

Key Focus Areas in Greening Commercial Buildings



Malaysian Commitment to Paris Accord

Prime Minister: 40 per cent cut in carbon emission

Malaysia's land mass is forested at 56.4 per cent while its green cover stands at 74 per cent, a strong signal to the world that it walks the talk in reducing carbon emission.

Prime Minister Datuk Seri Najib Razak said Malaysia was committed to a 40 per cent reduction in carbon emission per unit of gross domestic product by 2020, using the 2005 level as a baseline.

This, however, is subject to technology transfer and new additional funding from developed nations.

Najib, who is also the finance minister, added that the new economic model introduced in 2010 outlined the country's commitment to sustainability, not only in activities but the impact of development on environment and natural resources.

SUSTAINABLE DEVELOPMENT GOALS



40% GHG emissions intensity reduction by 2020 and 45% by 2030 from 2005 levels.

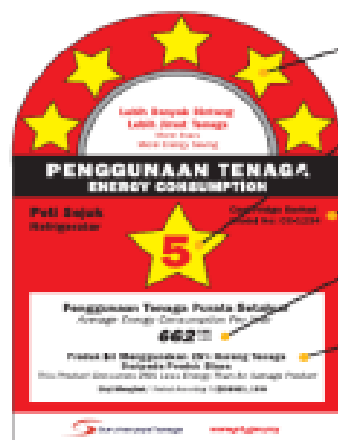
**Built environment contributes 30%-40% of total GHG emissions in Malaysia through the design, construction, cooling and illumination of buildings.
(Approx 8-10% embodied and 20-30% operational)**

Malaysian Regulations and Standards

Focus is on Energy Consumption

IV. MINIMUM STANDARD ENERGY PERFORMANCE (MEPS)

- ✓ introduced for 5 domestic electrical appliances :
 - Refrigerators
 - Air-conditioners
 - Televisions
 - Fans
 - Lightings (Fluorescent, CFL, LED)



- Energy rating 1 to 5-Star
- Appliance energy rating (equals the number of stars)
- Model information
- Energy consumption (in kWh/year)
- Energy saving compared to an average 3-Star model (in percentage)

- ▶ Efficient Management of Electrical Energy Regulations (EMEER 2008)
- ▶ MS 1525:2014 – Energy Efficiency and use of renewable energy for non-residential projects
- ▶ MS2680:2017 - Energy Efficiency and use of renewable energy for residential projects
- ▶ UBBL 38A
- ▶ UPCOMING – EECA (2020)

What are Green / Sustainable Buildings?

A Green Building, also known as a **sustainable building**, is a structure that is designed, built, renovated, operated, or re-used in an ecological and resource efficient manner.

Sustainable development is maintaining a delicate balance between the human need to improve lifestyles and feeling of well-being on one hand, and preserving natural resources and ecosystems which we and future generations depend on.



Standards and Certification

What are Standards?

- ▶ A standard is a set of guidelines and criteria against which a product, system, project or service can be judged.
- ▶ Generally developed through consensus by organizations.
- ▶ ISO defines a standard as: "a document, established by consensus, approved by a recognized body that provides for common and repeated use as rules, guidelines, or characteristics for activities or their results".
- ▶ Standards are either – “Prescriptive” , “Performance-based” or “Outcome Based” applied separately or together.

What is Certification?

- ▶ Certification is a confirmation that a product, system, project or service meets defined criteria of a standard.
- ▶ ISO defines certification as: "any activity concerned with determining directly or indirectly that relevant requirements are fulfilled".
- ▶ They can be either “Single attribute” or “Multi attribute”.

Who Are We?



GreenRE Sdn Bhd

- Green Building Standards Development (GreenRE)
- Green Building Certification
- Training:
 - GreenRE Managers Course (GREM)
 - GreenRE Refresher Course
 - Technical Seminars
 - Short Courses

Established Based On International Green Standards

Based on Singapore BCA's prestigious **GreenMark tool** which is recognised internationally.

GreenRE has been modified for Malaysian standards.

GreenRE has a portfolio of over 200 projects in Malaysia.

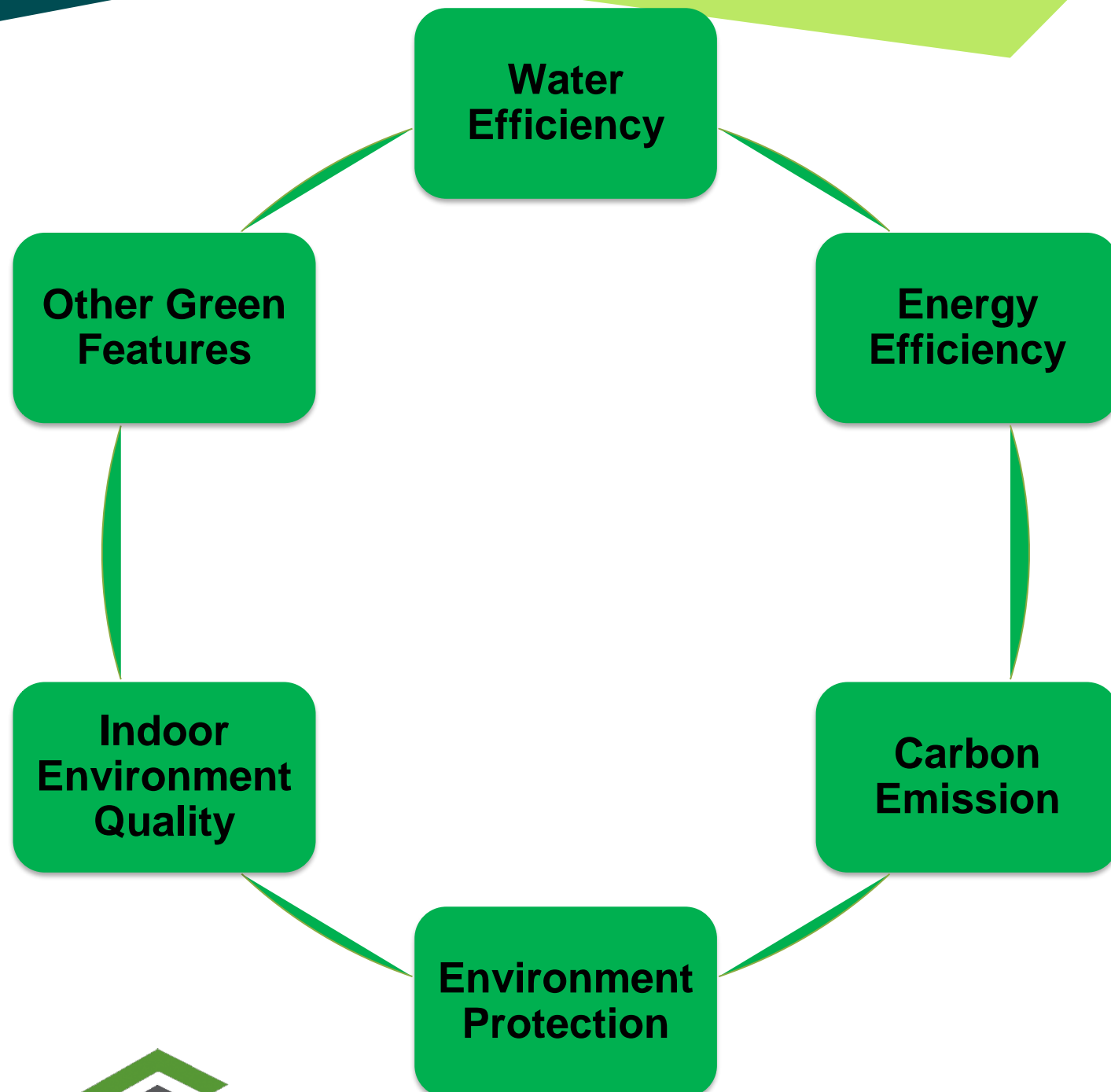
Endorsed by the Federal Government

MGTC and MIDA, approves GreenRE as a green building certification body under their MyHijau Mark Programme. All GreenRE certified buildings qualify for income tax allowances from MIDA & LHDN.

Recognized by **authorities** such as DBKL, MPSA and MBPJ in planning approvals.

IRDA recognizes GreenRE as a locally developed certification tool that is eligible for tax exemption incentives for the Iskandar Region.

Green Buildings



Part 1 – Energy Efficiency

NRB 1-1 Thermal Performance of Building Envelope -OTTV
NRB 1-2 Air-Conditioning System
NRB 1-3 Building Envelope – Design/ Thermal Parameters
NRB 1-4 Natural Ventilation/Mechanical Ventilation
NRB 1-5 Daylighting
NRB 1-6 Artificial Lighting
NRB 1-7 Ventilation in Carparks
NRB 1-8 Ventilation in Common Areas
NRB 1-9 Lift and Escalators
NRB 1-10 Energy Efficient Practices & Features
NRB 1-11 Renewable Energy

Part 2 - Water Efficiency

NRB 2-1 Water Efficient Fittings
NRB 2-2 Water Usage and Leak Detection
NRB 2-3 Irrigation System and Landscaping
NRB 2-4 Water Consumption of Cooling Tower

Part 3 – Environmental Protection

NRB 3-1 Sustainable Construction
NRB 3-2 Sustainable Products
NRB 3-3 Greenery Provision
NRB 3-4 Environmental Management Practice
NRB 3-5 Green Transport
NRB 3-6 Stormwater Management
NRB 3-7 Refrigerants

Part 4 - Indoor Environmental Quality

NRB 4-1 Thermal Comfort
NRB 4-2 Noise Level
NRB 4-3 Indoor Air Pollutants
NRB 4-4 Indoor Air Quality (IAQ) Management
NRB 4-5 High Frequency Ballasts

Part 5 – Other Green Features

NRB 5-1 Green Features & Innovations

Part 6 – Carbon Emission of Development

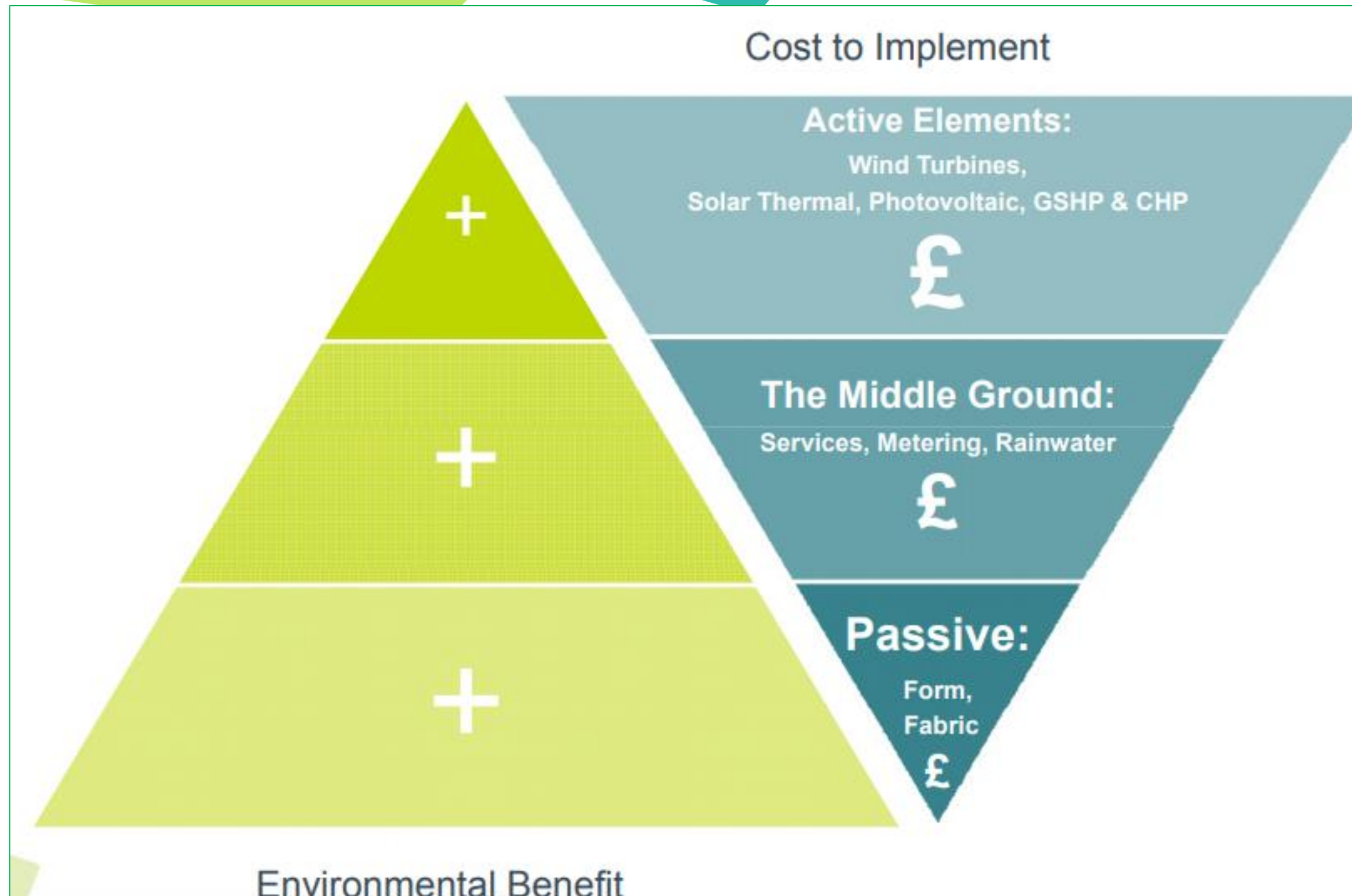
NRB 6-1 Carbon Emission of Development

Mandatory Requirements (UBBL 38A)

Non-residential building (NRB) :

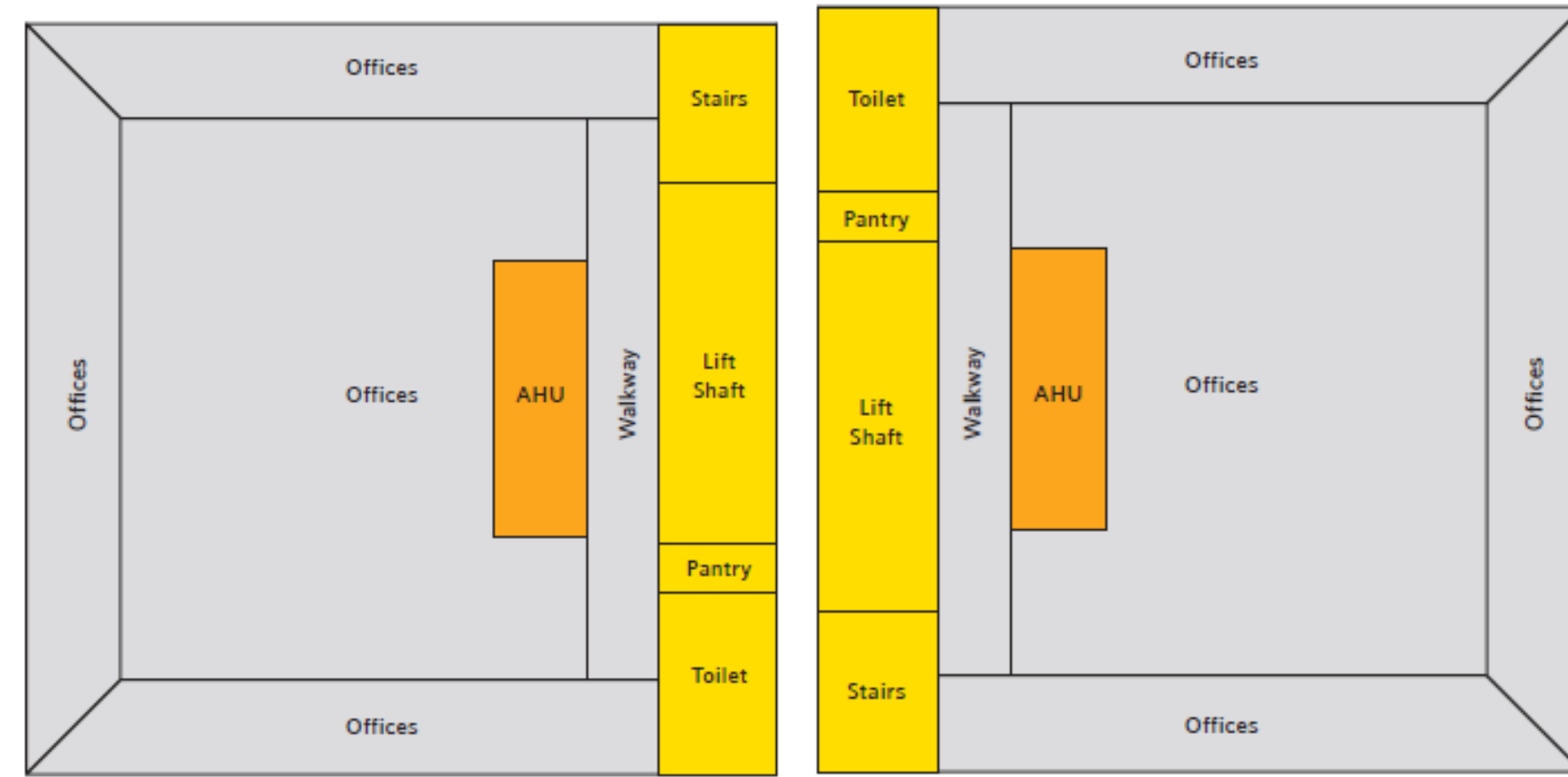
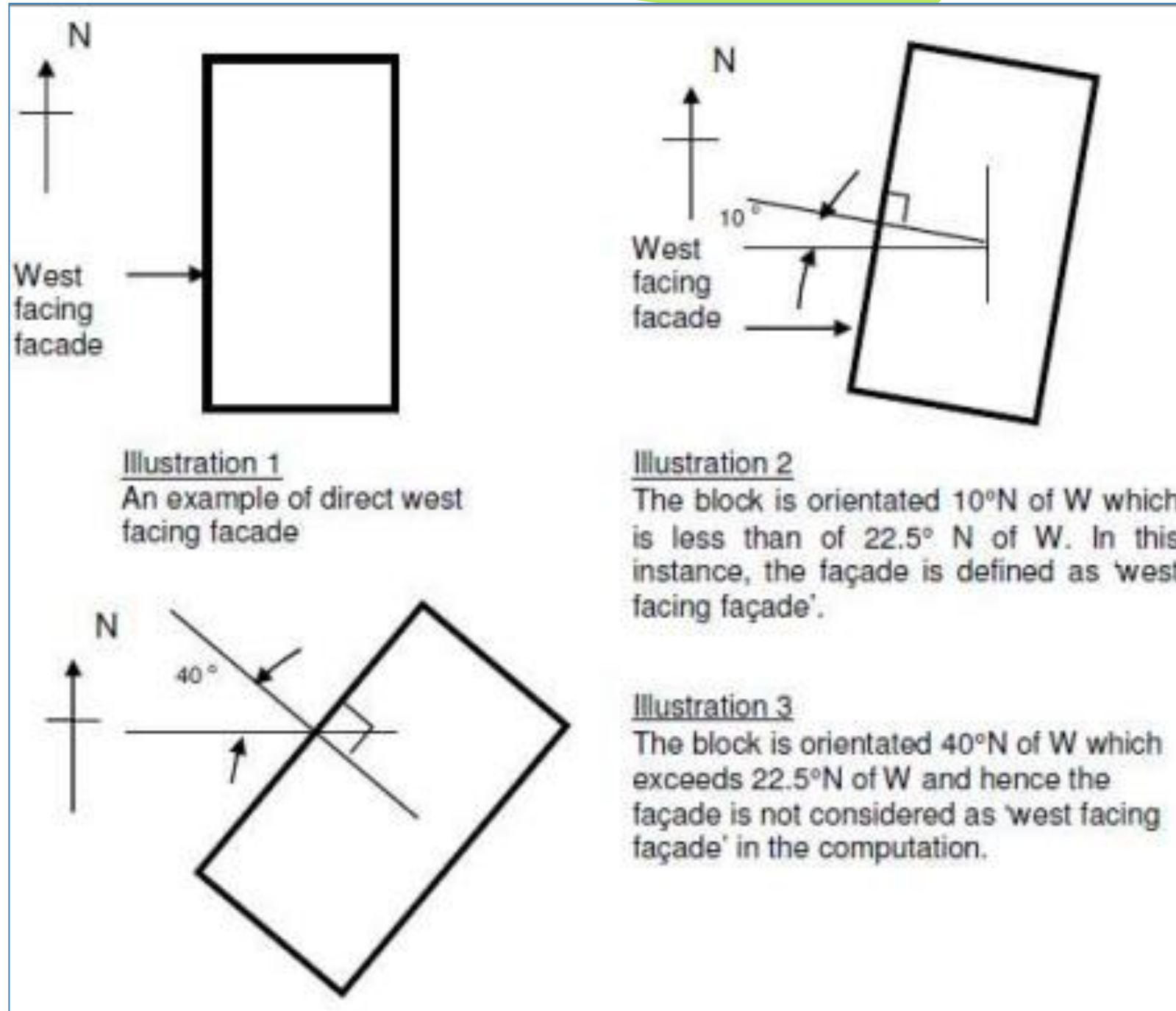
Parameters	Requirements
OTTV	Max 50 W/m ²
RTTV	Max 25 W/m ²
Roof U-Value	Light : Max 0.4 W/m ² K
	Heavy : Max 0.6 W/m ² K

Passive Design



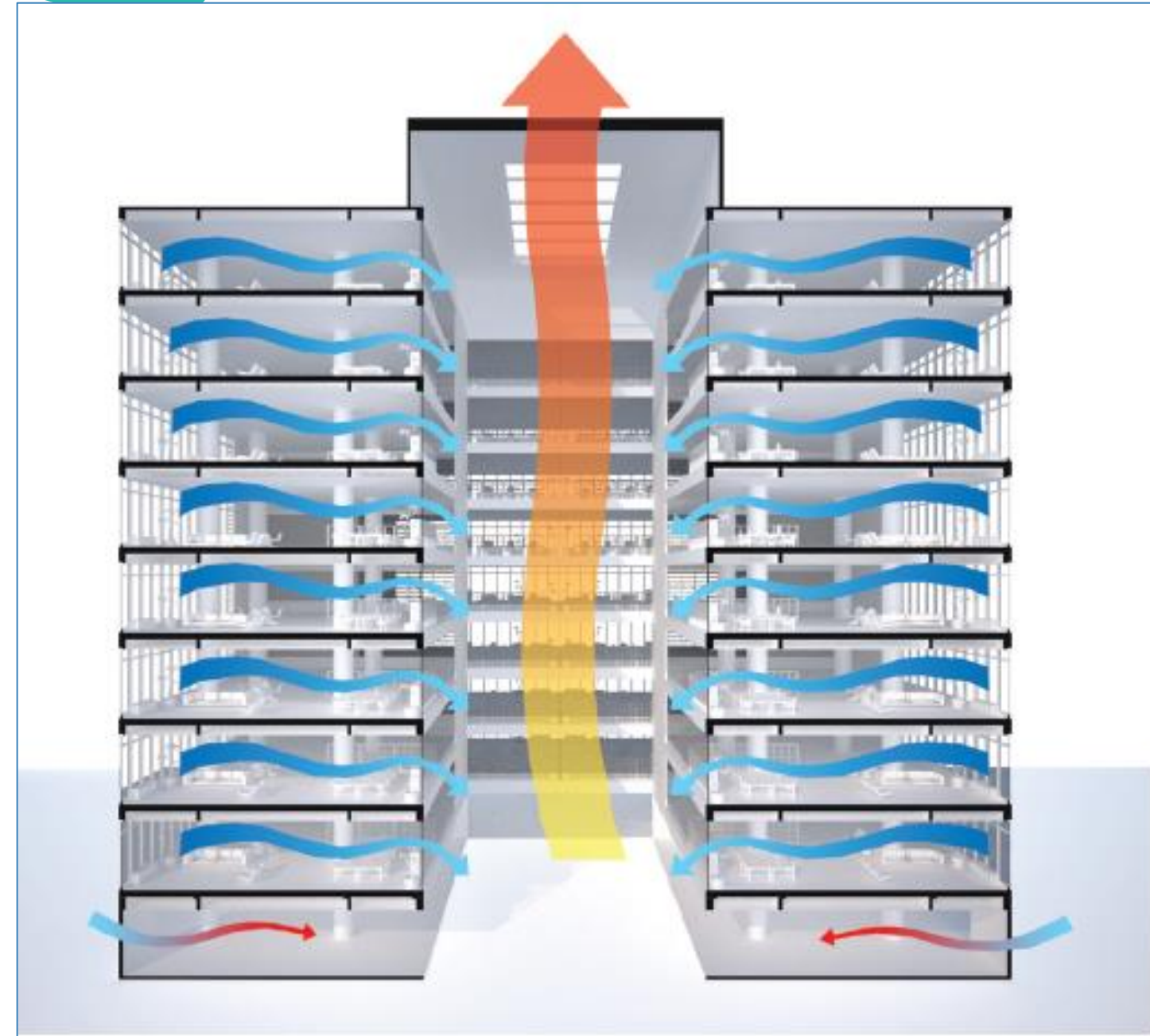
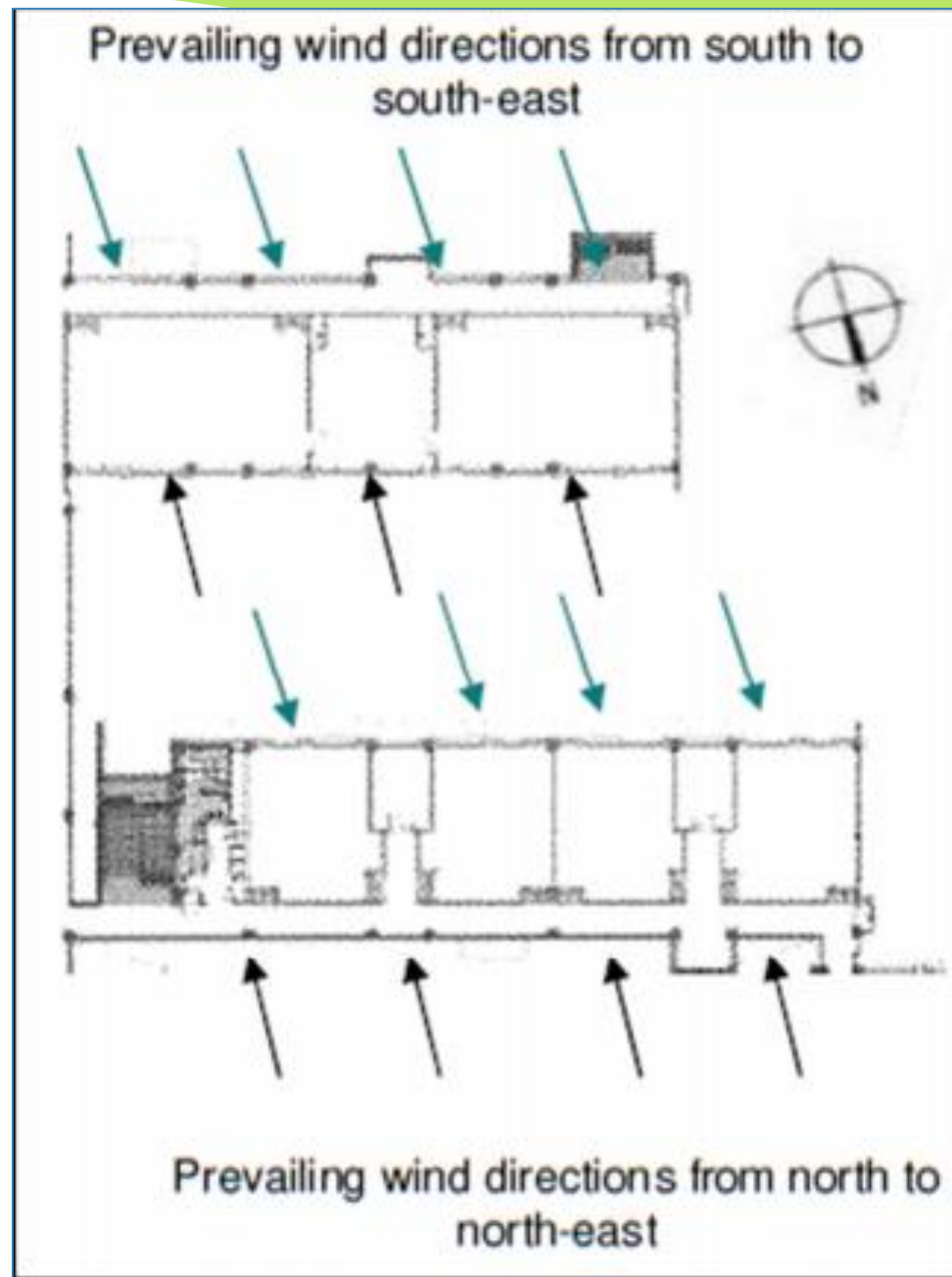
Passive Design – Orientation

Minimize West Facade



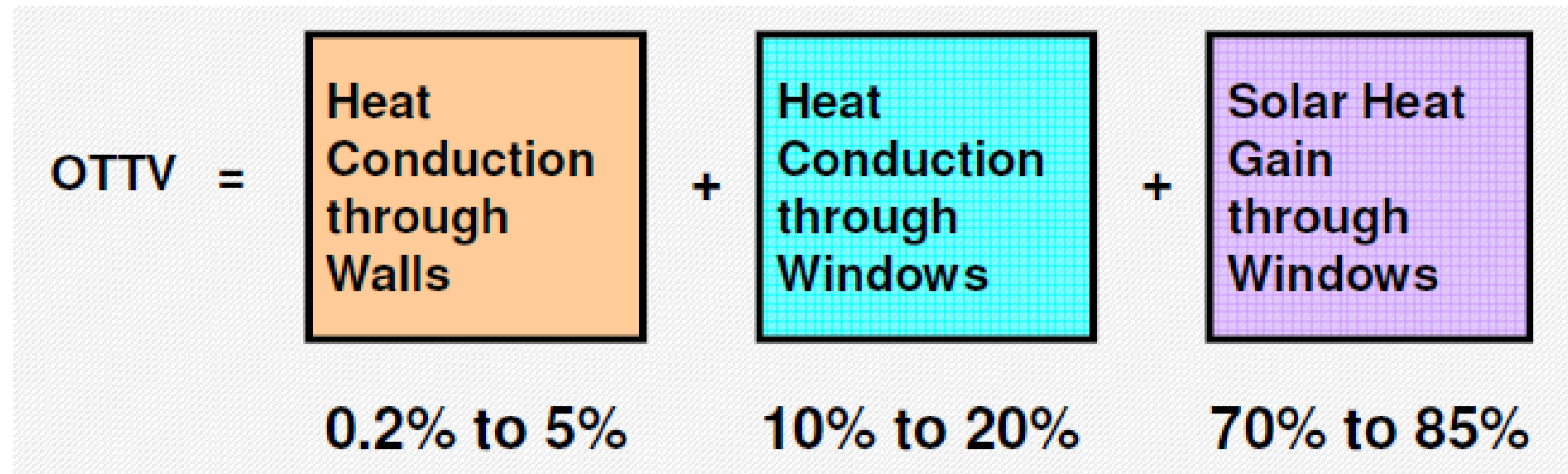
Appropriate positioning of building core can result in energy savings of 3-5% whilst maintaining overall NLA.

Passive Design – Natural Ventilation



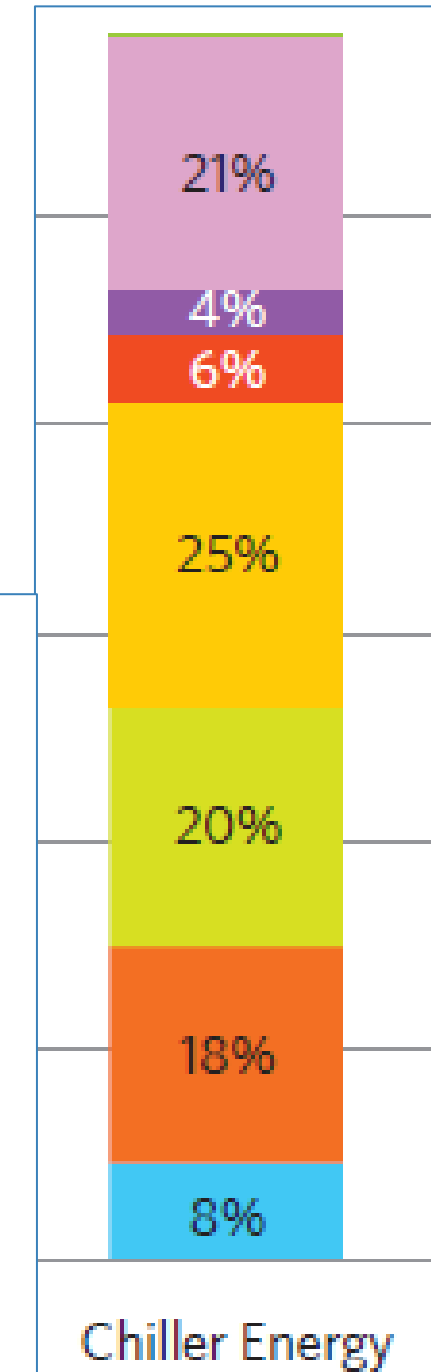
Cross Ventilation and Stack Ventilation

Passive Design – Thermal transfer through facade



Overall thermal transfer value (OTTV) is a measure of the average heat gain into the building through the building envelope

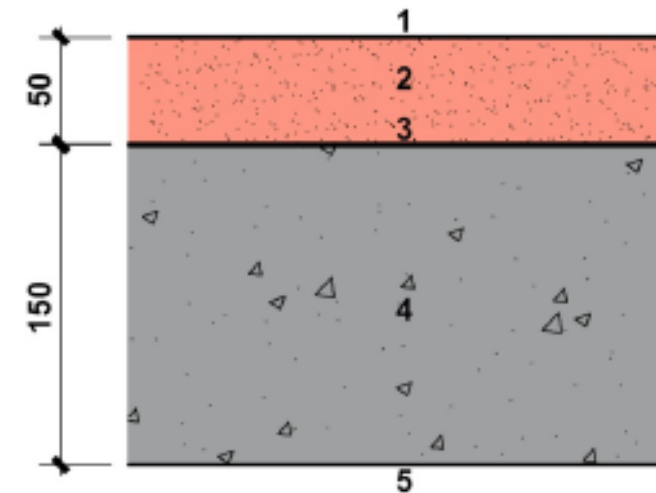
- Fresh Air Sensible Gain
- Dehumid Fresh air
- Dehumid People Latent Gain
- People Gain
- External Conduction Gain
- Solar Gain
- Lighting Gain
- Small Power Gain
- Fan Gain



Passive Design – Thermal transfer through roof

Roof Weight Group	Maximum U-Value (W/m²K)
Light (Under 50 kg/m²)	0.4
Heavy (Above 50 kg/m²)	0.6

R.C. Roof without insulation

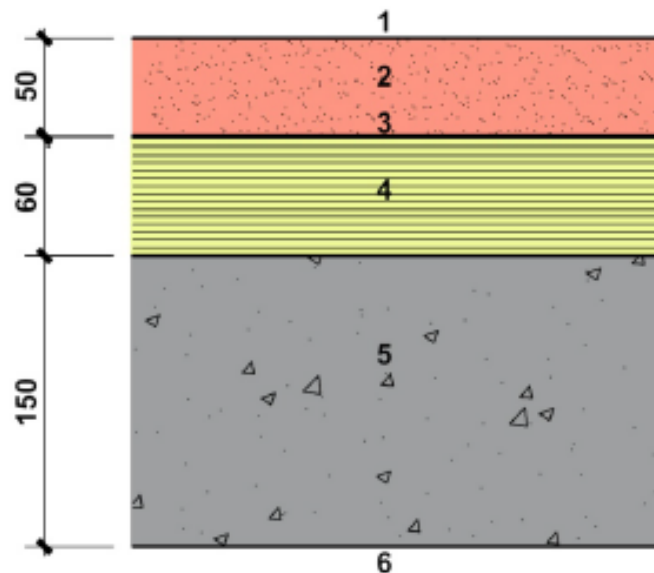


- 1 External surface
- 2 Cement screed, 50mm thk
- 3 Waterproof membrane
- 4 R.C Slab, 150mm thk
- 5 Internal surface

	THERMAL CONDUCTIVITY (W/mk)	R THERMAL RESISTANCE (m²k/W)
1	-	0.040
2	0.41	0.122
3	0.23	0.004
4	2.30	0.065
5	-	0.130
Total R		0.362

$$\begin{aligned}
 \text{U-Value} &= \frac{1}{R} \\
 &= \frac{1}{0.362} \\
 &= 2.762 \text{ W/m}^2\text{k}
 \end{aligned}$$

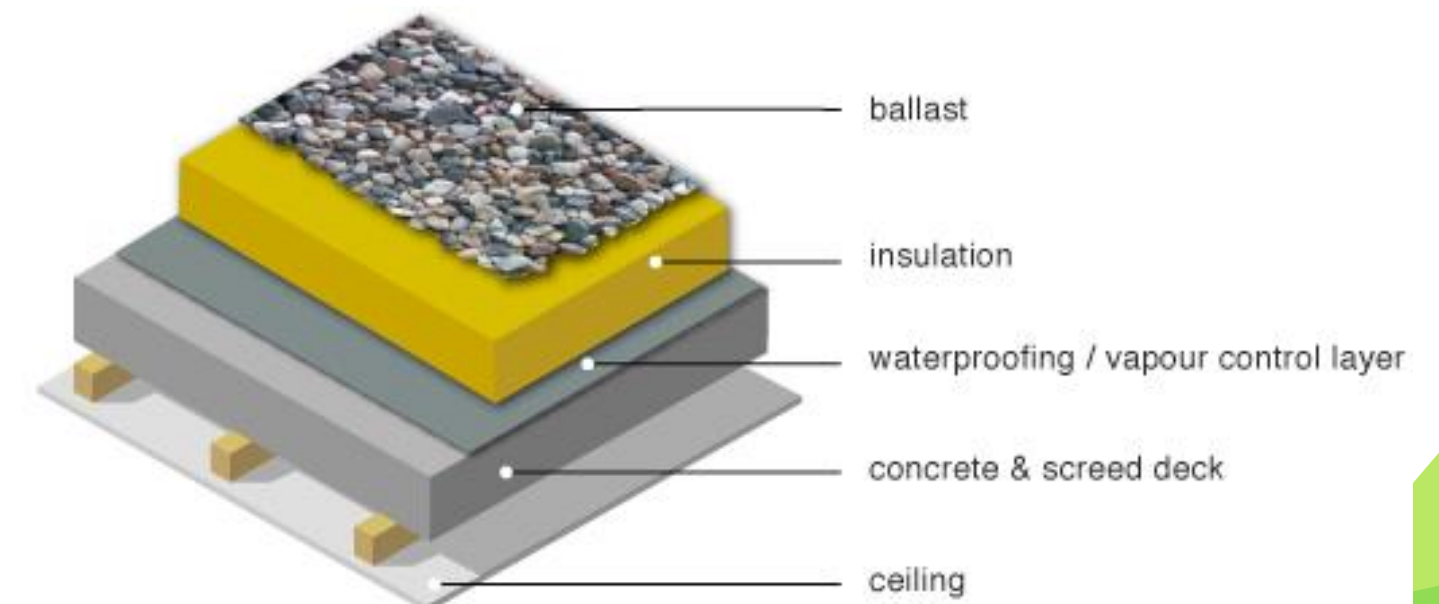
R.C. Roof with insulation



- 1 External surface
- 2 Cement screed, 50mm thk
- 3 Waterproof membrane
- 4 Expanded polystyrene, 60mm thk
- 5 R.C Slab, 150mm thk
- 6 Internal surface

	THERMAL CONDUCTIVITY (W/mk)	R THERMAL RESISTANCE (m²k/W)
1	-	0.040
2	0.41	0.122
3	0.23	0.004
4	0.04	1.500
5	2.30	0.065
6	-	0.130
Total R		1.860

$$\begin{aligned}
 \text{U-Value} &= \frac{1}{R} \\
 &= \frac{1}{1.861} \\
 &= 0.537 \text{ W/m}^2\text{k}
 \end{aligned}$$



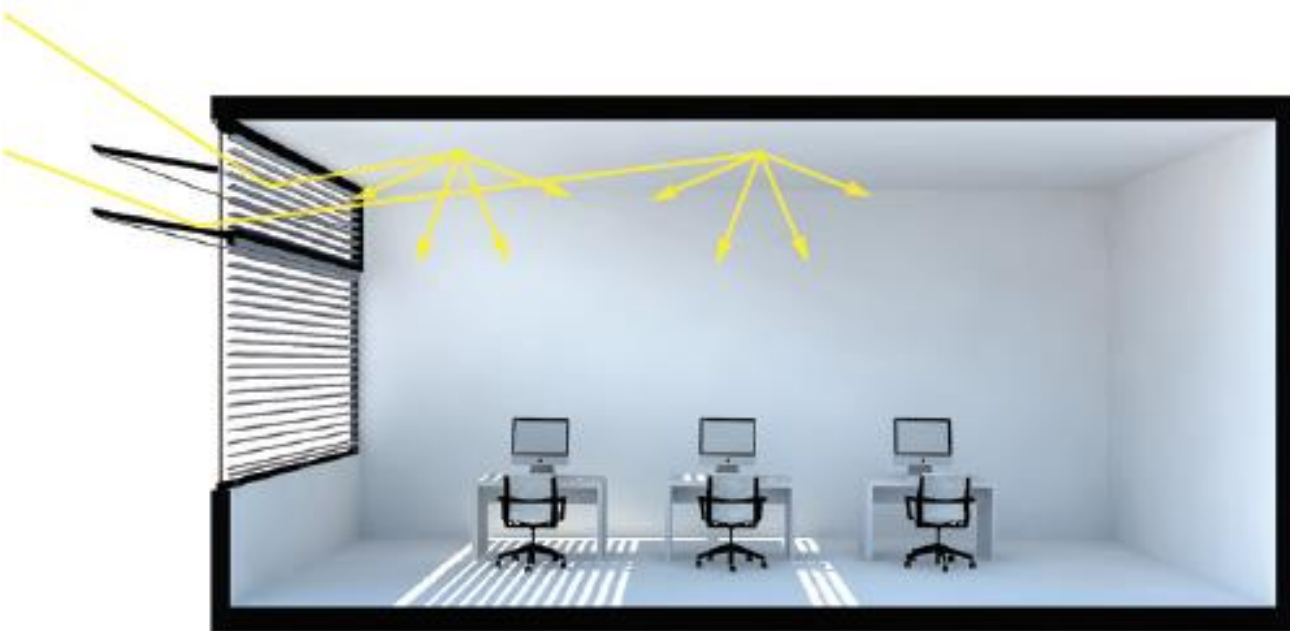
Passive Design – Daylight Harvesting

$$DF = \frac{E_{internal}}{E_{external}} \times 100\%$$

Where:

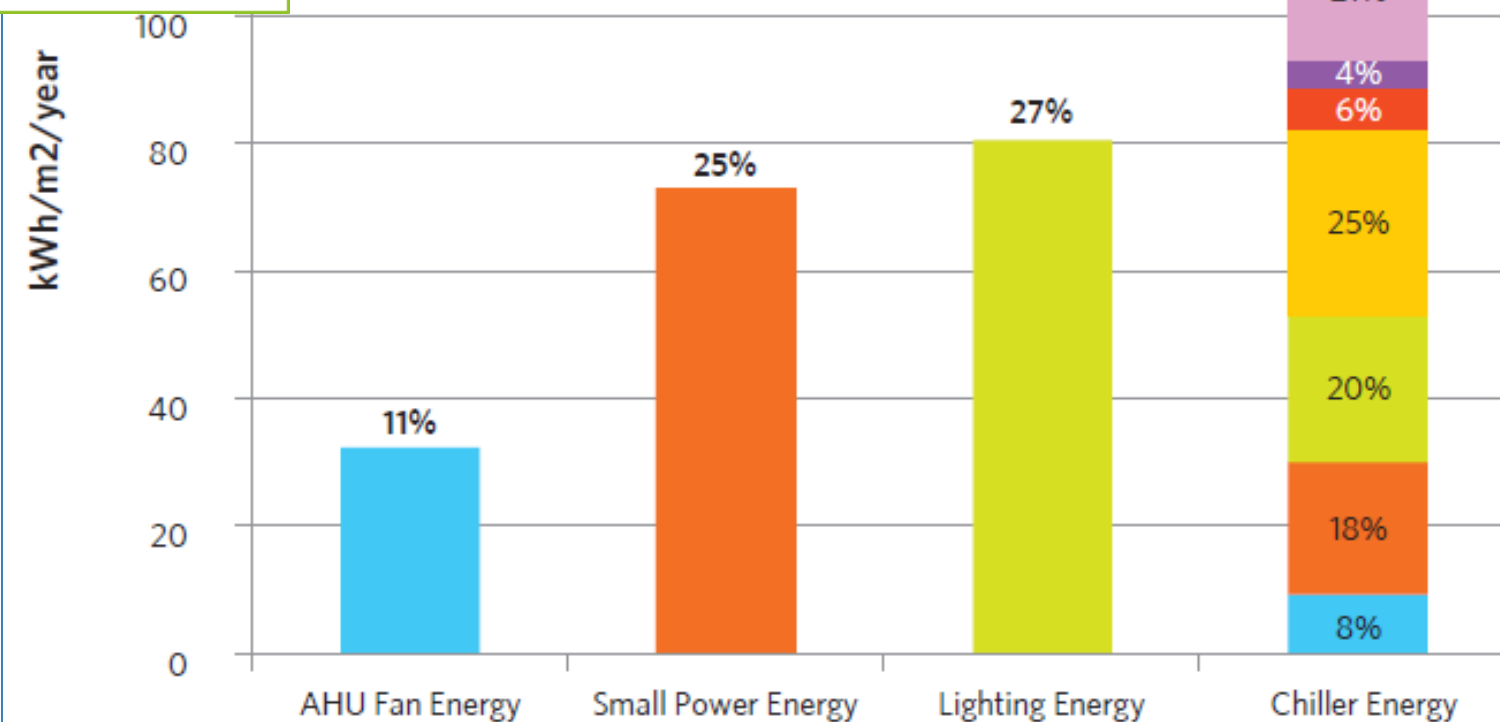
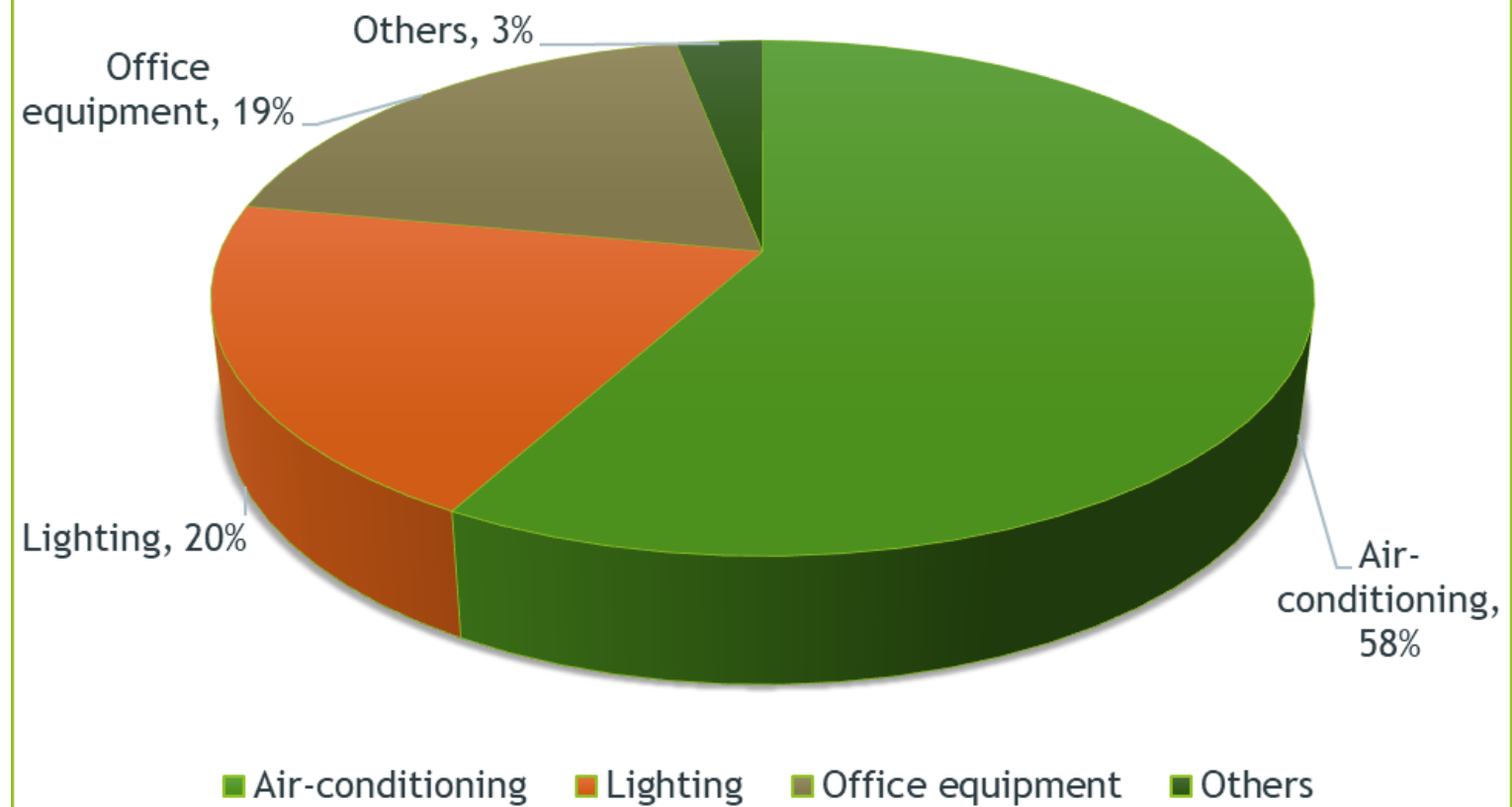
- DF** = Daylight Factor (%)
E_{internal} = Horizontal Illumination of reference point indoor (Lux)
E_{external} = Horizontal Illumination of unobstructed point outdoor in an overcast sky condition (Lux)

DF (%)	Lighting	Glare	Thermal comfort
> 6.0	Intolerable	Intolerable	Uncomfortable
3.5 - 6.0	Tolerable	Uncomfortable	Tolerable
1.0 - 3.5	Acceptable	Acceptable	Acceptable
< 1.0	Perceptible	Imperceptible	Acceptable



Active Design

Typical office building energy mix



- Fresh Air Sensible Gain
- Dehumid Fresh air
- Dehumid People Latent Gain
- People Gain
- External Conduction Gain
- Solar Gain
- Lighting Gain
- Small Power Gain
- Fan Gain

Active Design – Lighting



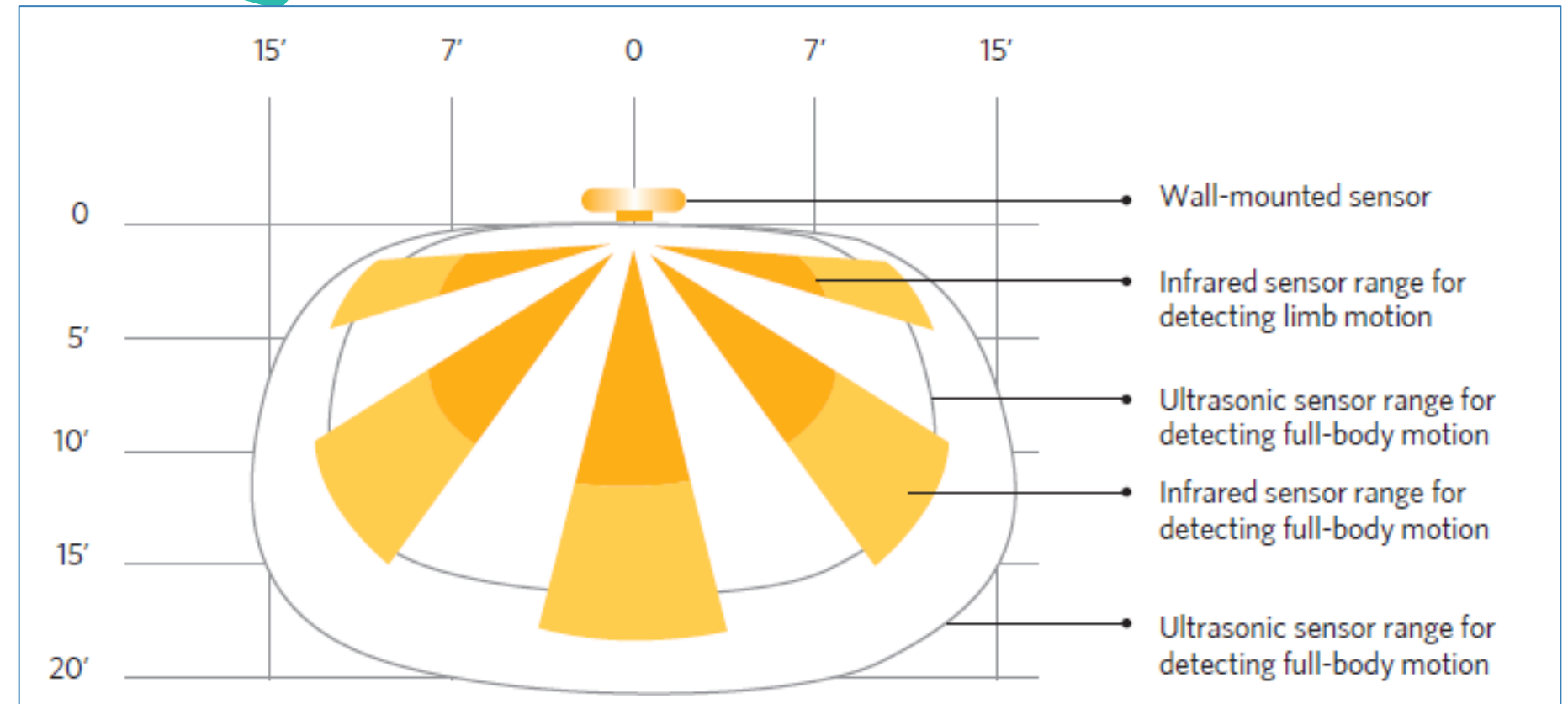
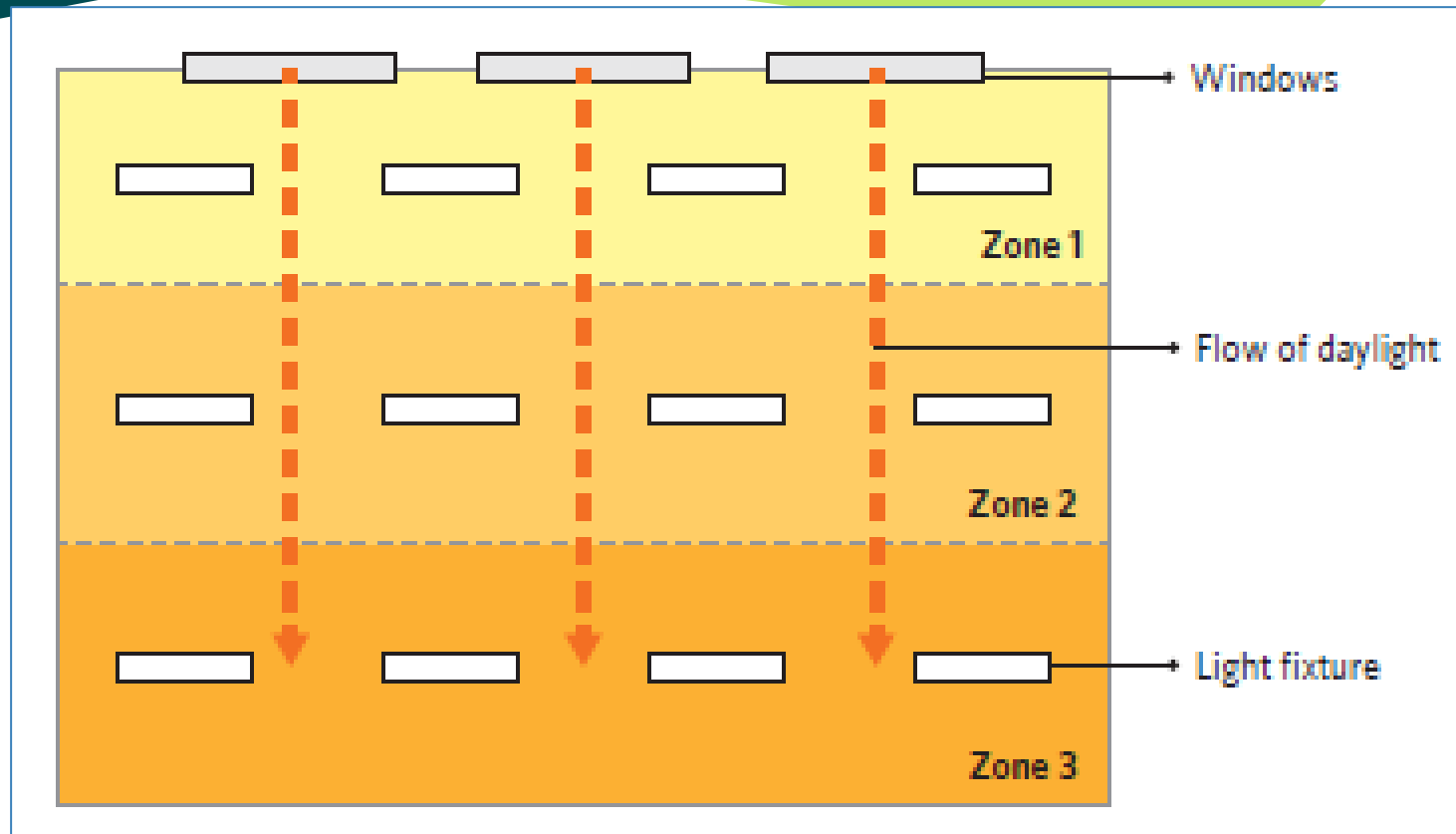
**T5 Lamps
with high
frequency
ballast**

LEDs



Type of Usage	Max. lighting power intensity (W/m ²)
a) Lighting for infrequently used area:	
- Minimum service illuminance	3 W/m ²
- Interior walkway and car-park	5 W/m ²
- Hotel bedroom	5 W/m ²
- Lift interior	5 W/m ²
- Corridor, passageways, stairs	5 W/m ²
- Escalator, traveller	6 W/m ²
- Entrance and exit	5 W/m ²
- Staff changing room, locker and cleaner room, cloak room, lavatories, stores.	5 W/m ²
- Entrance hall, lobbies, waiting room	5 W/m ²
- Inquiry desk	11 W/m ²
- Gate house	8 W/m ²
b) Lighting for working interiors	
- Infrequent reading and writing	8 W/m ²
- General offices, shops and stores, reading and writing	14 W/m ²
- Drawing office	14 W/m ²
- Restroom	6 W/m ²
- Restaurant, canteen, cafeteria	8 W/m ²
- Kitchen	11 W/m ²
- Lounge	6 W/m ²
- Bathroom	6 W/m ²
- Toilet	5 W/m ²
- Bedroom	5 W/m ²
- Class room, library	18 W/m ²
- Shop/supermarket/department store	24 W/m ²
- Museum and gallery	11 W/m ²
- Proof reading	18 W/m ²
- Exacting drawing	40 W/m ²
- Detailed and precise work	60 W/m ²

Active Design – Lighting

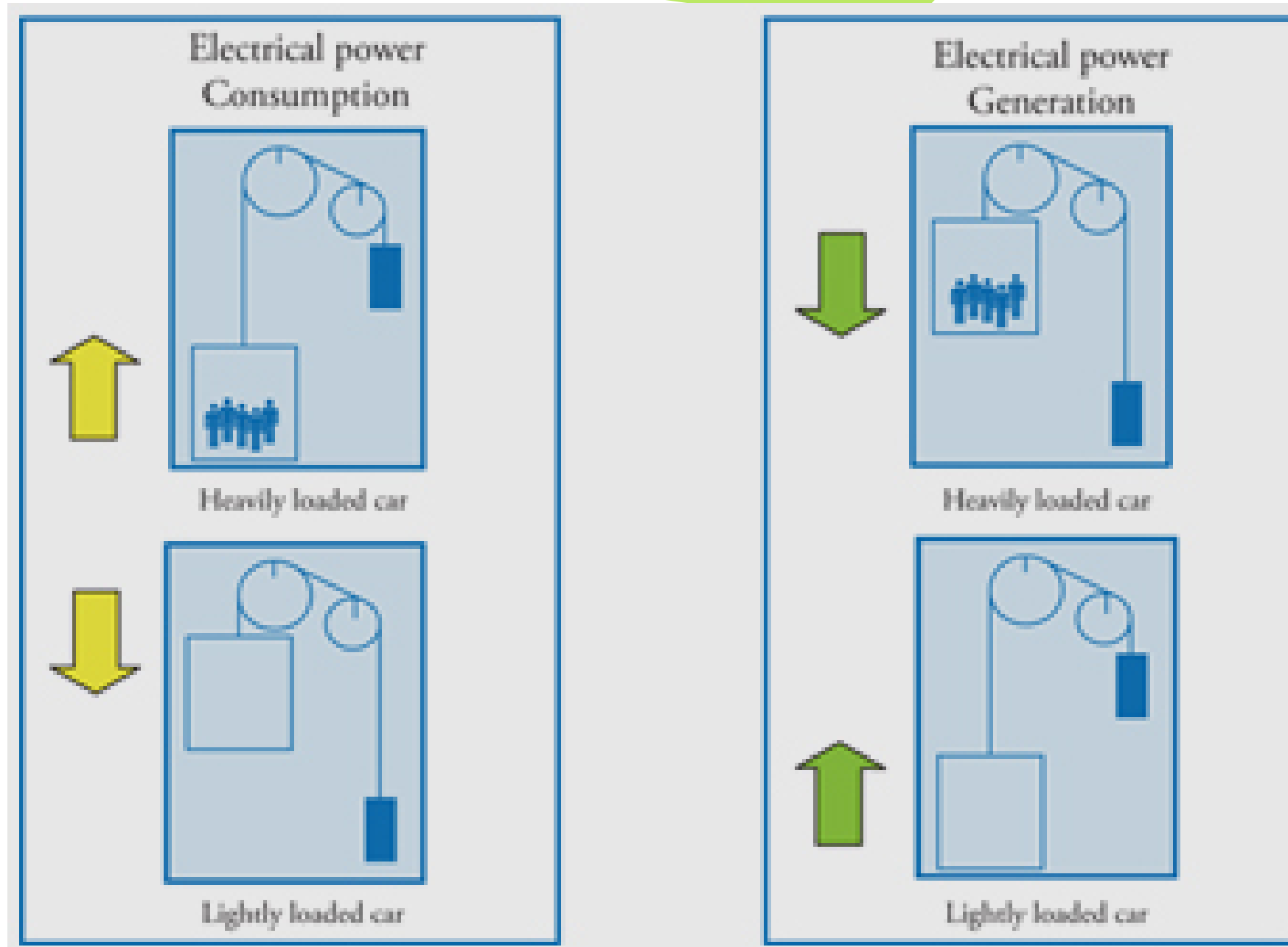


Zoning of lighting and use of motion sensors / photo sensors to ensure accurate demand based lighting usage.

Switched lighting zones to not exceed 100m²



Active Design – Lifts

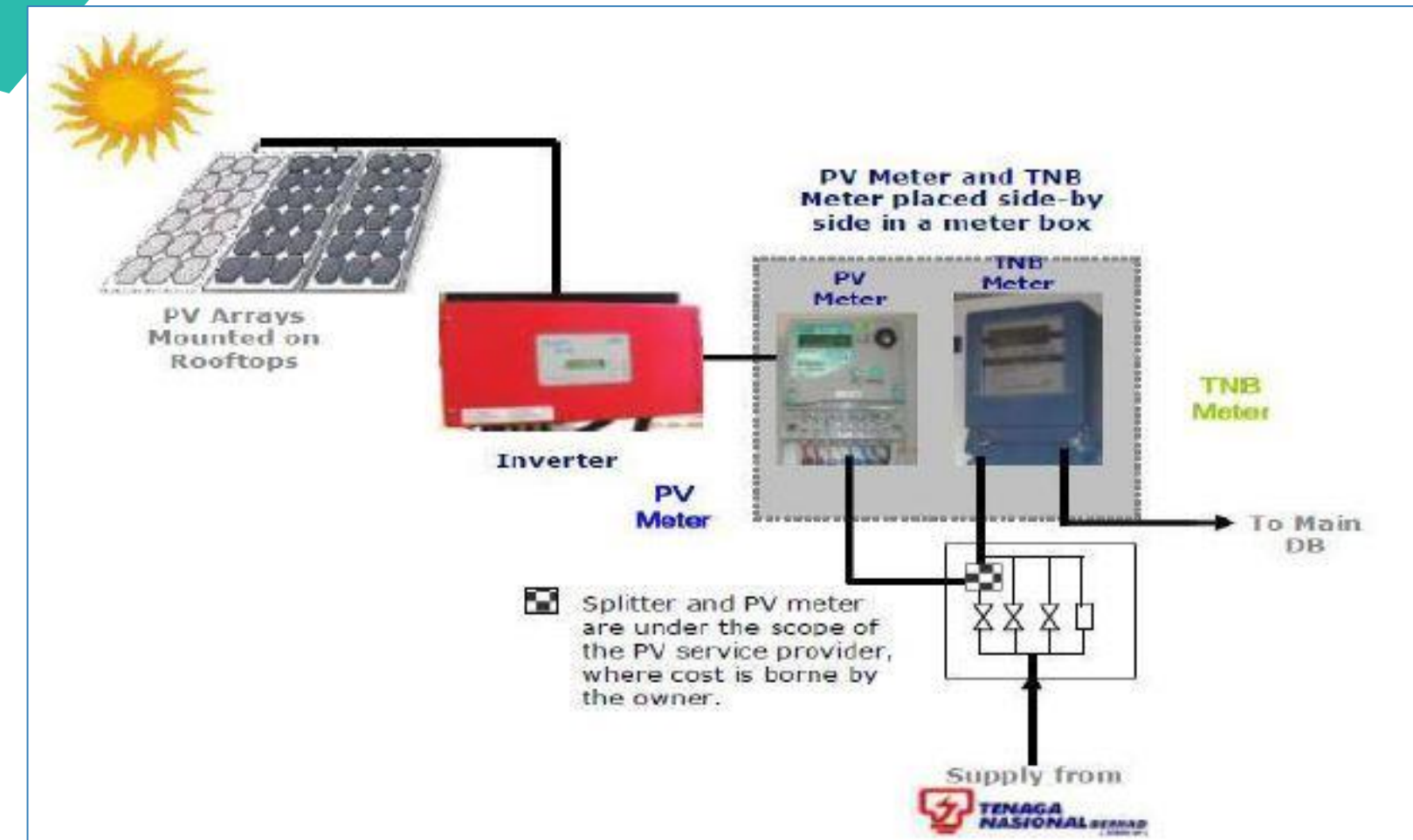


Encourage the use of energy efficient lifts and escalators.

- (a) Lifts with the following energy efficient features:
- AC variable voltage and variable frequency (VVVF) motor drive or equivalent.
 - Sleep mode features or equivalent.
- (b) Escalators with energy efficient features such as motion sensors.

Regenerative VVVF drive lifts to allow braking energy to be injected back to power grid. Can reduce energy consumption by up to 20%.

Active Design – Solar PV

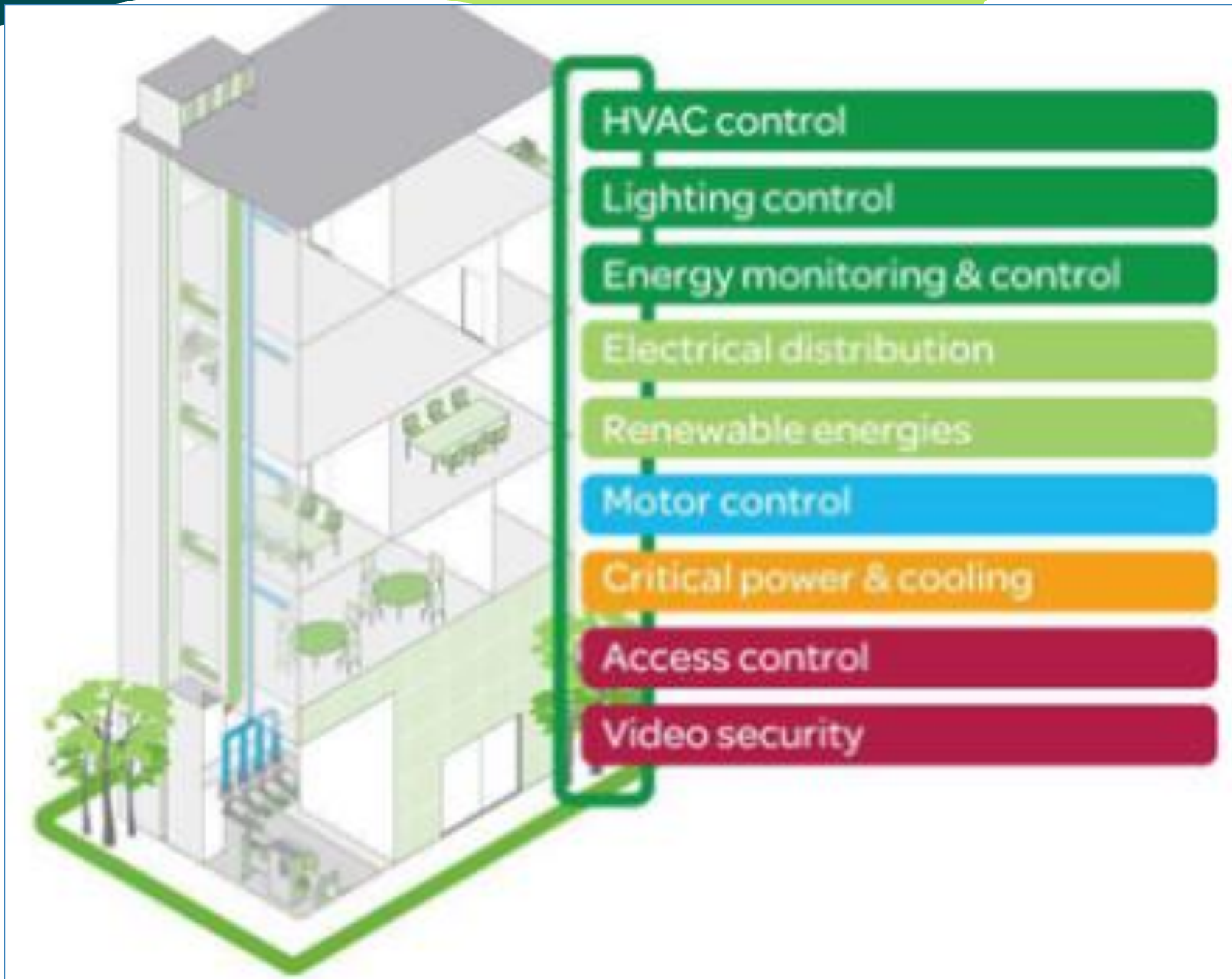


Target of 20% of all electricity generated in Malaysia to be from solar PV by 2025.

Net metering – TNB / SEDA

Installation cost of between RM3,000 – RM5,000 per kWp.

Active Design – Energy Management System (EMS)



The MS 1525 recommends that the EMS should be supplied with a full complement of energy management features including but not limited to:

- a) Direct digital control algorithms
- b) Starting and stopping of equipment based on a time schedule
- c) Temporary override of the time schedules to accommodate changes in usage
- d) Chilled water leaving and/or entering temperature reset algorithm
- e) Control loop set point reset algorithm
- f) Chiller sequencing and optimisation algorithm
- g) Demand limiting algorithm
- h) Duty cycling algorithm

**Requirement in UBBL38A for
air-conditioned buildings above
4000m²**

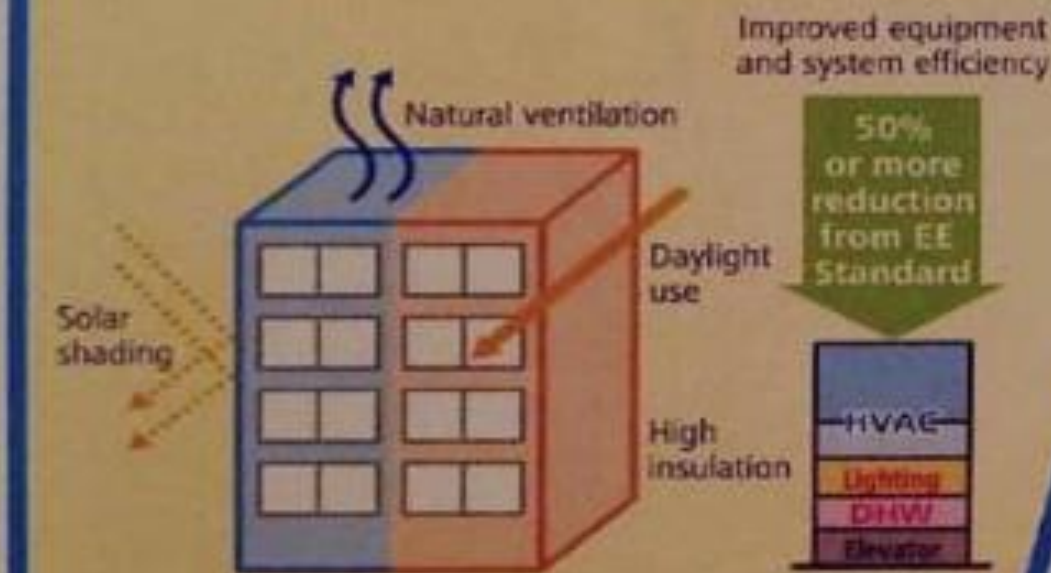
Zero Energy Building (ZEB)

Definition of ZEB

The concept of ZEB has been expanded to the "ZEB Series" which can be aimed for according to actual conditions. The first step is to aim for super-low energy buildings which are defined as "ZEB Ready", and then aim for "Nearly ZEB" and above.

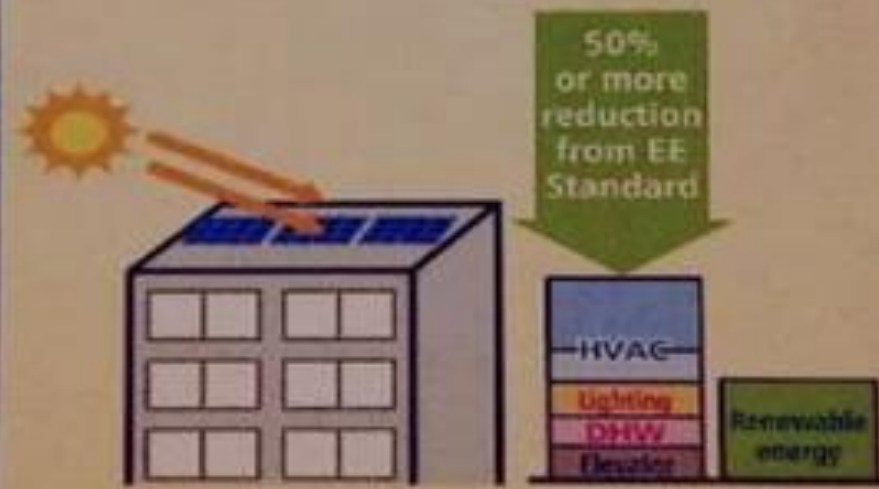
50% or more energy saving

ZEB Ready



75% or more net energy saving

Nearly ZEB



100% or more net energy saving

ZEB



Water Efficiency

Average Malaysian uses 220 to 240 litres of water per day. 32% more than UN recommended guidelines of 150 litres of water per day.

New law being drafted to make Water Efficient Product Labelling Scheme (WEPLS) mandatory for all water fittings.

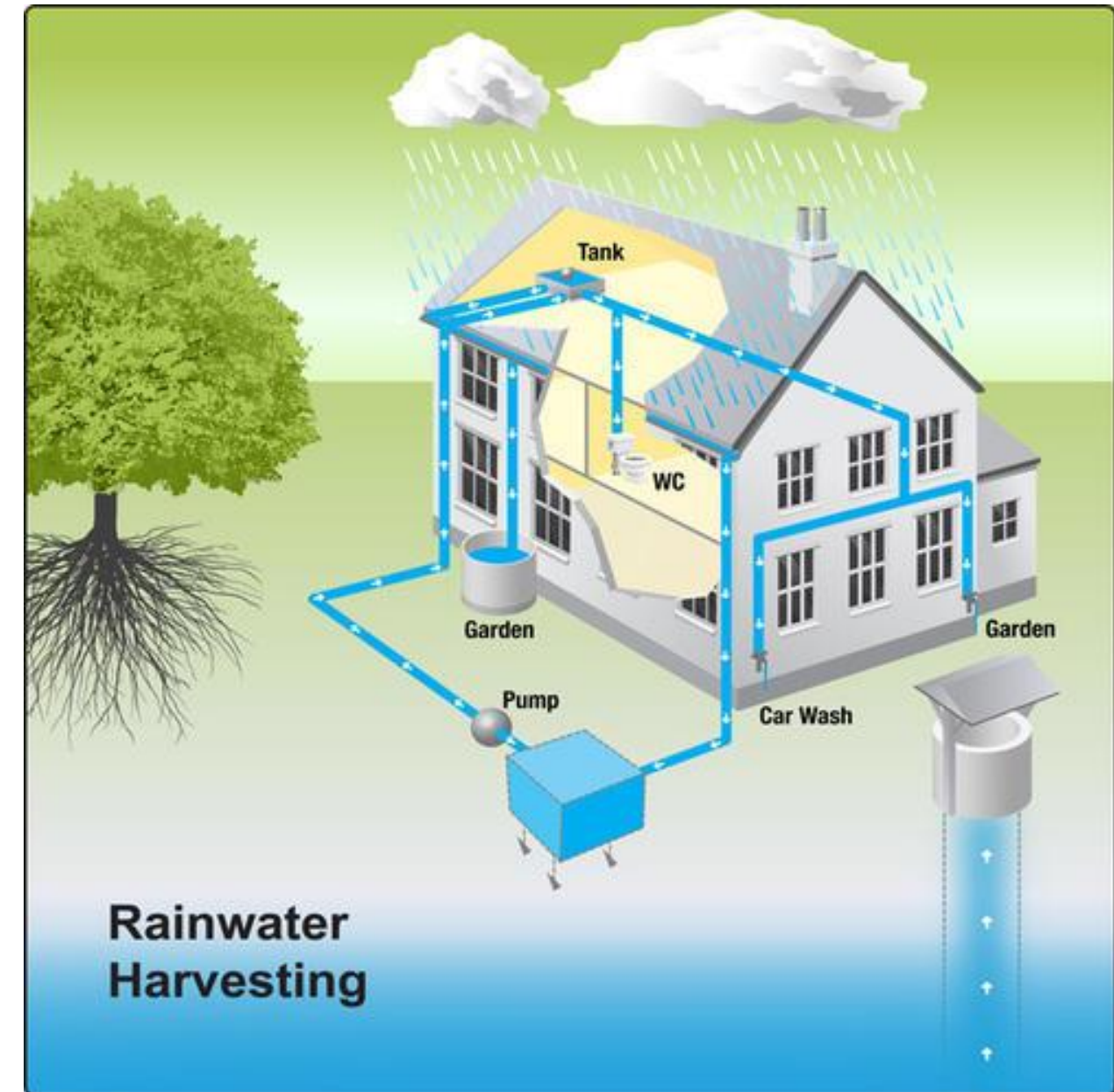
Products covered under WEPLS include basin tap, sink tap, shower tap and ablution tap, water closet, urinal equipment, shower heads and clothes washing machine.



Rainwater Harvesting

Guidelines for rainwater harvesting and utilization system (SPAHS) have been gazzeted by six (6) states namely Perak, Selangor, Malacca, Johor, Kelantan and Perlis as part of amendments to the UBBL.

All high rise buildings (including residential) and bungalows / semi detached houses with roof area exceeding 100sqm.

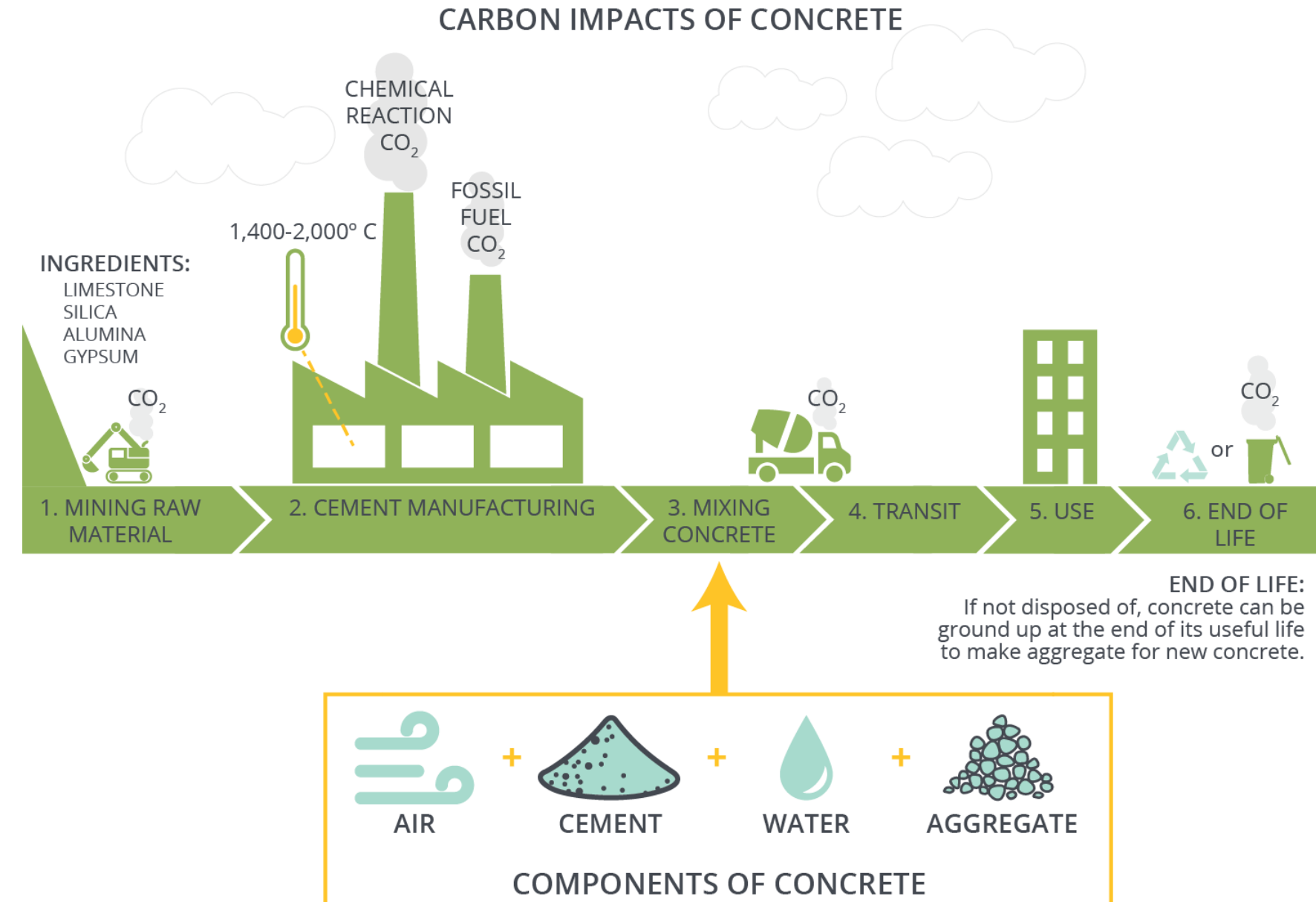


Environmental Protection

Around 4 billions tonnes of cement is produced globally on an annual basis. Cement production is responsible for 5% of global human produced CO2 emisisions.

Green concrete reduce ordinary Portland cement (OPC) with industrial by-products such as GGBS, silica fume and fly ash. This dramatically reduces the embodied carbon in concrete.

Recycled concrete aggregates.



©2018 2030 Inc./Architecture 2030. All Rights Reserved

Indoor Environment Quality

Improved indoor environment improves occupant wellbeing and productivity



Reduced sick building syndrome, absenteeism and presenteeism

Building Envelope

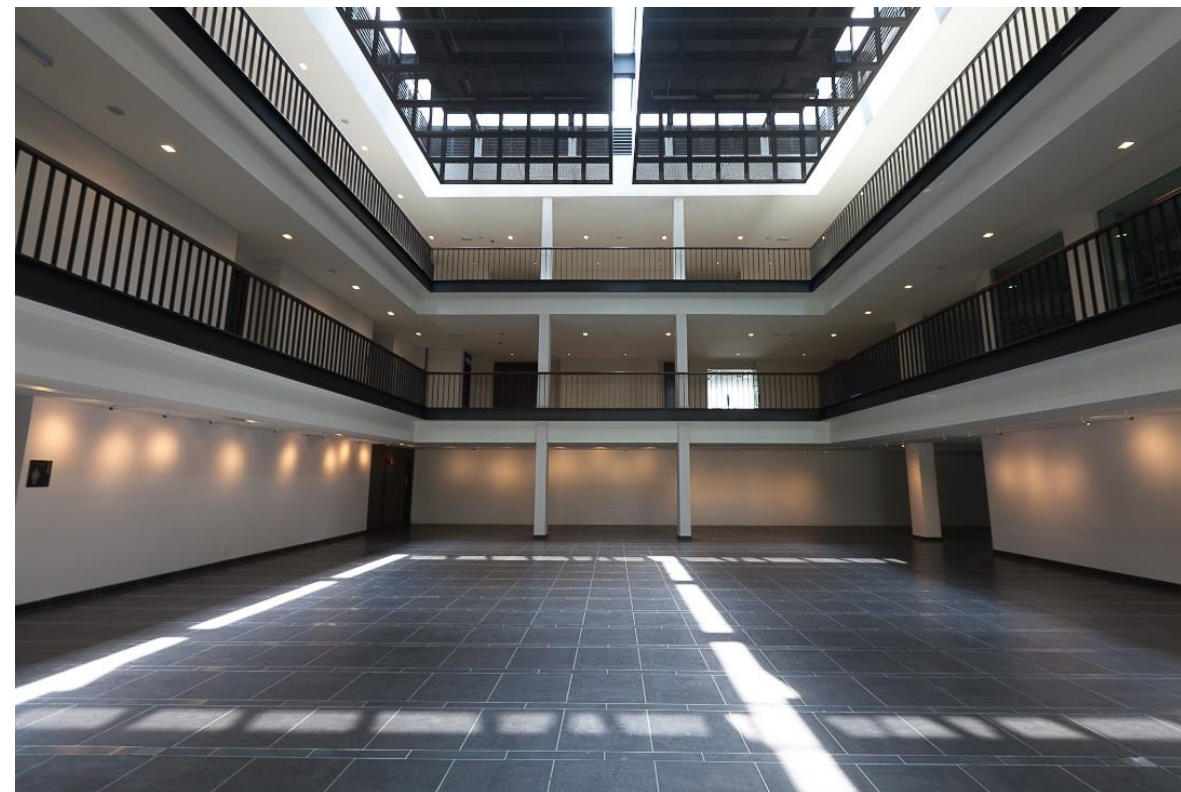
- Building is South facing
- West façade – accounts for 0.8% of total façade area.

Thermal Performance

- OTTV < 50 W/m²
- U-value of wall = 1.29W/m²K
- RTTV < 25W/m²
- Double Skin @ West facing wall

Energy Efficiency & EE Fittings

- Design simulation EEI = 109.64 kwh/m² / yr
- Actual EEI < 100 kwh/m² / yr (in 2019)



Natural Ventilation & Daylighting

- 63.6% have natural ventilation
- Stack ventilation
- Louvres at roof level
- Daylight factor of 1-3.5% is achieved in 50% of occupied spaces in the building.

Water Efficiency & Rainwater Harvesting System

- Water Meters
- Water efficient fittings -55% reduction achieved
- RWHS collection – 20,242 litres/ week (65% of usage)

Renewable Energy

- Installed capacity : 21kWp
- Average Energy collected :28 MWh
- Renewable Energy: approx. 5%



Wisma Rehda, Gold Certified

GreenRE Criteria (Non-Residential Building)

	Category	POINTS
Part 1	Energy Efficiency	114
Part 2	Water Efficiency	15
Part 3	Environmental Protection	45
Part 4	Indoor Environmental Quality	9
Part 5	Other Green Features	7
Part 6	Carbon Emission of Development	3
	Total	193

Minimum 30 points from Part 1 (capped at 50 points)

Minimum 20 points from Part 2-6 (capped at 50 points)

Maximum Score = 100 points



GreenRE Certified Buildings:

Cost Savings in the Long Term For A Sustainable Future

GreenRE certified buildings are resource efficient.

They use less water and energy, hence saving money & safeguarding the environment over the long run.

Lower life-cycle cost.

Summary of Cost Premium vs Energy Savings

GreenRE Rating	Bronze	Silver	Gold	Platinum
Cost premium (% of GDC)	0-1%	0-1.5%	2-5%	3-8%
Potential Energy Savings – Baseline is MS1525	10-20%	15-25%	25-35%	30–40%



WE STAND FOR
CLEANER
GREENER
& **SAFER**

tomorrow

For everything there is a reason.
the old things have passed away,
behold, new things have come....



Thank You

