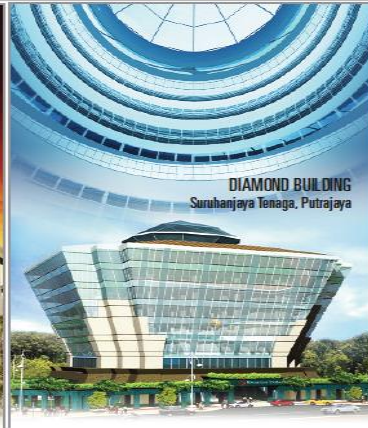
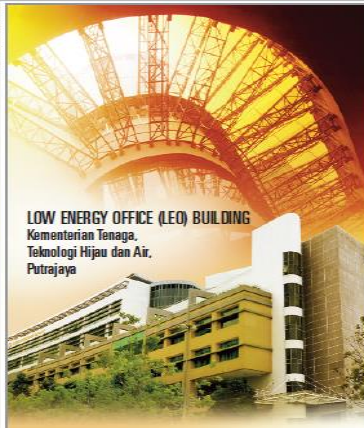
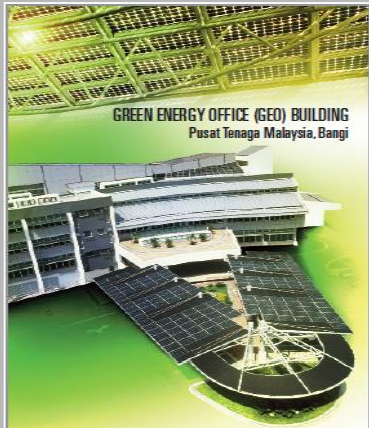


ZERO ENERGY BUILDING (ZEB) DEVELOPMENT GUIDE (VOLUNTARY) FOR BUILDING SECTOR IN MALAYSIA



Ready for Zero Energy Building (ZEB Ready)
Nearly Zero Energy Building (nZEB)
Net Zero Energy Building (NZEB)



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SUSTAINABLE ENERGY DEVELOPMENT AUTHORITY
(SEDA MALAYSIA)



THE ZERO ENERGY BUILDING (ZEB) GUIDE



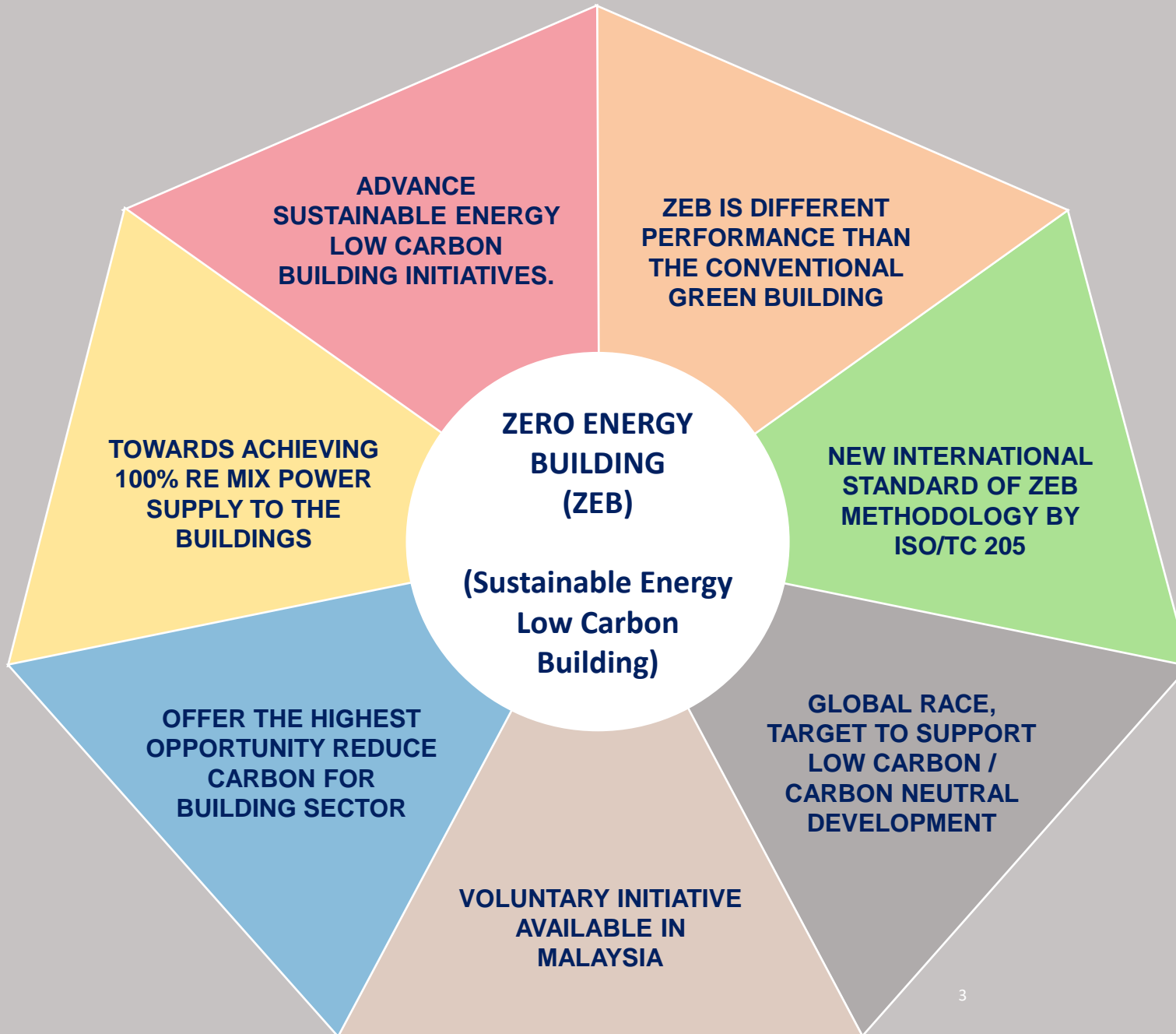
PART 1 : GENERAL GUIDE ON ZERO ENERGY BUILDING (ZEB)

- Basically will be in form of general guide.
- About ZEB (international & local development).
- Rational of ZEB development for Building Sector.
- New definition of ZEB family & Standard Methodology.
- Past & current ZEB project in Malaysia (and examples).
- ZEB implementation concept based on past and current local EE and RE in building projects (for new building & existing building).
- Defining the baseline and target.
- ZEB Performance Assessment & Certification (with examples).

PART 2 : TECHNICAL REFERENCE

- ISO ZEB Standard.
- EE and RE design strategies.
- Understanding the MS1525 : The building energy code.
- Establish baseline and target (with examples).
- EE & RE features & technologies.
- Examples of ZEB performance analysis.





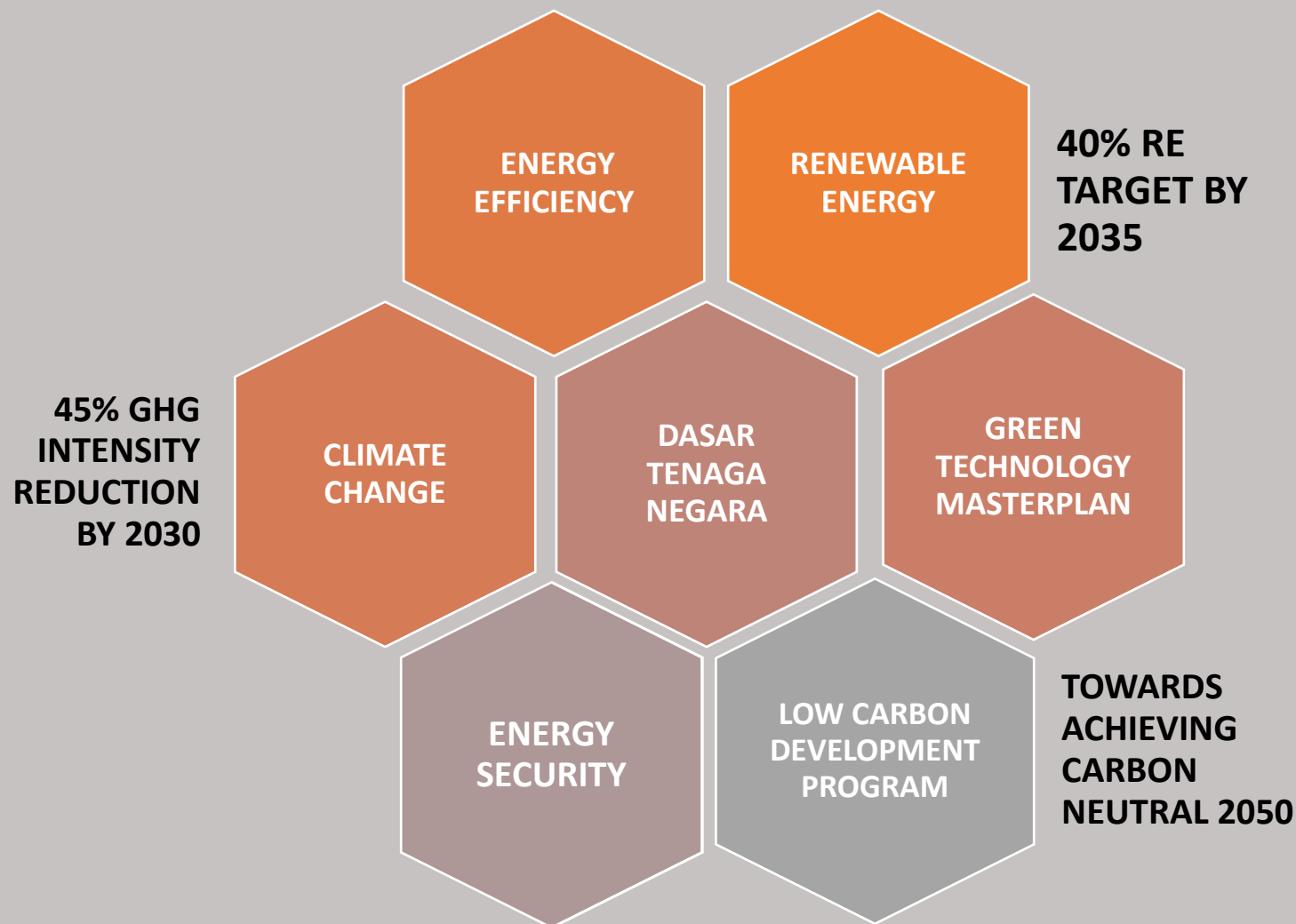
INTRODUCTION



- a **compilation of experience and the continuity** of past KeTSA's/agencies on EE in building design projects (The LEO, GEO & Diamond Building).



SUPPORTING THE CURRENT POLICIES



Sustainable Energy Low Carbon Building & Zero Energy Building provide support to current government policies.

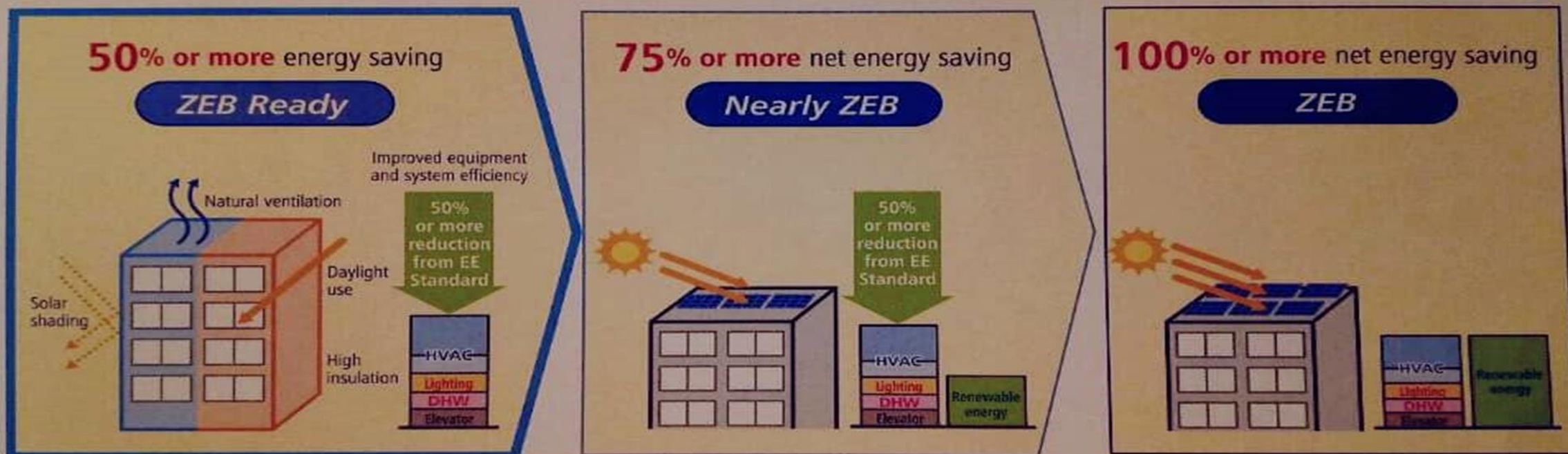


DEFINITION OF ZEB

ZEB METHODOLOGY STANDARD BY THE ISO TC 205 WG

Definition of ZEB

The concept of ZEB has been expanded to the "ZEB Series" which can be aimed for according to actual for 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.



ZERO ENERGY BUILDINGS (ZEB) SERIES

(Malaysia adopted the Japanese definition on ZEB with minor changes to suit local scenario)

initiative by SEDA Malaysia, collaboration with JASE-W Japan



ADOPT THE STANDARDISATION OF ZEB METHODOLOGY (ISO TC 205 WG)



1) At Planning Stage:

- Have **clear 'policy' or 'need statement'** to achieve ZEB.
- Step-by-step (Ready to go ZEB , Nearly ZEB & Net ZEB).

2) At Design Stage:

- To **select proper strategy** to achieve ZEB.
- Translate design to specifications : Design, materials, equipment certified by local / international standard.

3) At Construction stage:

- **According to specification.**
- To install the right selected materials / equipment.

4) At Commissioning stage:

- Commissioning **according to performance** requirement.

5) At Monitoring & Verifications stage:

- To **inspect the actual energy consumption.**
- To inspect the actual and compare to design energy consumption target.

6) At Reporting stage:

- To analyse the actual and design target energy system performance report, by simulation, etc.
- To **report the actual performance and ZEB achievement.**

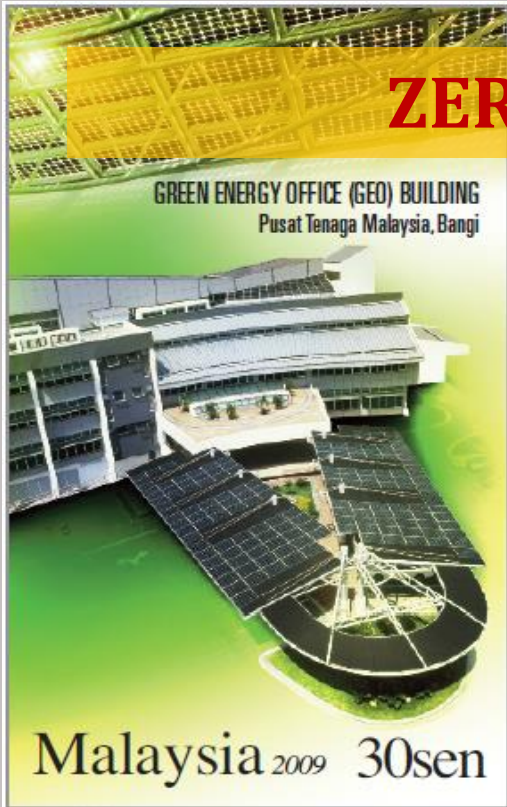
**Six Core Elements
for Standardisation
(ISO)**



PAST INTEGRATED EE BUILDING DESIGN PROJECT (ZERO ENERGY BUILDING IN MALAYSIA)

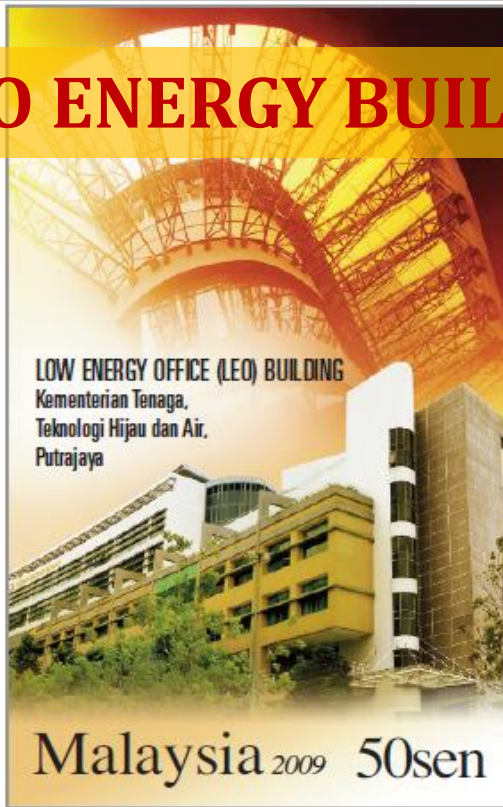


2007



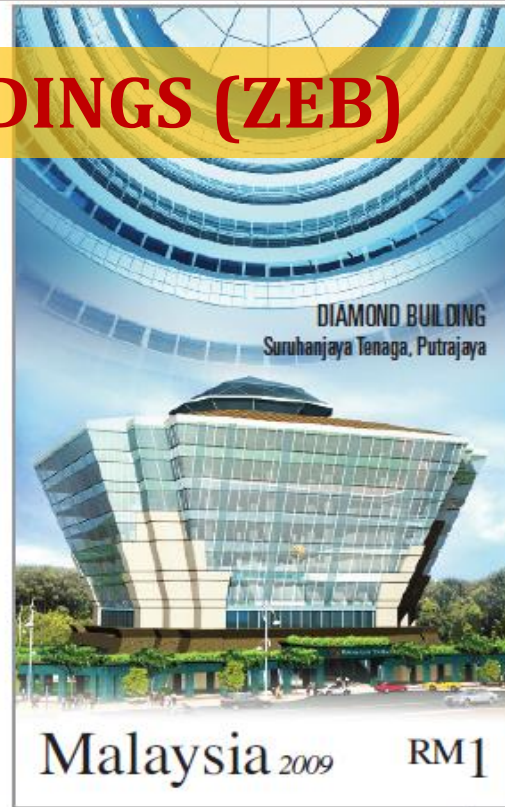
BEI = 65
Net BEI = 30 (86% reduce)
65 TonCO₂/year
GBI : Certified (2009)
ASEAN EA : 2009/2010/2011

2004



Net BEI = 114 (59% reduce)
1,490 TonCO₂/year
GBI : Silver (2011)
ASEAN Energy Award : 2006

2010



BEI = 85
Net BEI = 63 (70% reduce)
637 TonCO₂/year
GBI & GreenMark : Platinum (2011)
ASEAN EA : 2012

2011



- Net BEI = 15.6kWh/m²/year (more than 70% reduce)
- 384.2 TonCO₂/year
- SME Green Award 2012
- ASEAN Energy Award : 2012 :
1st Runner-up Tropical Buildings



OTHER TYPE OF BUILDINGS (ZERO ENERGY BUILDING IN MALAYSIA)



2007 & 2017

LOW CARBON HOUSE P14 @ PUTRAJAYA
(A Net Zero Energy Home)

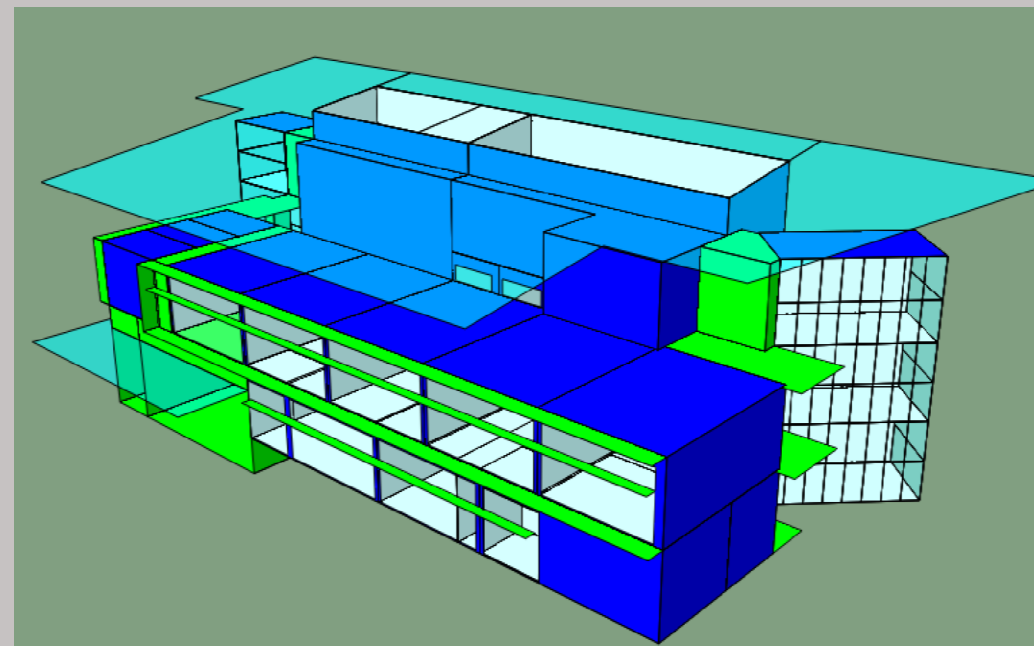


EE (61.4%) + RE (38.6%)
= 100% reduction
Net BEI = 0 kWh/m²/year

UniKL-BMI Living

2023 (NEW)

Lab SEDA RE Training Partner

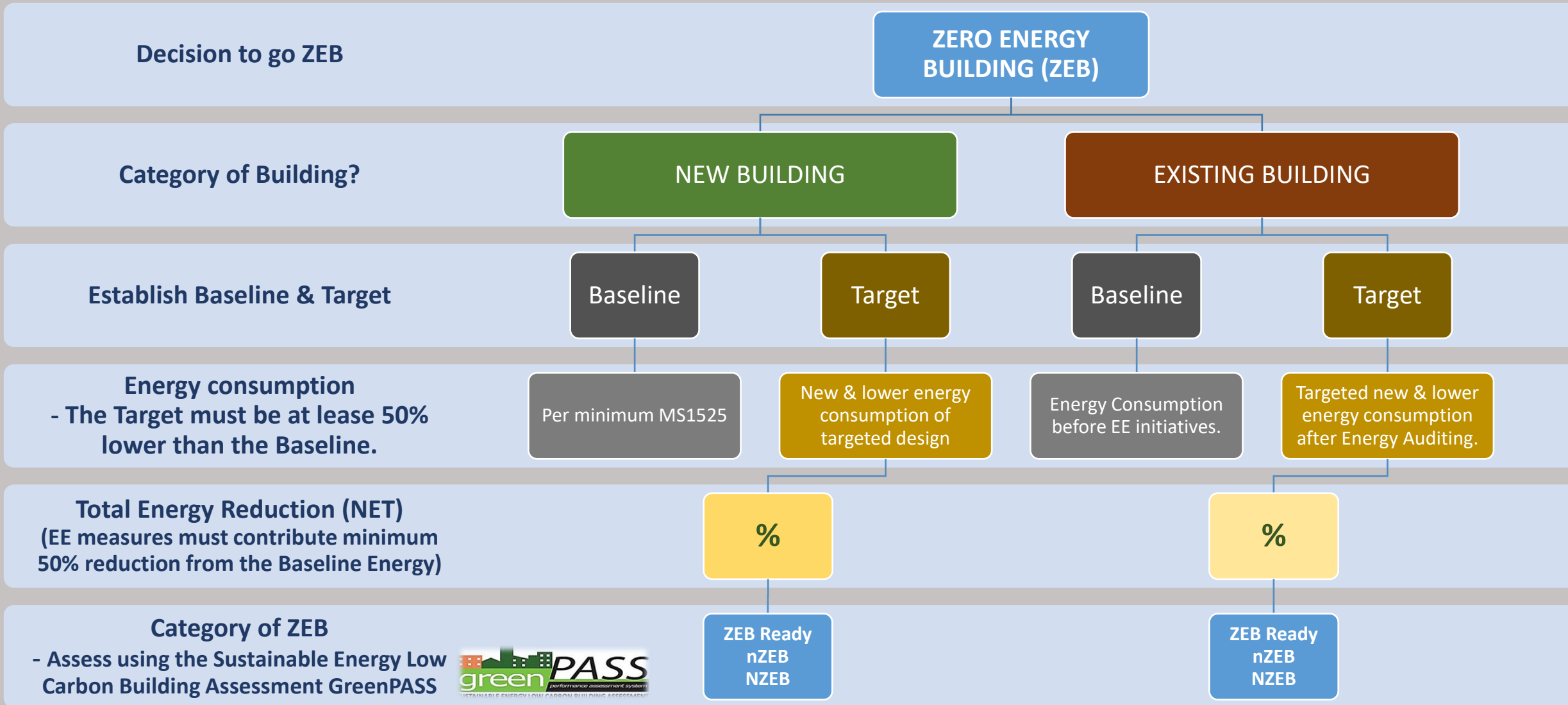


**A Positive Zero Energy
Building (Net ZEB Category)**

EE (51.3%) + RE (101.75%)
= 153% reduction
Net BEI = 0 kWh/m²/year



Implementation Concept of Zero Energy Building (ZEB)





Implementation Concept of Zero Energy Building (ZEB)



FOR NEW BUILDING

- Solar panel
- Shading
- Natural ventilation
- Building Envelope
- Insulation
- Building orientation
- Daylighting
- Material used

PASSIVE DESIGN FEATURES

ACTIVE DESIGN FEATURES

**FINAL OUTCOME
(ENERGY REDUCTION)**

- Lighting system
- Airconditioning
- Chillers
- Pumps & Fans
- Elevators
- Equipments & Plug loads
- Appliances.
- Building Energy Management System

**Only assess the final outcome,
the % of energy reduction**

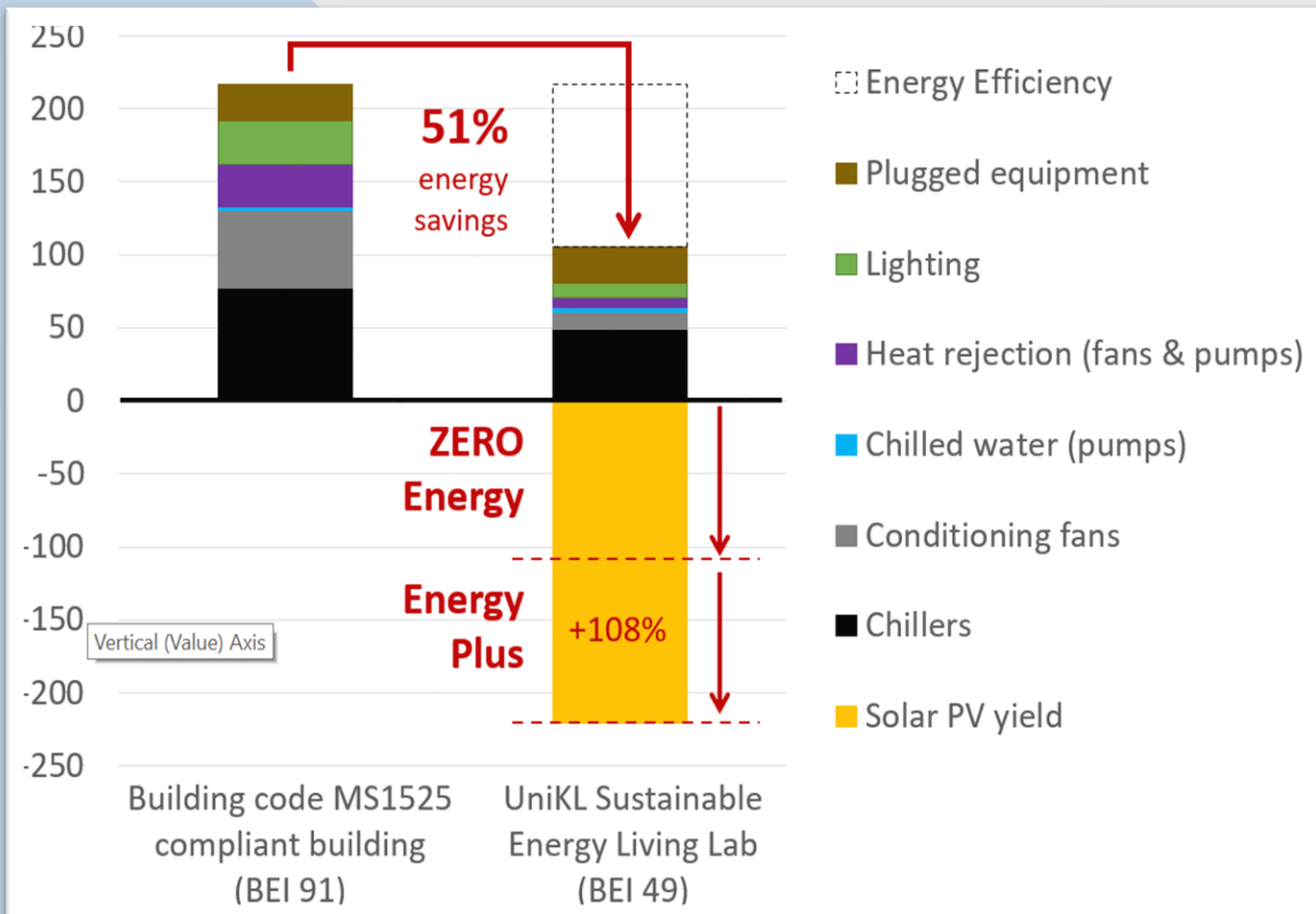




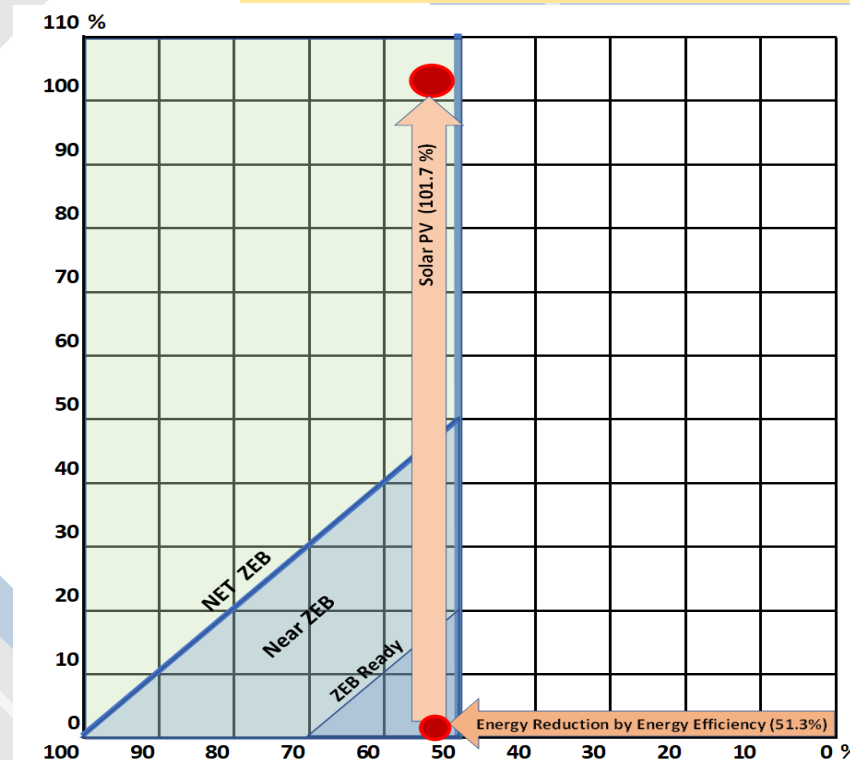
Implementation Concept of Zero Energy Building (ZEB)



Energy Consumption (MWh/year)



EXAMPLE FOR NEW BUILDING



Net Zero Energy (153% reduction):

- Reduction by EE = 51.3%.
- Reduction by RE = 101.73%



Implementation Concept of Zero Energy Building (ZEB)



FOR EXISTING BUILDING

PASSIVE FEATURE

- Solar panel
- Shading
- Natural ventilation
- Building Envelope
- Insulation
- Building orientation
- Daylighting
- Material used

OPERATION

- Monitoring & reporting
- Training & Capacity building
- Retrofitting
- Energy Auditing
- Energy Management
- Operation & Maintenance

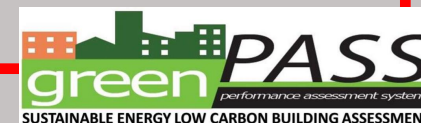
RETROFITTING & FINE TUNING

ACTIVE FEATURE

- Lighting system
- Airconditioning
- Chillers
- Pumps & Fans
- Elevators
- Equipments & Plug loads
- Appliances.
- Building Energy Management System

**FINAL OUTCOME
(ENERGY REDUCTION)**

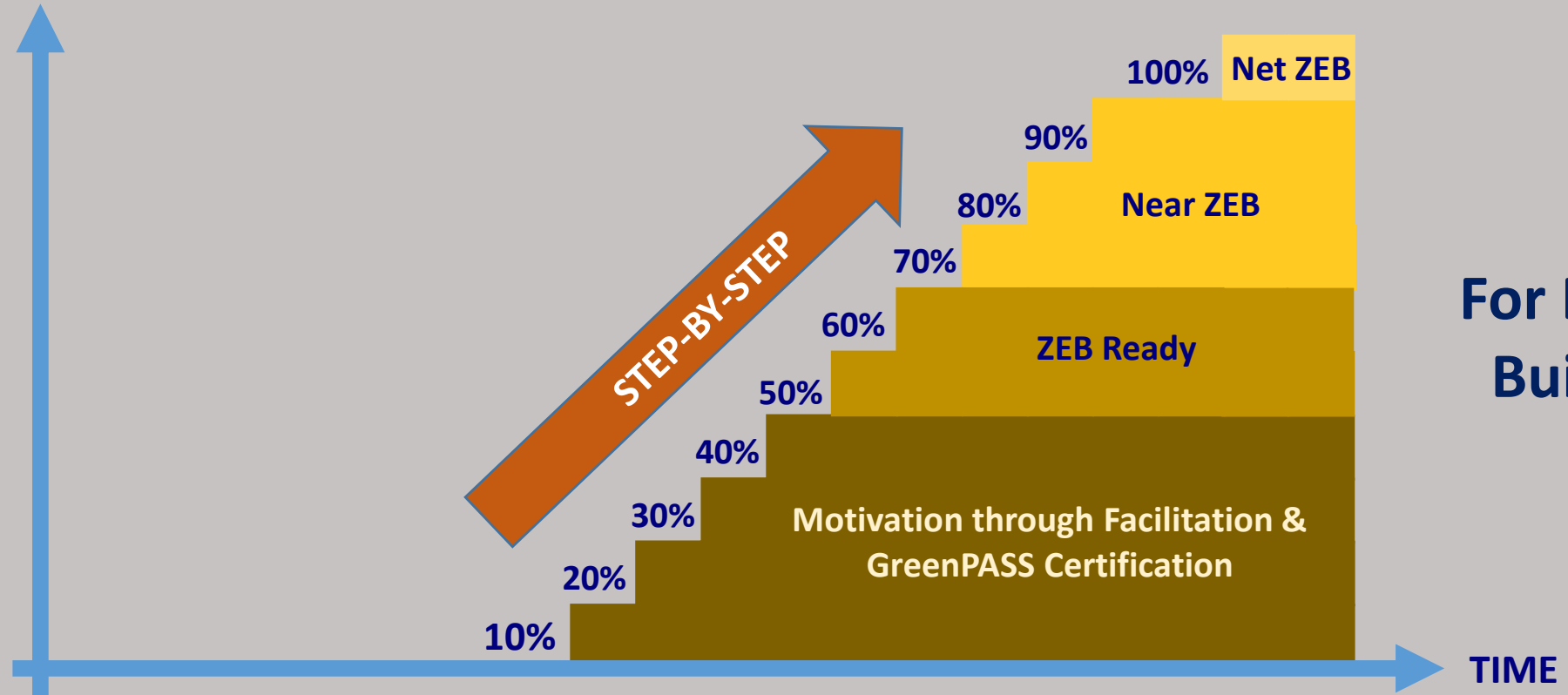
Only assess the final outcome,
the % of energy reduction





Affordable Way to Achieve Zero Energy Building (ZEB) For Existing Building

PERFORMANCE
(Degree of Energy Reduction, %)



For Existing Buildings

STEP-BY-STEP APPROACH

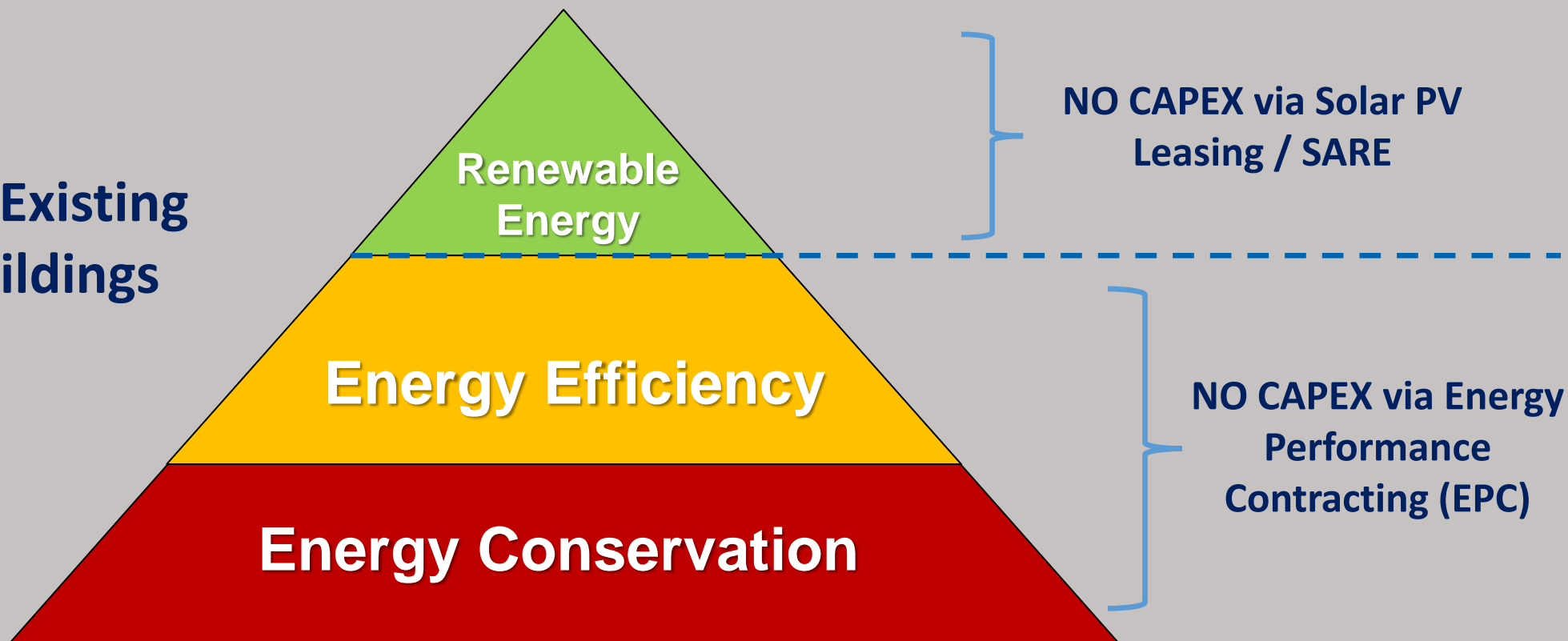


Affordable Way to Achieve Zero Energy Building (ZEB) For Existing Building



$$\text{ZEB} = (\text{EE} + \text{RE}) \times \text{Sustainable Practices}$$

For Existing Buildings



SUSTAINABLE ENERGY PYRAMID !!

BASIC PRINCIPAL FOR SUSTAINABLE ENERGY & LOW CARBON PROGRAM

SUMMARY / MAPPING OF GREEN BUILDING / LOW CARBON BUILDING / ZEB

GOV. POLICY
(Metric = GHG/Carbon)

GOV. POLICY TARGET = REDUCE CARBON /GHG INTENSITY 45% .

GREEN BUILDING (GB)

SUSTAINABLE ENERGY LOW CARBON BUILDING (LCB)

METRIC = DEGREE
OF 'GREEN /
SUSTAINABILITY'

METRIC:
Based on Number of Points Collected

METRIC:
Based on % of Energy reduction
(~ % Operational carbon reduction)

Conventional Green Building

- Penarafan Hijau (PH-JKR).
- Green Building Index (GBI)
- GreenRE (REHDA)
- Melaka Green Seal (Melaka)
- GreenMARK (BCA – Singapore)
- LEED (USGBC – US)
- CASBEE - ISKANDAR

Low Carbon Green Building
- MyCREST (CIDB)

Zero Energy Building (ZEB)

- Ready for ZEB / nZEB / NZEB
- BY SEDA



Upgrade to
GB

Or Upgrade
to ZEB

Energy Efficient Low Carbon Building (BASIC)

Low Carbon Building Assessment by SEDA
(GreenPASS)

Passing points (45% -
50%)

GB Project

MyCREST

Owner
ready with budget

Owner ready
but NO / Less budget

EE Building
Project

Initiative start with 1%
reduction

Step-by-step
Pilot / facilitation /
certification by SEDA

Normal Buildings



ASSESSMENT TOOL SUITABLE FOR ZERO ENERGY BUILDING (ZEB) IN MALAYSIA (aligning to new ZEB definition)

SUSTAINABLE LOW CARBON BUILDING ASSESSMENT

(Under the Low Carbon Building Facilitation Program)

A voluntary & industry driven initiative by:



Sustainable Buildings
and Climate Initiative
Common Carbon Metric

Using:

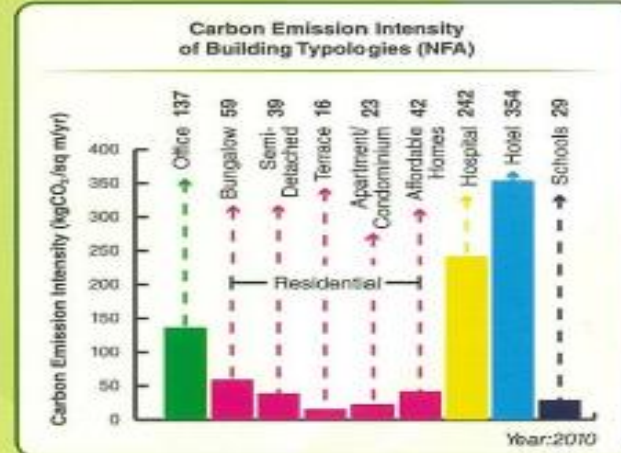


Carbon Reduction in Existing Building:

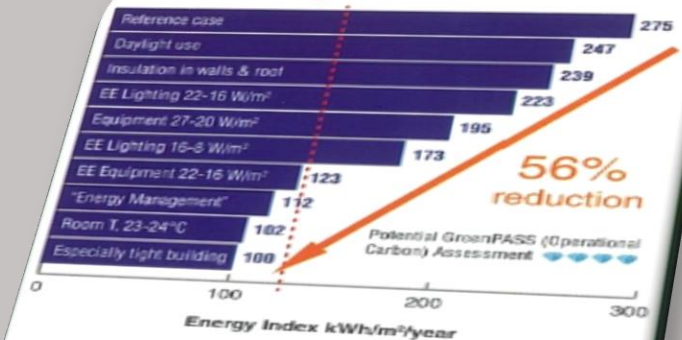
MEASURES	ANNUAL SAVING	
	Electrical kWh/yr	RM/yr
No Cost Measures		
De-lamping office lighting	13,476	8,153.38
Low Cost Measures		
Use timer controller for temperature and operate air ventilation	687,760	160,935.84
Use of daylight in warehouse	19,943	4,666.66
Replace normal EXIT signage to LED	2,208	516.67
Awareness campaigns	703,931	164,719.85
High Cost Measures		
Replace the Metal Halide lamps to TSHO lamps	957,012	228,940.81
Lighting zoning	498,584	116,668.66
TOTAL	2,882,914	684,601.87

Actual Cost Reduction 50%

Sample of Carbon Common Metric in Putrajaya:



Example of CO₂ Reduction for LEO Building:



www.seda.gov.my/greenpass

SUSTAINABLE ENERGY LOW CARBON BUILDING ASSESSMENT GREENPASS BY SEDA

* Adopted the CIDB's Construction Industry Standard (CIS-20:2012) – GreenPASS Operation



**STANDARD
INDUSTRI
PEMBINAAN**
(CONSTRUCTION INDUSTRY STANDARD)

CIS 20:2021

**GREEN PERFORMANCE ASSESSMENT SYSTEM IN
CONSTRUCTION**

Descriptors: carbon based performance assessment system, (sile, energy, IEQ, waste, water),
carbon emissions reduction, rating

© Copyright
CONSTRUCTION INDUSTRY DEVELOPMENT BOARD

CIDB Construction Industry
Development Board Malaysia
LEMBAGA PEMBANGUNAN INDUSTRI PEMBINAAN
No. 1, Jalan 10/1, Medan Damansara, 50480 Kuala Lumpur, Malaysia
Tel: 603-40471000 Fax: 603-40471001
http://www.cidb.gov.my

**Renewable
Energy**

ENERGY EFFICIENCY

Energy Conservation

TOWARDS ZERO ENERGY



Level of Achievement % Energy reduction	Assessment Scheme for buildings (diamond)	ZEB Certification Scheme *
100% or more		Net ZEB (NZEB)
≥ 70 to < 100		Near ZEB (nZEB)
≥ 50 to < 70		ZEB Ready
≥ 30 to < 50		
≥ 10 to < 30		
≥ 1 to < 10		

ZEB = (EE + RE) X Sustainable Practices

* Note : Aligning to ISO &
Japan ZEB Scheme Concept





EXAMPLE: PILOT ASSESSMENT & CERTIFICATION (VOLUNTARY) USING GREENPASS



Existing building



New building





CURRENT ECO SYSTEM TO SUPPORT ZERO ENERGY BUILDING (ZEB)



**READY ASSESSMENT TOOL
for ZEB / LCB by SEDA
adopted CIDB's *CIS20:2012*
- *GreenPASS (Operation)***

**Low Carbon Cities
Framework (LCCF)
: Low Carbon
Building**

**STANDARDS on Sustainable
Energy:
MS1525, MS2680, MS1837,
ISO15001 / AEMAS**

**Guidelines & References
Cases**

**Energy Efficient products
ready in Malaysia (ST
MEPS)**

**Existing professional NGOs
& experts in Malaysia
(government & private)**

Supporting ZEB program in Malaysia

**EE & RE Trainings &
Capacity Building Program
by agencies / private.**

**INCENTIVES:
Current incentives on
sustainable energy &
financial facilities (EPC)**

**R & D Experts for local
universities on Sustainable
Energy**

**NET ENERGY METERING
(NEM) Program by SEDA :
To off-set further balance
of energy needed by RE.**

**SEDA's Low Carbon Building
/ ZEB Facilitation Program:
PBTs, Gov Agencies &
Private**

**Existing Sustainable Energy
Service Provider
(ESCOs & Solar PV /
thermal Service Provider)**

**Affordable Online Energy
Monitoring System (by
SEDA, etc)**

Thank you for your attention



FACILITATION ON LOW CARBON BUILDING / ZEB PROGRAM?

Call / text +6019 2829102 / +603 88705800

www.seda.gov.my/ZEB

+

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