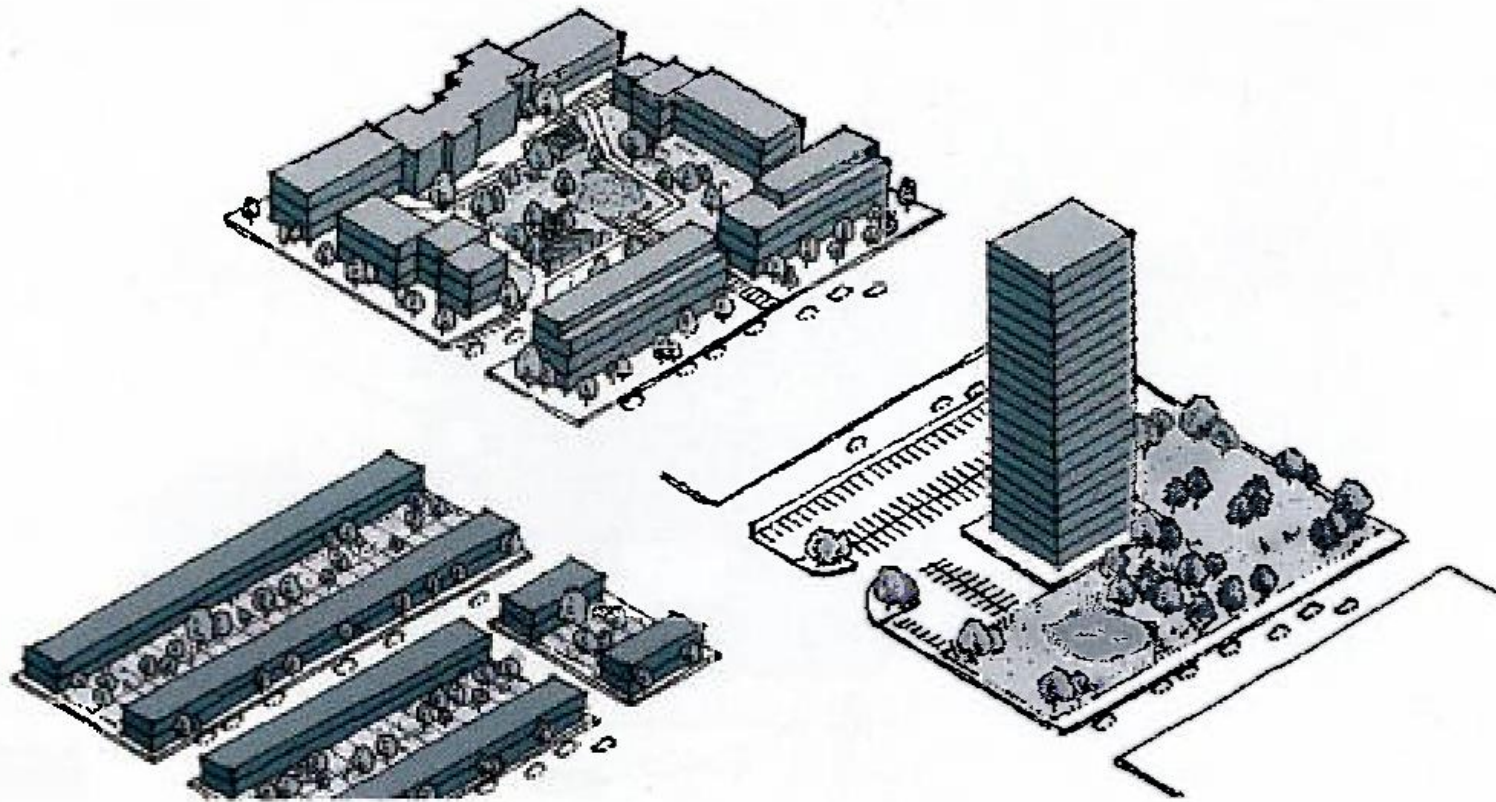
- High density neighborhoods that are enough to trigger economies of scale and ensure livability.





# Urban Form Matters

- Support mixed use, street life and walkability by designing compact blocks and buildings





# Connectivity

- Design street patterns and networks that connect the different parts of the city and eases access to goods and services.



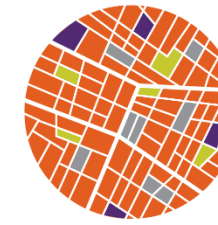
WALKABLE

- Built for walking speeds up to 4-5km/hr
- Focus on:
  - open space
  - public realm



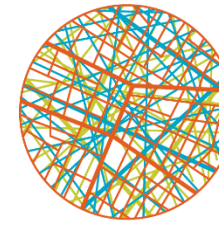
FINE GRAIN FABRIC

- Small blocks
- Small lots and varied street frontages
- Human scale
- Permeable



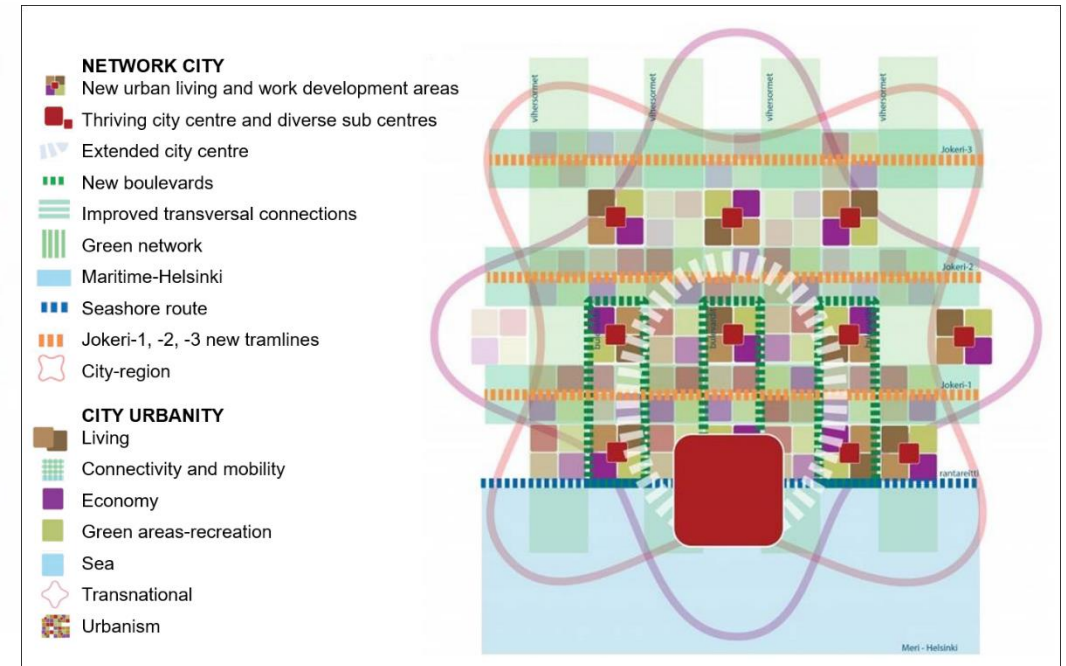
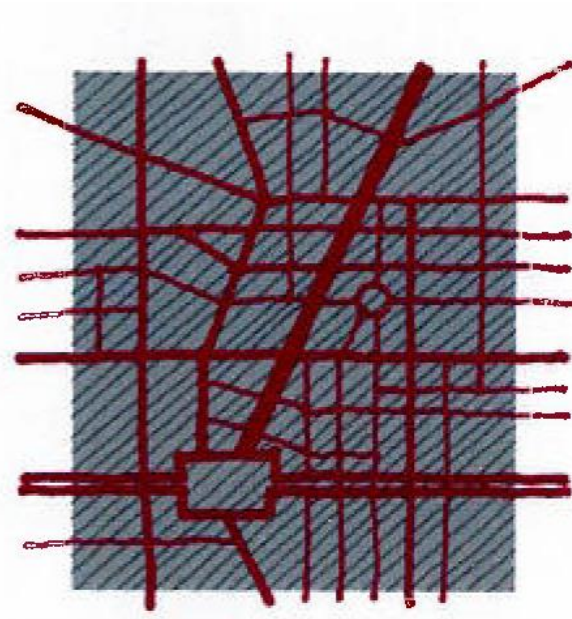
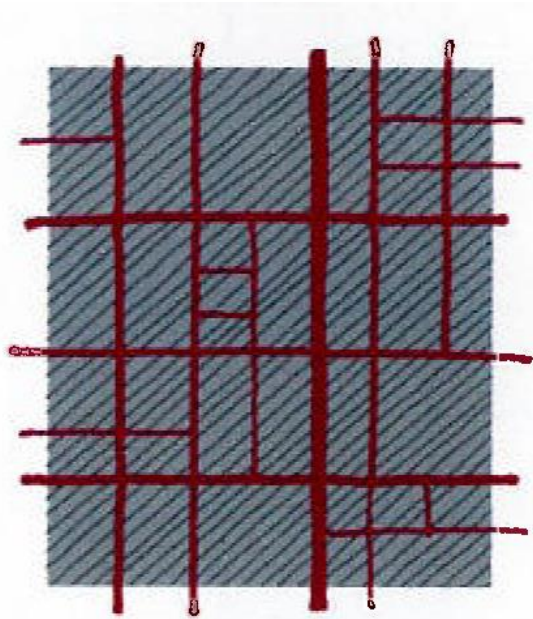
FINE GRAIN ACTIVITY

- Every day needs
- Arts, culture and heritage
- Night-time economy
- Co-located facilities and services at the heart of neighbourhoods



SOCIALLY CONNECTED

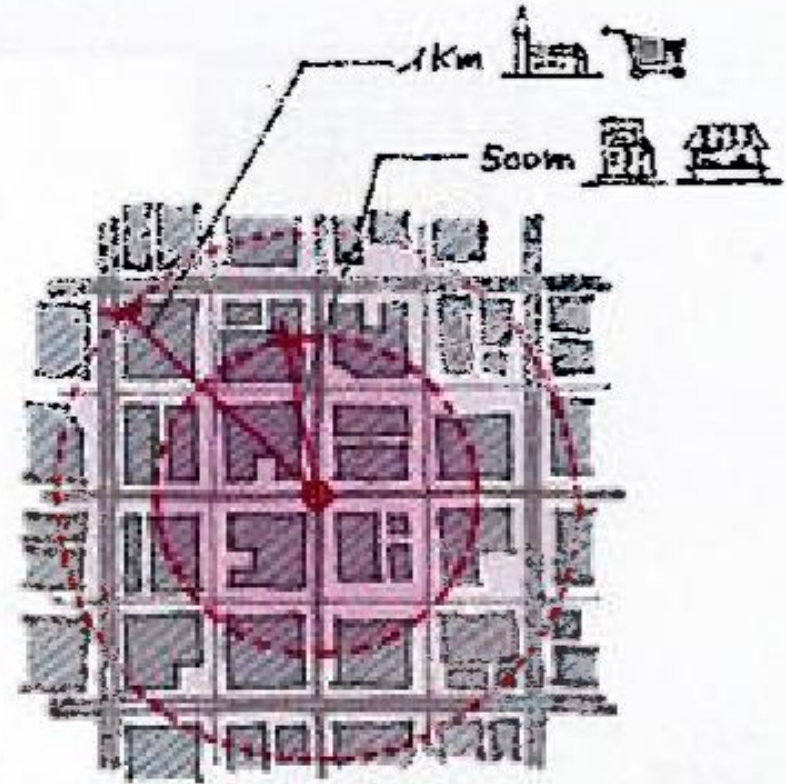
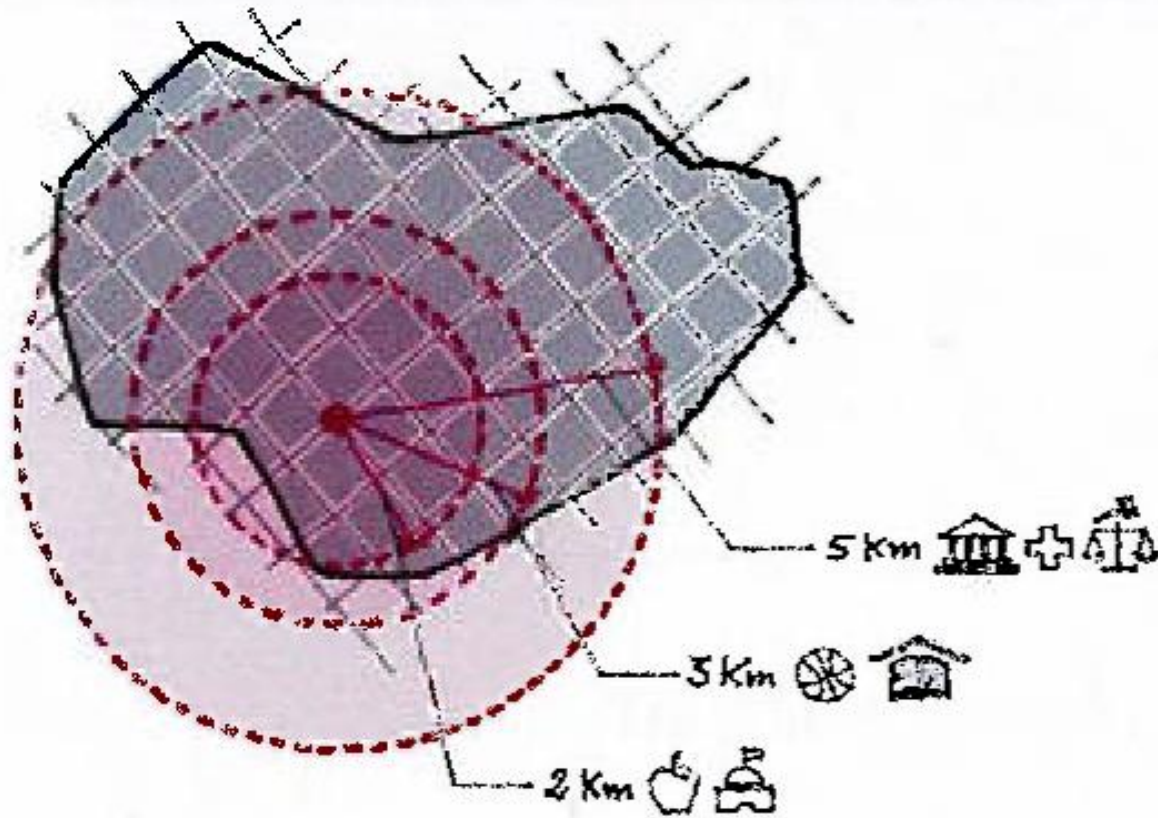
- Formal and informal opportunities to develop and maintain social connections and networks





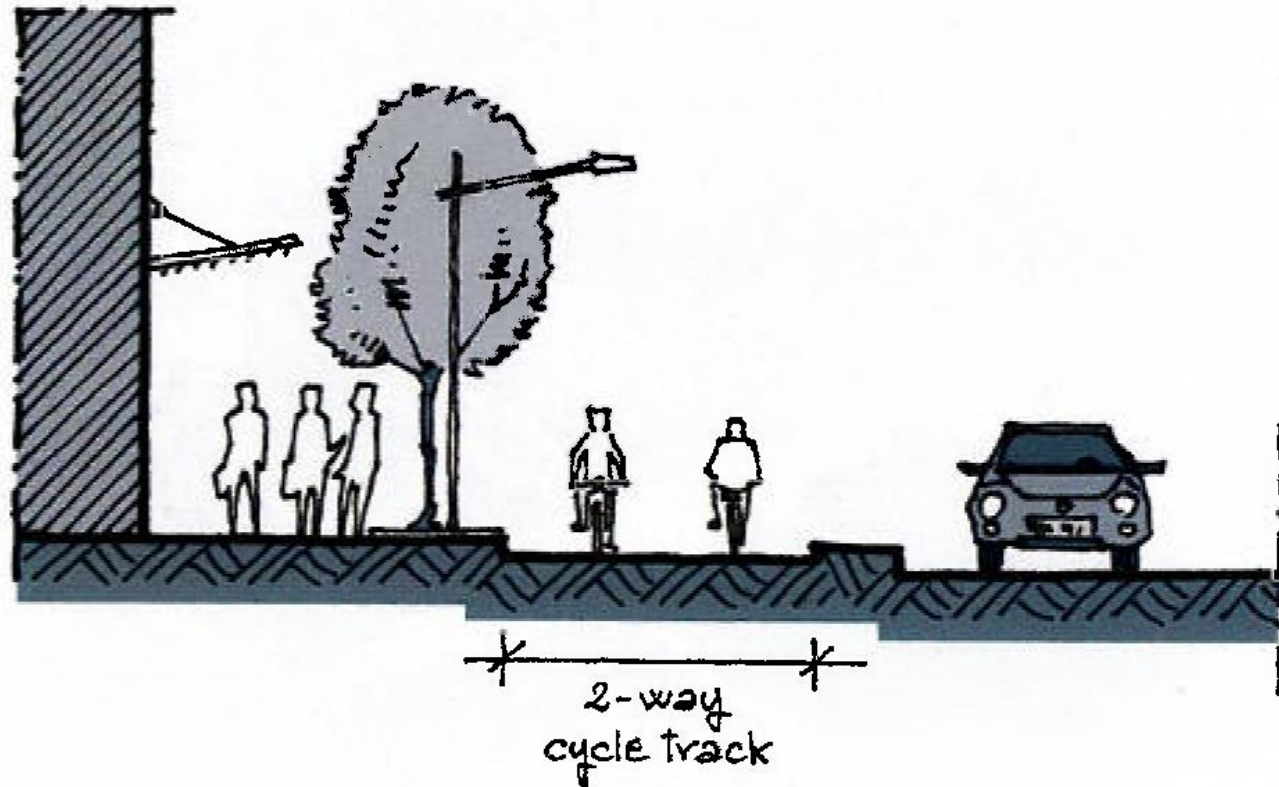
## Walkability

- Favor pedestrian mobility by emphasizing on walking distances, mixed use and public transport.



# Active Mobility

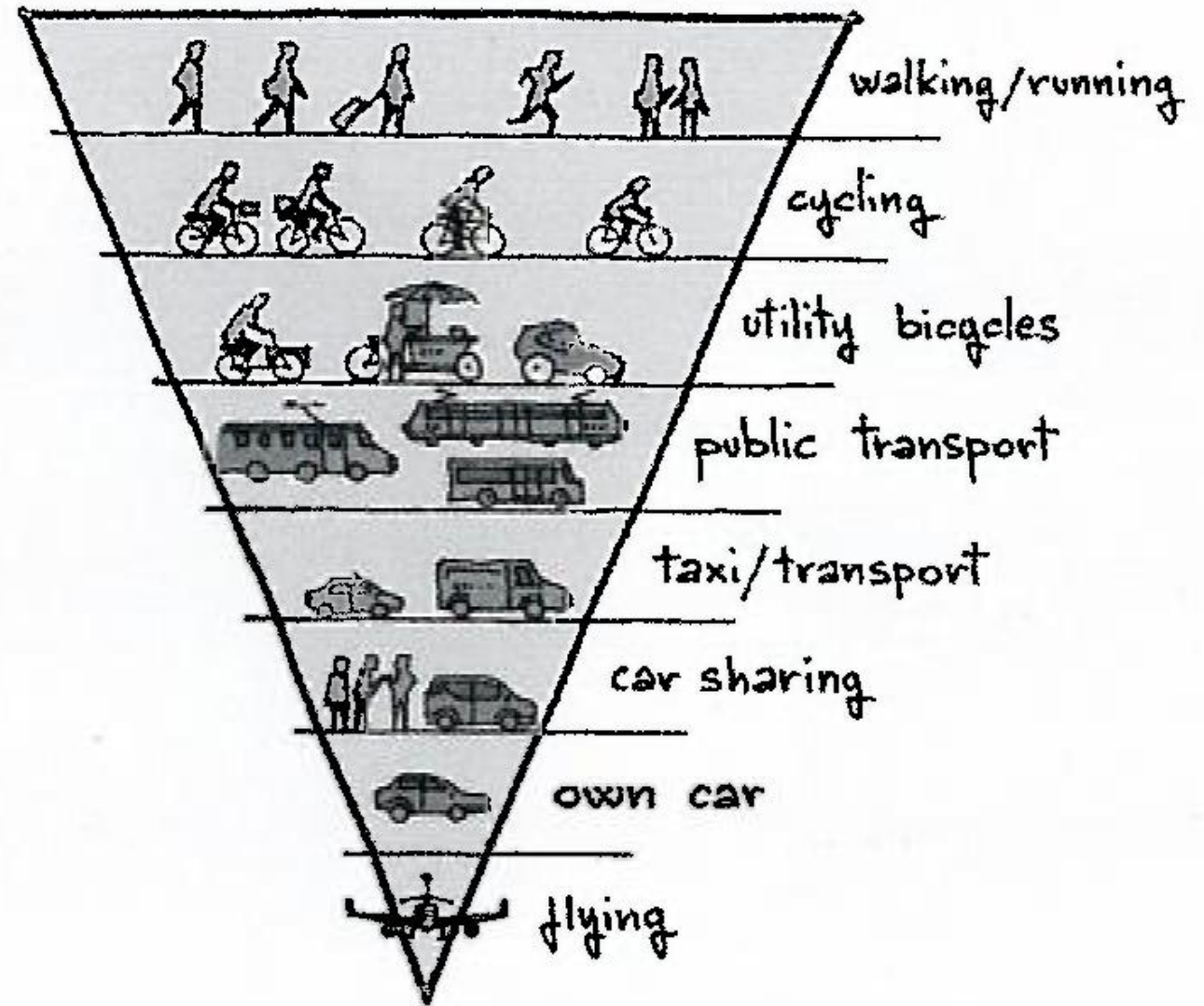
- Street design should provide for pedestrians and cyclist lanes.
- Cycling extends reach of public transport.





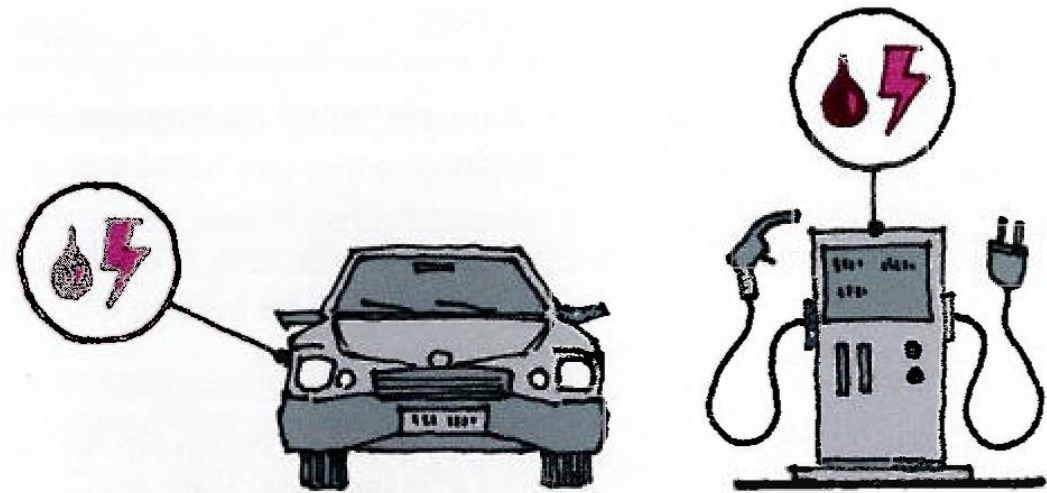
## Promote the “Shift”

- Encourage modal shift from energy intensive modes (cars) to walking, cycling and using public transport. Make cycling and walking safe and attractive.



## Promote Vehicle Efficiency

- Promote green transport by promoting the shift from fossil fuel dependent vehicles to hybrid and electric cars.





# Previous Project

**NUCLEUS TOWER** | A meticulously choreographed office building

(credited to Arkitek MAA Sdn Bhd)





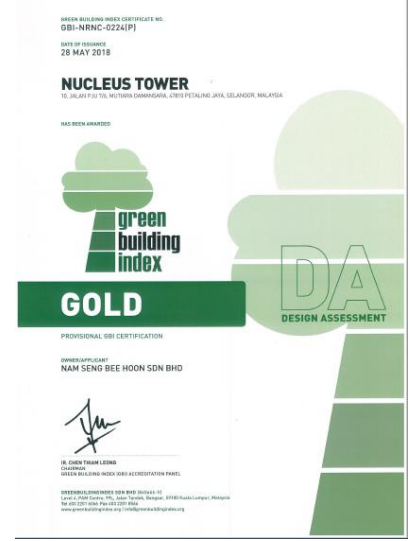
# nucleus

MUTIARA DAMANSARA

Nucleus Tower is the latest building in Mutiara Damansara, Petaling Jaya which has been recognized with MSC status as well as certified with GBI Gold design assessment. Most of Nucleus Tower features design is aligned with the Sustainable Development Goals (SDG). Therefore, Nucleus Tower is a sustainable building in Mutiara Damansara by enhancing the quality of life to its communities through Localizing the Sustainable Development Goals.



PETALING JAYA  
SUSTAINABLE  
COMMUNITY  
AWARD 2019





# Location Plan

**Project Name :**  
**Nucleus Tower**  
**Mutiara Damansara, Petaling Jaya**

**Project Status :**  
**Completed,**  
**CCC obtained 5/7/18**

**Project Scale / Size :**  
**25-Storey Office Tower**  
**1-Annex Building**  
**4 Level of Basement**

**Project Objective & Strategy :**

- To become a Green Building pioneer in Mutiara Damansara
- To become a strategic location for business hub in Petaling Jaya



**nucleus**  
**MUTIARA DAMANSARA**



# nucleus

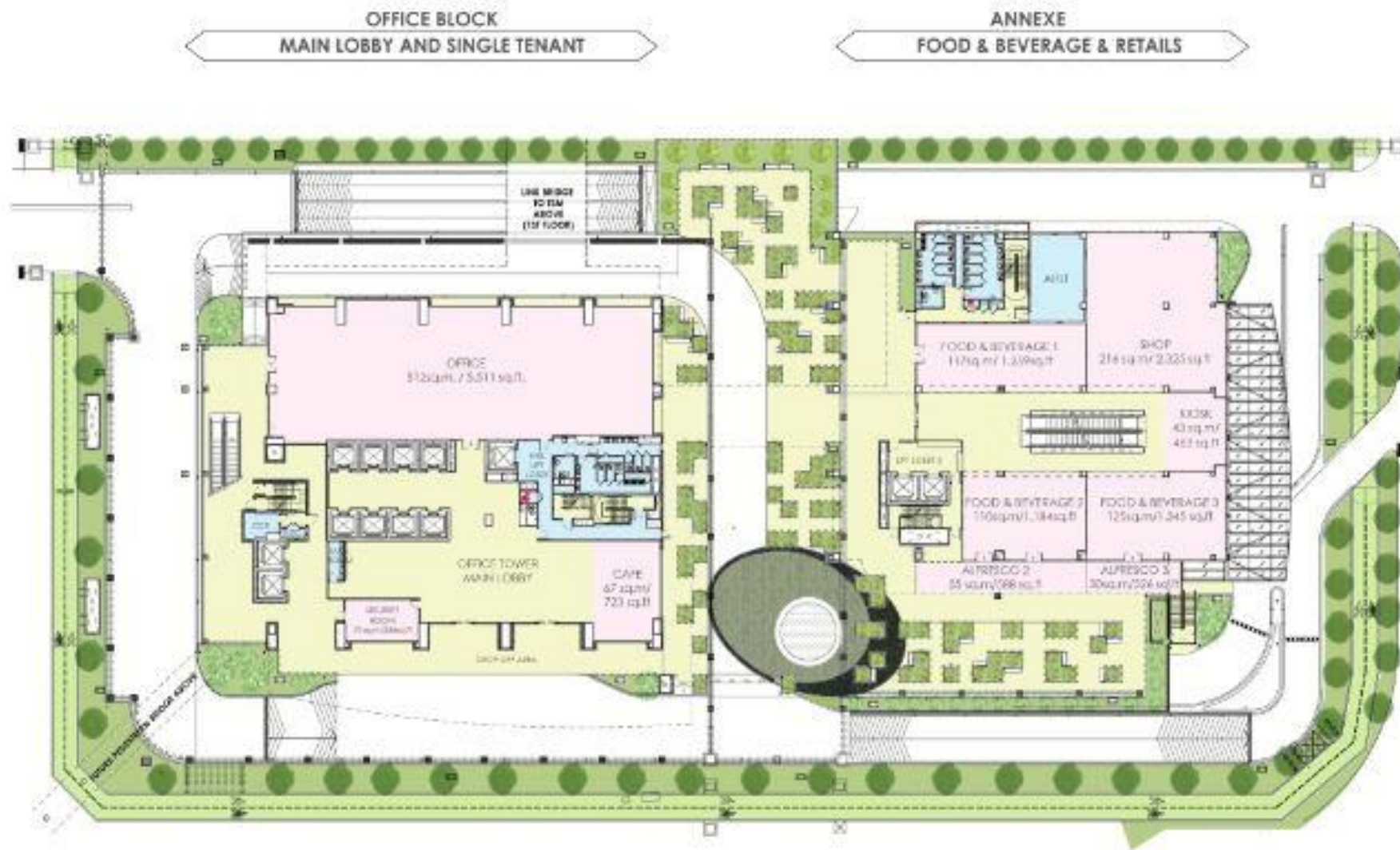
MUTIARA DAMANSARA











**Ground Floor**  
2. Control Room  
3. Office  
4. Toilet

5. Performance Plaza  
6. Alfresco Dining  
7. Food & Beverage  
8. Shop



ANNEXE  
MULTI PURPOSE HALLS, RETAILS & F&B



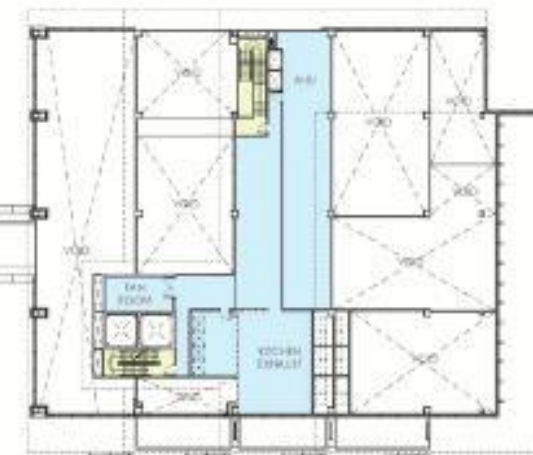
1. Meeting room
2. Office
3. Food & Beverage
4. Pre-function Area

5. Surau
6. Multi-purpose Hall
7. Toilet
8. Covered linkway

OFFICE BLOCK  
MULTI-TENANT OFFICES



ANNEXE  
MECHANICAL FLOOR





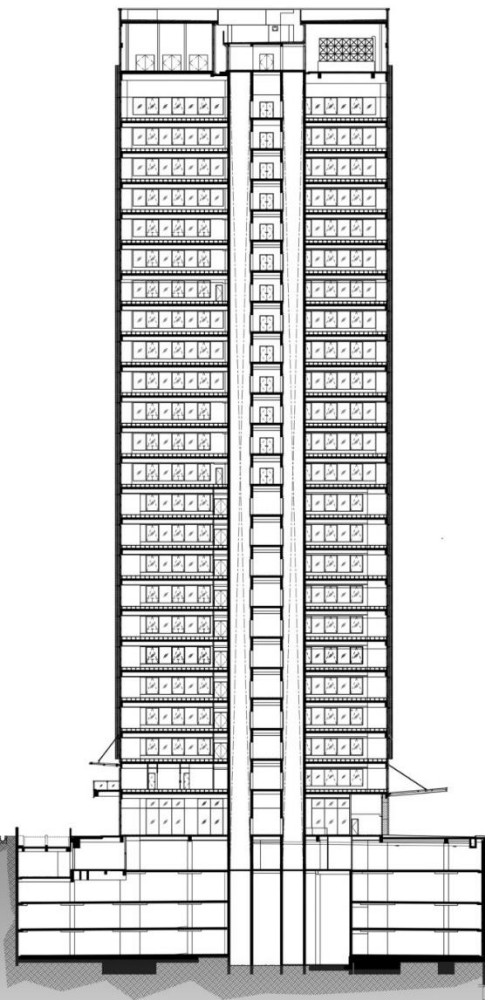
North Elevation



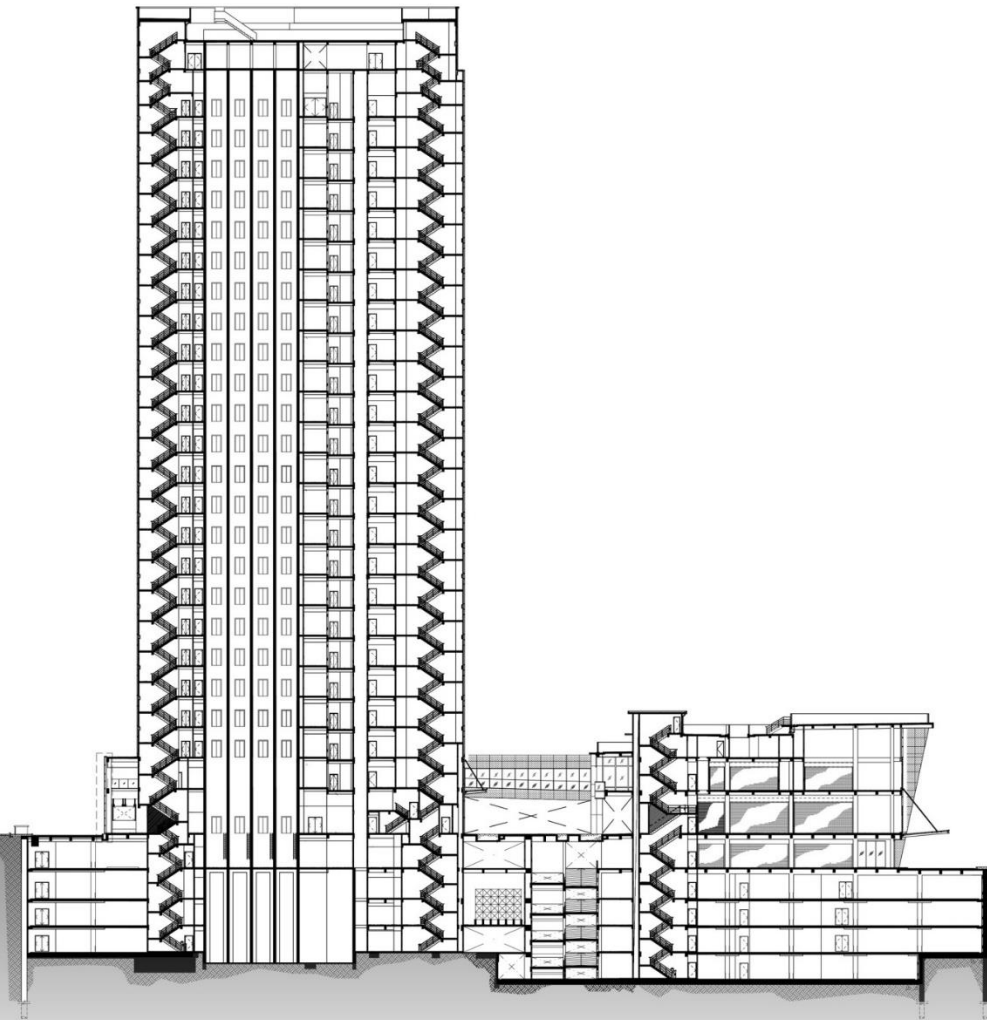
South Elevation







SECTION A-A



SECTION B-B



# nucleus

MUTIARA DAMANSARA

3 GOOD HEALTH  
AND WELL-BEING



3 GOOD HEALTH  
AND WELL-BEING



**Ensure healthy  
lives and promote  
well-being for  
all at all ages**

Since 2000, impressive progress has been made on many health fronts. However, to meet the SDG health targets by 2030, progress must be accelerated and expanded, in particular in regions with the highest burden of disease. Areas that deserve special attention include mortality rates for children under five years of age, unintended pregnancies particularly among adolescents, reducing infectious diseases related with lack of safe water, sanitation and hygiene (WASH) services, premature deaths due to non-communicable diseases, mental disorders such as depression, tobacco and alcohol use, and indoor and ambient air pollution. Health systems strengthening and funding are also key to achieving SDG3.



## WALKWAY & CYCLING TRACK



As a GBI building, Nucleus Tower encourage their tenant to practice a healthy life-style by providing a pedestrian walkway and cycling track for the communities. Moreover, Nucleus Tower had provided a safe and comfortable walking experience by having anti-climb fences to reduce potential criminal chances.











# ELEVATED PEDESTRIAN WALKWAY



An elevated pedestrian walkway linking Nucleus Tower to The Curve Mall and Mutiara Damansara MRT station will encourage the tenant and communities to walk safely and comfort compared to street walkway. This initiative will promote a good health and well-being practice in the population.







# SMOKE-FREE BUILDING



Nucleus Tower is smoke-free building. Hence, cigarette and electronic cigarette are prohibited in the building. This regulations has been stated in the in-house rules for tenants as well as encourage and motivate employees to quit or reduce cigarette consumption. A smoke free environment creates a safe and healthy workplace.



# nucleus

MUTIARA DAMANSARA

7 AFFORDABLE AND  
CLEAN ENERGY



## Goal 7:

Ensure access to  
affordable, reliable,  
sustainable and  
modern energy for all.



As the global population continues to rise, so will the demand for cheap energy. A global economy reliant on fossil fuels and the increase of greenhouse gas emissions is creating drastic changes to our climate system. Efforts to encourage clean energy has resulted in more than 20 percent of global power being generated by renewable sources. Still, one in seven people lack access to electricity, and progress in every area of sustainable energy falls short of what is needed to achieve energy access for all and to meet targets for renewable energy and energy efficiency. Meaningful improvements will require higher levels of financing, bolder policy commitments, and the willingness of countries to embrace new technologies on a much wider scale.



# SOLAR PANEL SYSTEM



Nucleus Tower is operate by utilizing solar energy through solar panel. Solar energy is partially providing electrical supply by combining with the main electrical supply from Tenaga Nasional Berhad (TNB) to generate the electrical appliances in the building. Solar power is non-polluting and usage of it does not emit any greenhouse gasses or harmful waste.

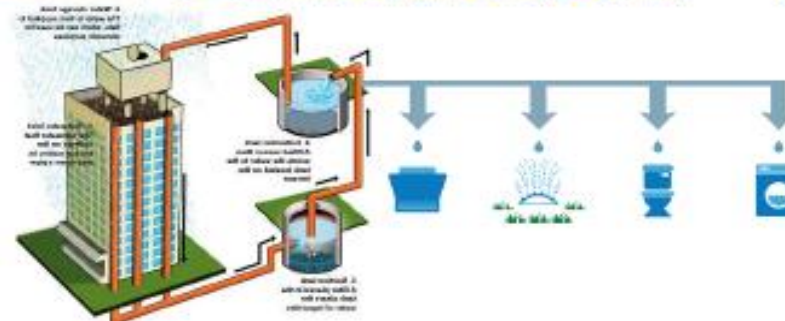




# RAIN-WATER HARVESTING SYSTEM



Nucleus Tower also operate by utilizing rain-water through rain water harvesting system. Rain-water is collected and being utilized for plant watering and for flushing usage in toilet. Rain water is and ever-lasting free source that can be acquired naturally. Rain water harvesting could reduce the pressure on processed supply water which enhance the green living & sustainable.

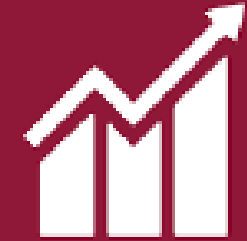




# nucleus

MUTIARA DAMANSARA

## 8 DECENT WORK AND ECONOMIC GROWTH



**Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all**

Over the past 25 years, the number of workers living in extreme poverty has declined dramatically and the middle class in developing countries now makes up more than 34% of total employment. However, we are now seeing slower growth, widening inequalities and not enough jobs to keep up with a growing labour force. Increasing labour productivity, reducing the unemployment rate, especially for young people, and improving access to financial services and benefits are essential components of sustained and inclusive economic growth, as are effective measures to eradicate forced labour, slavery and human trafficking.



# ECONOMIC GROWTH & QCLASSIC



Nucleus Tower is constructed by using local materials which supplied by local vendors. This is one of the initiative to support local company as well as to contributed to the Malaysia economic growth.

Nucleus Tower main contractor had achieved 82% of QCLASSIC score and certified by CIDB. This indicate that the labour had provided high quality workmanship during course of construction. As a result, Nucleus Tower is successfully constructed.







## CONDUSIVE WORKING SPACE



Nucleus Tower is providing a conducive and comfortable working space to tenants as well as provide rental service for interested parties to organize events at the space provided. A conducive environment workplace could increase the employee productivity and work effectively toward the given assignment and task. By rental, the management could generate additional profits.

GENERAL OFFICE AREA



nucleus  
MUTIARA DAMANSARA

MAIN LIFT LOBBY AREA



TURNSTILE AT MAIN LOBBY

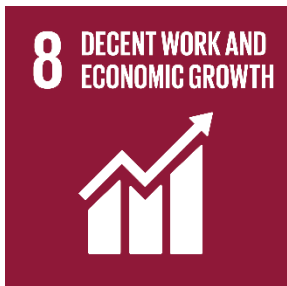


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CONDUSIVE OFFICE SPACE FOR SME COMPANY



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MUTIARA DAMANSARA



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# nucleus

MUTIARA DAMANSARA

9 INDUSTRY, INNOVATION  
AND INFRASTRUCTURE



9 INDUSTRY, INNOVATION  
AND INFRASTRUCTURE



**Build resilient  
infrastructure, promote  
inclusive and sustainable  
industrialization and  
foster innovation**

Investment in infrastructure and innovation are crucial drivers of economic growth and development. With over half the world population now living in cities, mass transport and renewable energy are becoming ever more important, as are the growth of new industries and information and communication technologies. More than 4 billion people still lack access to the Internet. Bridging this digital divide is crucial to ensure equal access to information and knowledge, and foster innovation and entrepreneurship. Promoting sustainable industries, and investing in scientific research and innovation, are all important ways to facilitate sustainable development.



# MULTIMEDIA SUPER CORRIDOR (MSC)

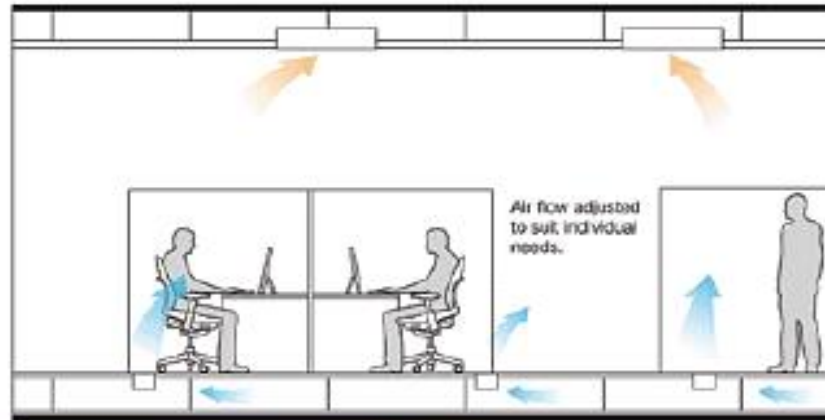


Nucleus Tower is certified as one of MSC status building in Category (Tier) 1. This shows that Nucleus Tower is providing high-tech infrastructure in term of IT and multimedia products and services. As a MSC status building, Nucleus Tower gives eligible ICT-related business for local and foreign companies. Tenant will be provided with 24 hours electrical supply and excellence internet as well as TELCO coverage in Nucleus Tower.





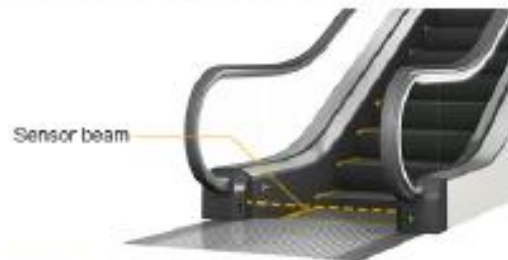
## RAISED FLOOR SYSTEM



Nucleus Tower is using raise-up floor system which could ease the wiring installations and improve the aesthetic quality as all electrical and mechanical system are placed underneath. The used of raised floor system for air-conditioning distribution can significantly reduce energy use in many ways such as reduced fan power requirement and cooling load reduced.



# MOTION SENSOR SYSTEM



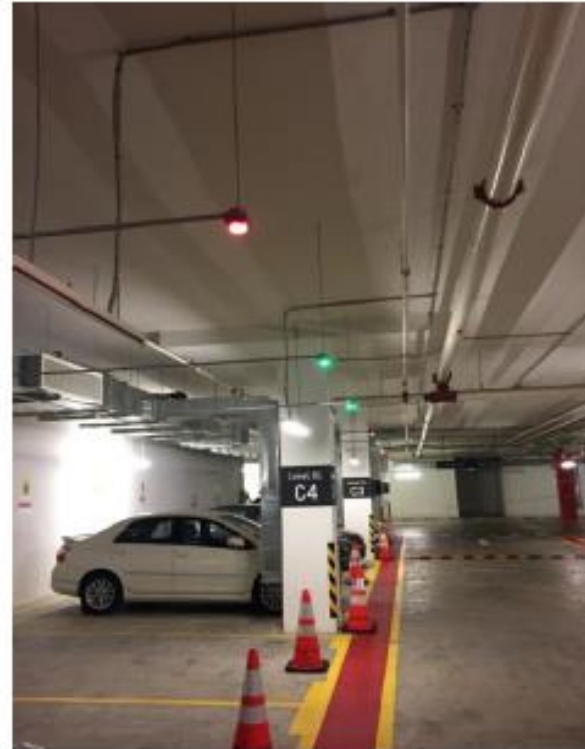
Light sensor at each floors and staircase



In order to achieve high energy efficiency, the escalator and several lighting system are operating by using sensor motion mode which means the escalator and light will only operate if and only if there are motion detected. Hence, the usage of electrical energy will be optimized and by curbing the electricity use is good for environment and save money.



## PARKING GUIDANCE SYSTEM



Nucleus Tower parking is being integrated with Parking Guidance System (PGS) which would ease the drivers to indentify the vacancy of the parking bay. Moreover, this system help to reduce time to park by decreasing waiting and searching time.



# nucleus

MUTIARA DAMANSARA

11 SUSTAINABLE CITIES  
AND COMMUNITIES



**Make cities and  
human settlements  
inclusive, safe,  
resilient and  
sustainable**

By 2030, two thirds of the world population (5 billion people) is expected to live in cities. Rapid urbanization has brought enormous challenges, including growing numbers of slum dwellers, increased air pollution, inadequate basic services and infrastructure, and unplanned urban sprawl, which also make cities more vulnerable to disasters. Making cities safe and sustainable means ensuring access to safe and affordable housing, investment in public transport, creating green public spaces, and improving urban planning and management in a participatory and inclusive manner.



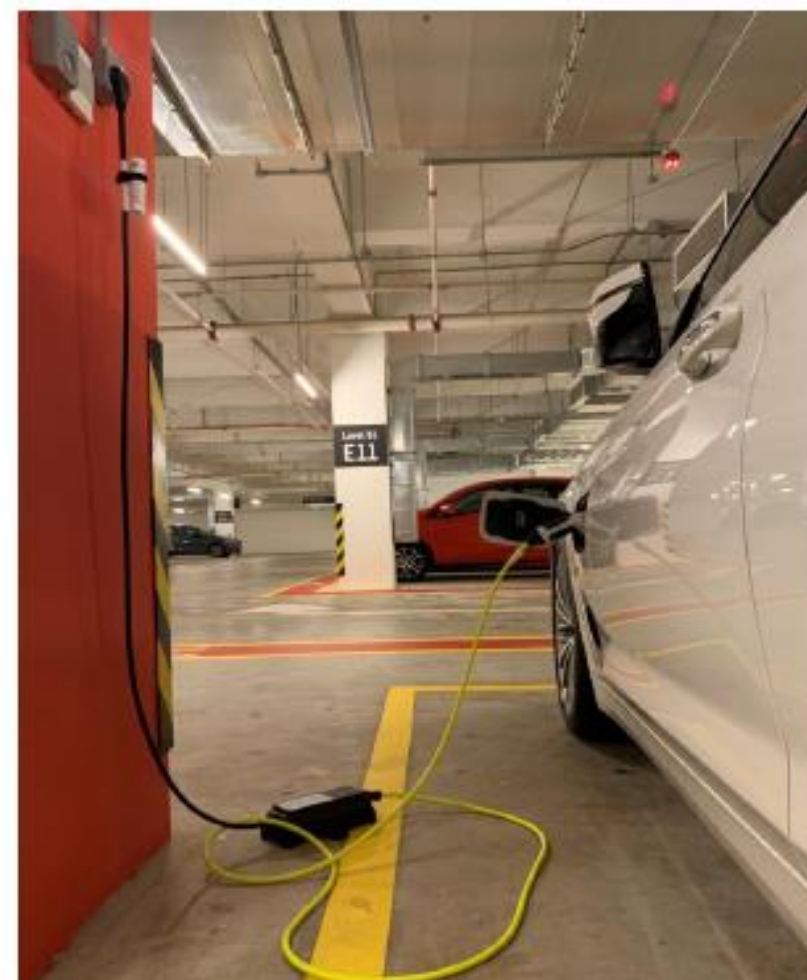
## ELEVATED PEDESTRIAN SKYWALK



Nucleus Tower is encouraging the tenant to be sustainable communities by using the link-bridge which connected MRT station to Nucleus Tower as well as to rest of commercial buildings. At the same time, they are saving the world by reducing the production of carbon emissions and promoting the healthy life style through walking.



# DESIGNATED CARPARK



Nucleus Tower as GBI design building is encouraging the tenant and communities to become sustainable cities and communities by promoting carpool, hybrid and electrical car. As a return, the communities will be designated for a special parking bay if they are using the alternatives above.





# nucleus

MUTIARA DAMANSARA

12 RESPONSIBLE  
CONSUMPTION  
AND PRODUCTION



12 RESPONSIBLE  
CONSUMPTION  
AND PRODUCTION



**Ensure sustainable  
consumption  
and production  
patterns**

To achieve sustainable development, we urgently need to reduce our ecological footprint by changing the way we produce and consume goods and resources. Agriculture is the biggest user of water worldwide, and irrigation now claims close to 70 percent of all freshwater for human use. The efficient management of our shared natural resources, and the way we dispose of toxic waste and pollutants, are important targets to achieve this goal. Encouraging industries, businesses and consumers to recycle and reduce waste is important, as is supporting a shift to more sustainable patterns of consumption. Halving the global food waste at the retailer and consumer levels is also key for creating more efficient production and supply chains.



# ALUMINIUM FORMWORK



Aluminium formwork

In order to reduce waste during construction, Nucleus Tower had used Miven Aluminium formwork whereby the formwork will be repeatedly utilized for the following structure. Furthermore, aluminium formwork system will give integral finish to the structure as well as could speed-up the construction period.





Nucleus Tower is supporting the recycling initiative by providing the recycle bin at the common floors such as lobby and basement carpark. Thus, recycle awareness could be created and indirectly will reduce the ecological pollution caused by waste. Moreover, recycle bin could improve the building productivity as well as to provide quality life for the communities.

# nucleus

MUTIARA DAMANSARA

13 CLIMATE ACTION



13 CLIMATE ACTION



**Take urgent action  
to combat  
climate change  
and its impacts**

Greenhouse gas emissions continue to rise, and are now more than 50 percent higher than their 1990 level. The annual average losses from tsunamis, tropical cyclones and flooding amount to hundreds of billions of dollars. The goal aims to mobilize \$100 billion annually by 2020 to address the needs of developing countries and help mitigate climate-related disasters. Mitigating climate change and its impacts will require building on the momentum achieved by the Paris Agreement on Climate Change, which entered into force on 4 November 2016. It is still possible, with the political will and a wide array of technological measures, to limit the increase in global mean temperature to two degrees Celsius above pre-industrial levels.



- 3 GOOD HEALTH AND WELL-BEING
- 7 AFFORDABLE AND CLEAN ENERGY
- 8 DECENT WORK AND ECONOMIC GROWTH
- 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
- 11 SUSTAINABLE CITIES AND COMMUNITIES
- 12 RESPONSIBLE CONSUMPTION AND PRODUCTION
- 15 LIFE ON LAND

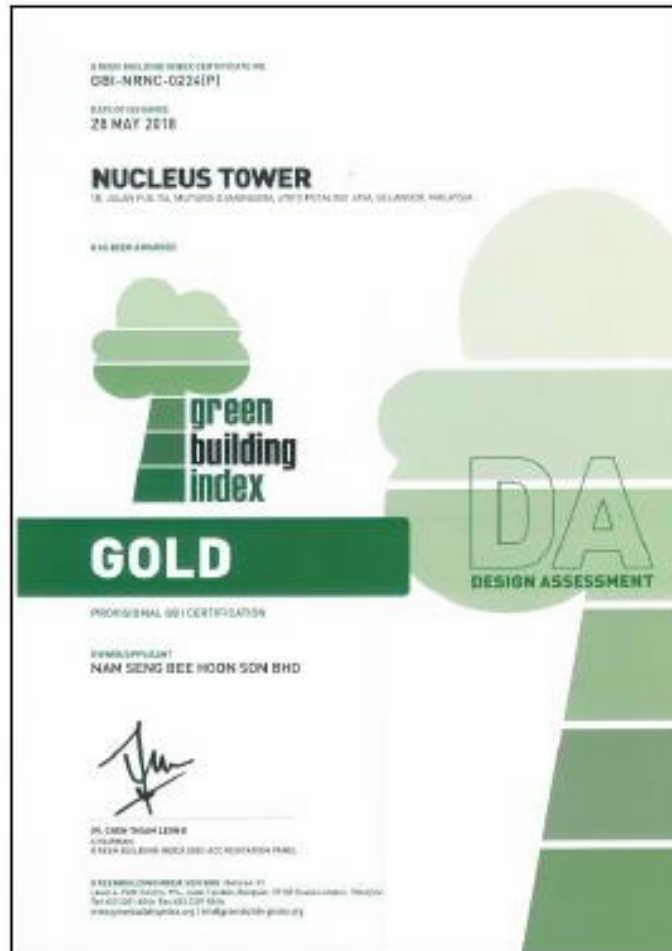
nucleus

MUTIARA DAMANSARA

13 CLIMATE ACTION

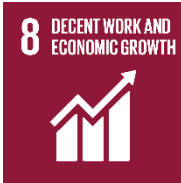


# GREEN BUILDING INDEX (GBI)



By applying GBI design to Nucleus Tower, the building is automatically to be one of the initiatives to combat the climate actions. This is simply due to the GBI requirements that demanding the building or development to be sustainable, high efficiency in term of energy and resources through-out the construction stage as well as reduced the production of toxic substances.





# CARBON DIOXIDE MONITOR



CO2 & Temperature Sensor

Nucleus Tower is controlling the Carbon Dioxide building especially basement. Whenever unusual amount of CO2 and temperature fluctuation are detected, the system will automatically balance the air requirement and normalized the surround temperature. This will help to increase air quality as well as aids communities with a better living quality of life.

**CO2 system also installed at each office levels**



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15 LIFE ON LAND



**Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halt and reverse land degradation and halt biodiversity loss**

Plant life provides 80 percent of our human diet, and we rely on agriculture as an important economic resource and means of development. Forests provide vital habitats for millions of species and important sources for clean air and water, and are crucial for combating climate change. Progress in preserving and sustainably using the Earth's terrestrial species and ecosystems is uneven. Declining trends in land productivity, increasing drought and desertification, and poaching and trafficking of wildlife remain serious concerns. Urgent action must be taken to reduce the loss of natural habitats and biodiversity, which are part of our common heritage.

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## GREENERY & LANDSCAPE



**NO STRESS!!!**



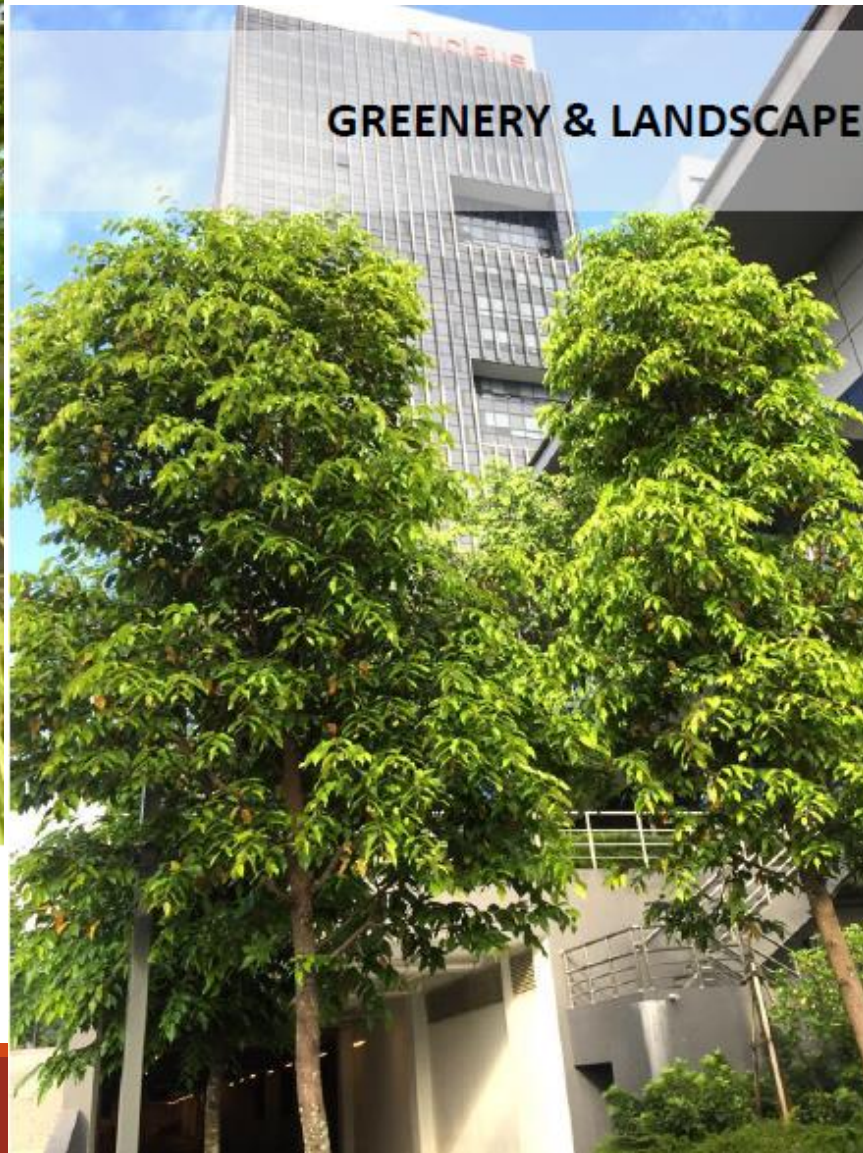
Being in nature or surround by greenery environment could help to reduce stress as well as increase pleasant feelings. Hence, Nucleus Tower is occupied with plenty of landscape in order create a nature viewing scenes to the tenants which will enhance the employees performance at work.



## GREENERY & LANDSCAPE



## GREENERY & LANDSCAPE

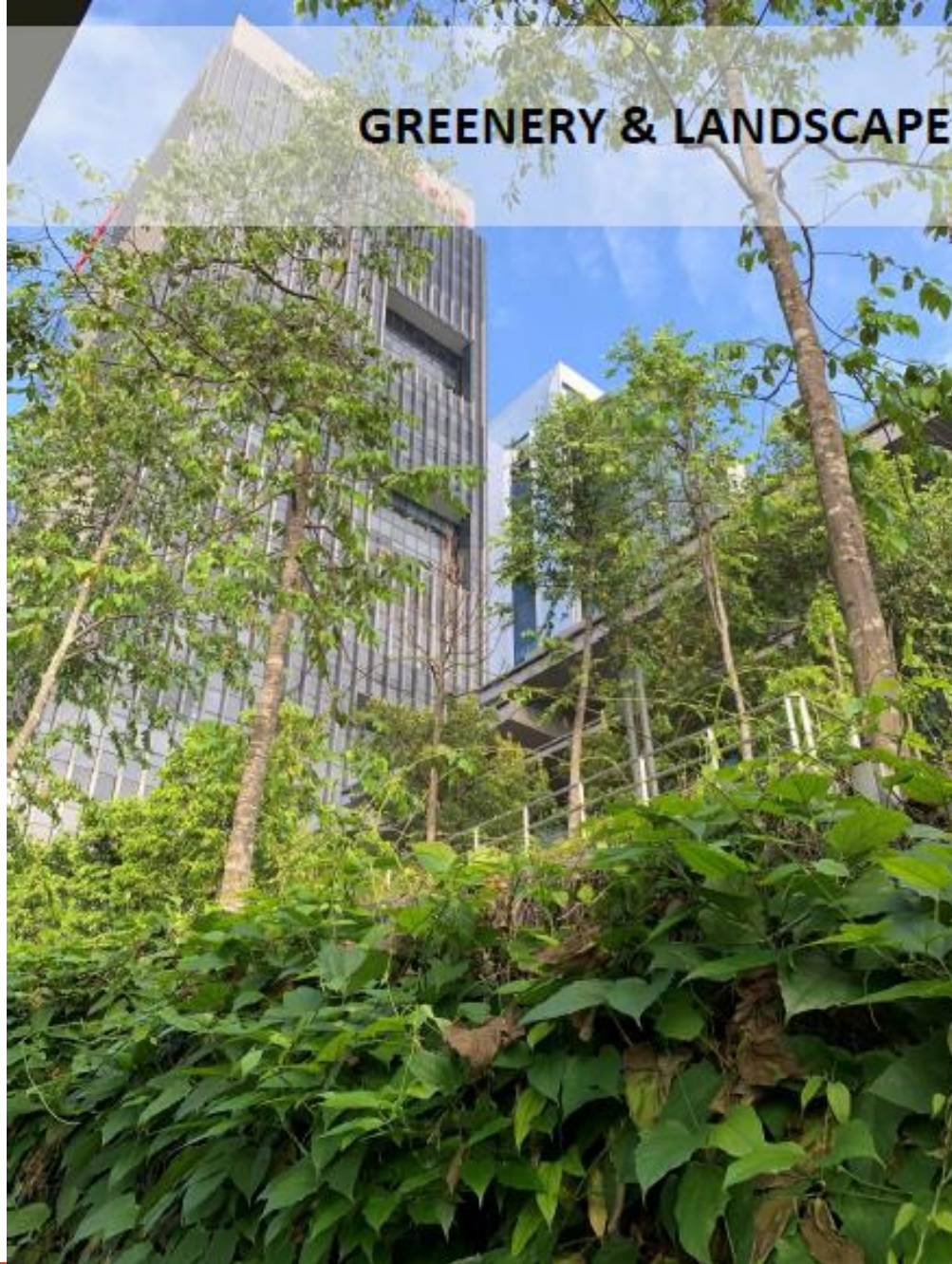


## GREENERY & LANDSCAPE





## GREENERY & LANDSCAPE



## GREENERY & LANDSCAPE





The verticality of the facade is toned down by having lighter and darker grey banding horizontally which make the building more dynamic in a graceful manner











“Sustainability” is the key word for this avant-garde design. The office spaces are furnished with advanced state-of-art technology in matching its status as high-tech and eco-friendly office tower. Underfloor air-conditioning system at office spaces, daylight responsive lighting system at common spaces and motion sensors at toilet and escape staircases are used to cut down energy consumption. The green roof is used at the annex building and skywalk which serves as thermal insulation and acts as a visual relief to the office users. Native or adaptive herbs are selected for the pocket garden to create cooling effect at the central plaza, and the maintenance cost of the landscape is substantially reduced through a thoughtful rainwater harvesting system. Nucleus Tower’s users and visitors will experience a meticulously designed office building. The design strength stems from its awe-inspiring verticality and its sleek silhouette which represents a compelling vision of a 21st century urban development.



