SBN - IPEEC Workshop in Paris 2nd February 2011

The SBN Project on Tropical Zero Carbon Buildings

"SBN Hot & Humid – Carbon Neutral"

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- Global Warming is the Challenge
- The building sector is the single most largest emitter
- The building sector must deliver on reducing CO_2 emissions

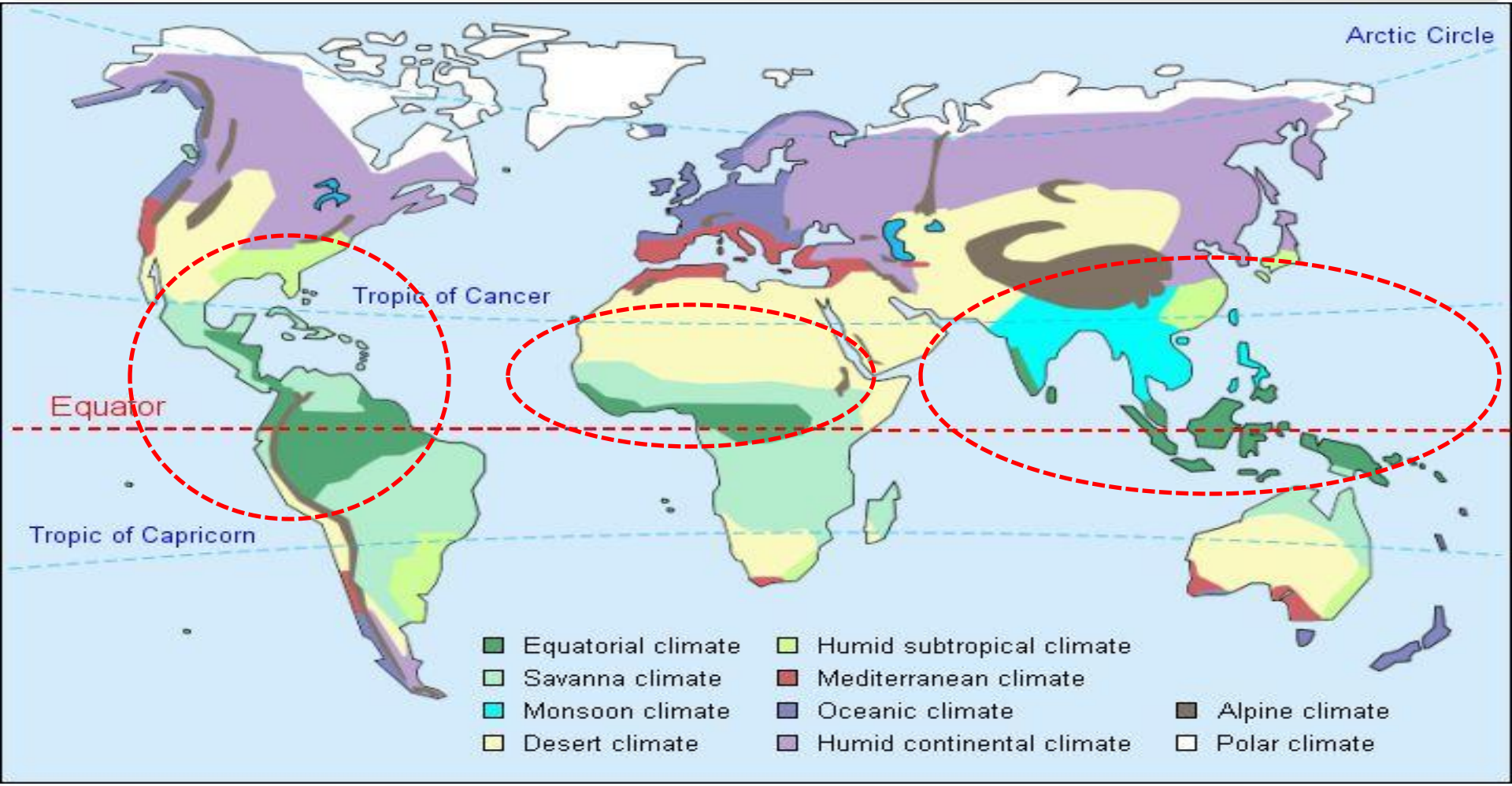
- 40% of Energy Consumption
- 30% of Greenhouse Gases
- 25 - 40% of Solid Waste

Source : IEA ECBCS

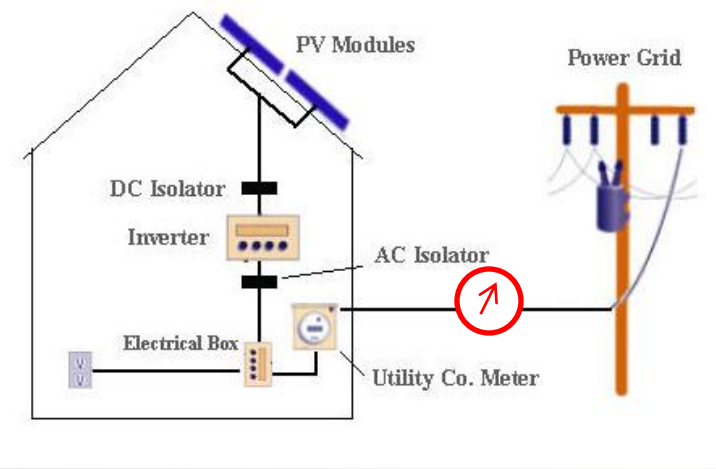
- ➢ There is an urgent need to accelerate the uptake of low carbon buildings
- ✓ Low Carbon/Zero Carbon Buildings can be built with Today's Technologies
- ❑ Build and Demonstrate followed by Legislation : a 10 years timeline is possible

Tropical Hot and Humid Climate :

- Unique to Low Carbon Building Design : Zero CO_2 Buildings possible
- A rapid growth in construction in SE Asia, 0.9 billion people
- Global Warming calls for rapid action on Low Carbon Buildings



A Zero Carbon Building : Definitions

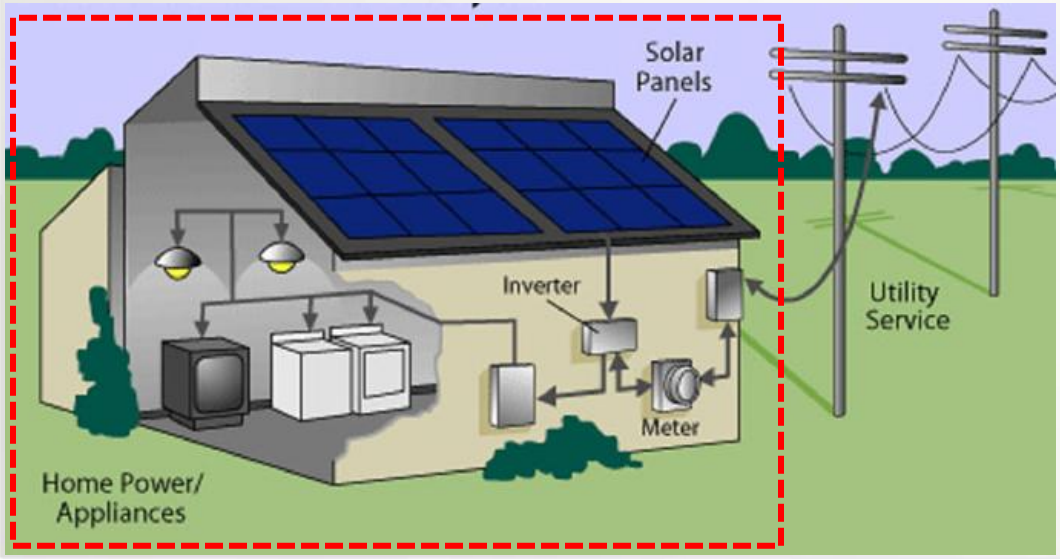


- The building uses zero electricity on an annual basis

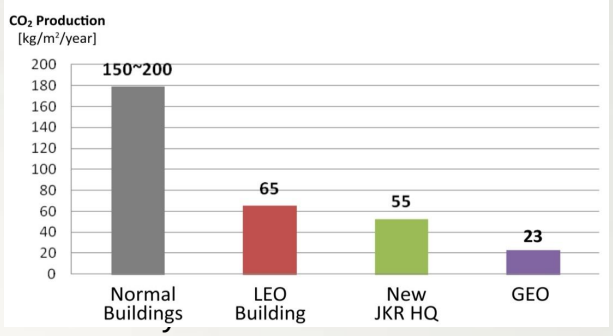
or

- On a life cycle basis, the building produces as much energy as what was used during construction, use and demolition

or



IEN Consultants : To Our Credentials



- 34 years of int. experiences on energy efficiency and solar energy in buildings
- Active in IEA Energy Research Programs 1978 - 1997
- Represented in the IEA SHC and ECBCS Executive Committees 1997 - 2011
- Developing low carbon green buildings in SE Asia from 2001 onwards

IEN Competences

Certified Green using acknowledged Green Labelling Schemes

★ We Combine a High Environmental Rating with a Low Carbon Footprint

GREEN MARK

2 Projects

U.S. GREEN BUILDING COUNCIL LEED USGBC

7 Projects

green building index

11 Projects

breeam

20+ Projects



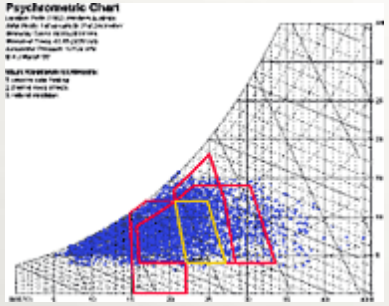




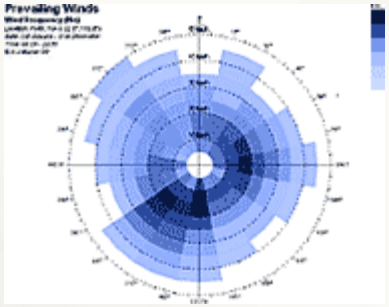
Design Analysis

Climatic analysis

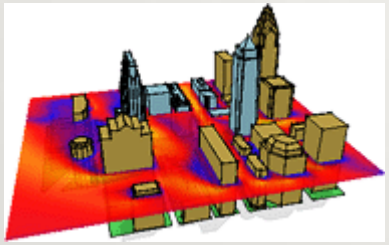
Psychrometric Chart
with hourly climate data

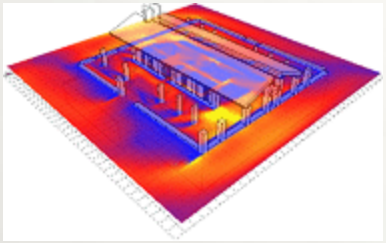


Wind Rose
hourly wind frequencies



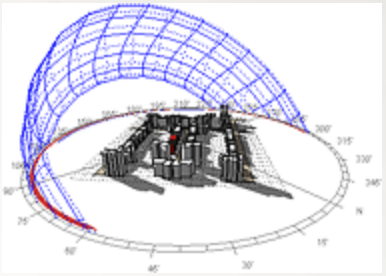
Air flow

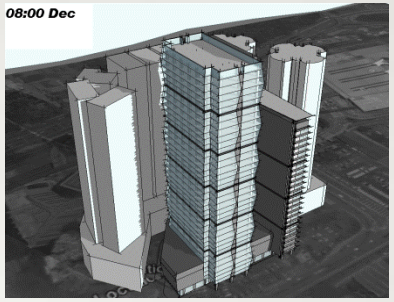




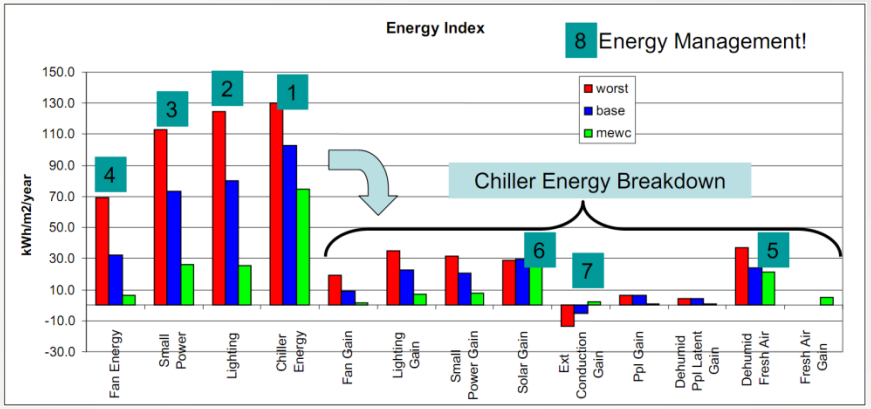
Energy analysis

Sun path





Energy Distribution



The Energy Commission **Diamond Building** in Malaysia

15 ongoing Projects by IEN Consultants

Sarawak Energy HQ
Kuching, Malaysia (2008-)

New Terminal 2 at Kuala Lumpur Int. Airport
Kuala Lumpur, Malaysia (2008-)

Ministry of Works HQ

Shell Regional Headquarter
Kuala Lumpur, Malaysia (2009-)

Public Mutual Bank
Kuala Lumpur, Malaysia (2008-)

Kuala Lumpur Eco City

Bangsar, Kuala Lumpur, Malaysia (2009-)

Stamp of Approval

Hot & Humid – Carbon Neutral, HOW ?

1. Take advantage of the climate :

- ✓ Solar radiation every day year round
- ✓ Daylight available every day year round
- ✓ Relatively low in – out temperature difference
- ➢ Protect the building against direct radiation and against humidity

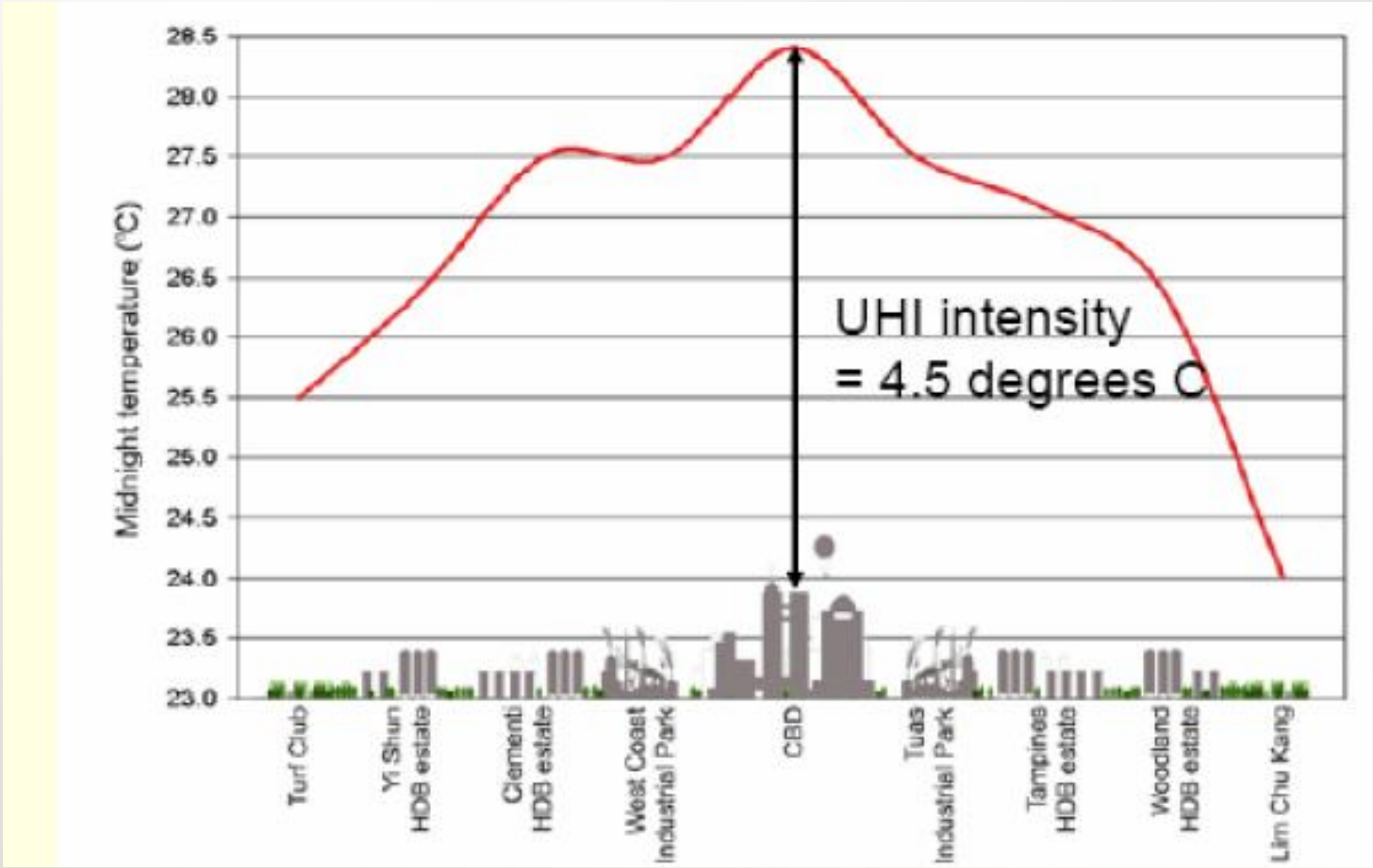
2. Rediscover appropriate tropical climatic design of buildings

- ❖ Architectural design that protects against solar radiation, and others

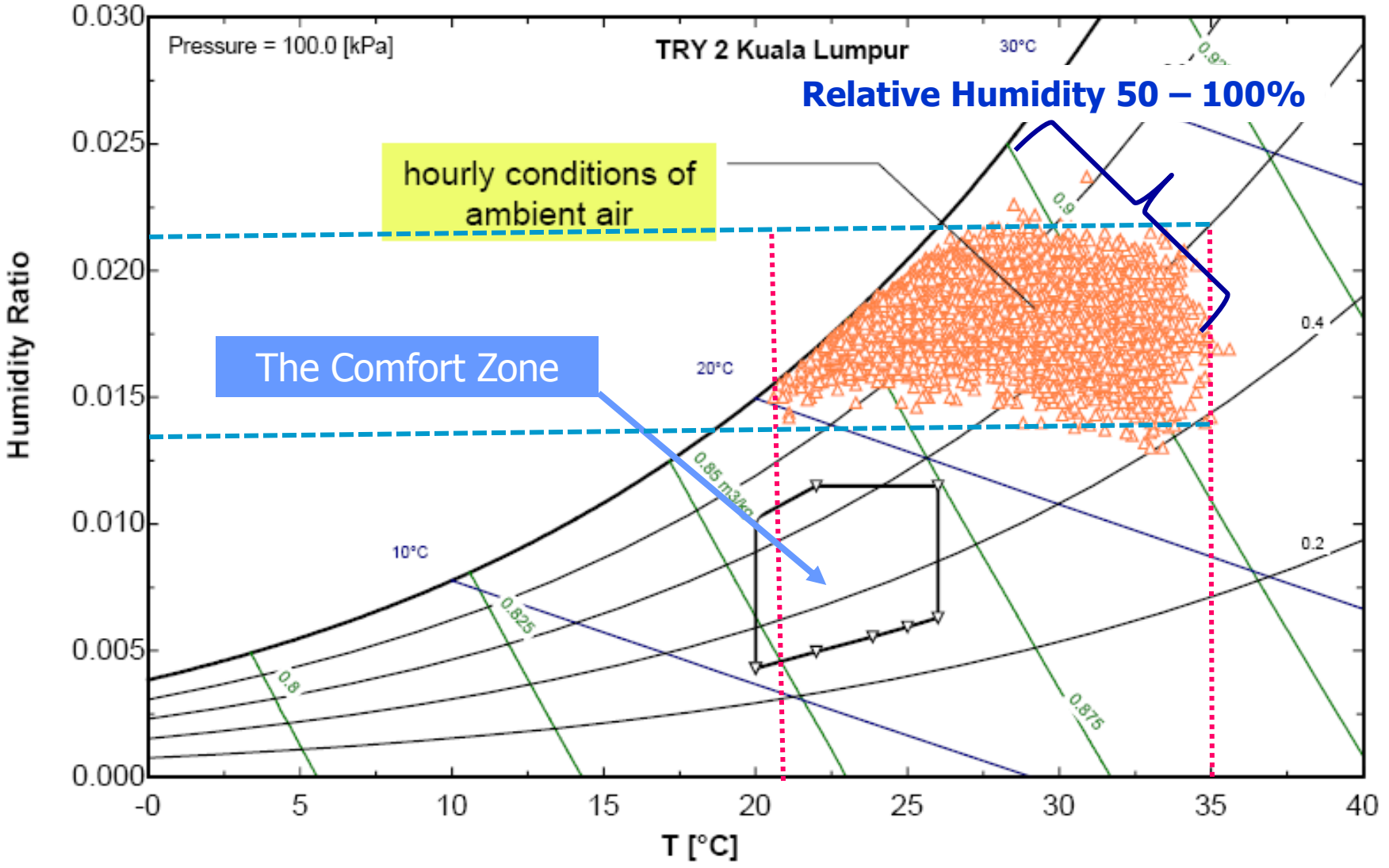
3. Use new energy technologies

- ❖ High performance glazing, - lighting, - motors and - fans
- ❖ Intelligent control systems for ventilation, cooling and lighting

Urban Heat Island Effect
Singapore



Warm and Humid Climate : Temperature and Humidity in Kuala Lumpur

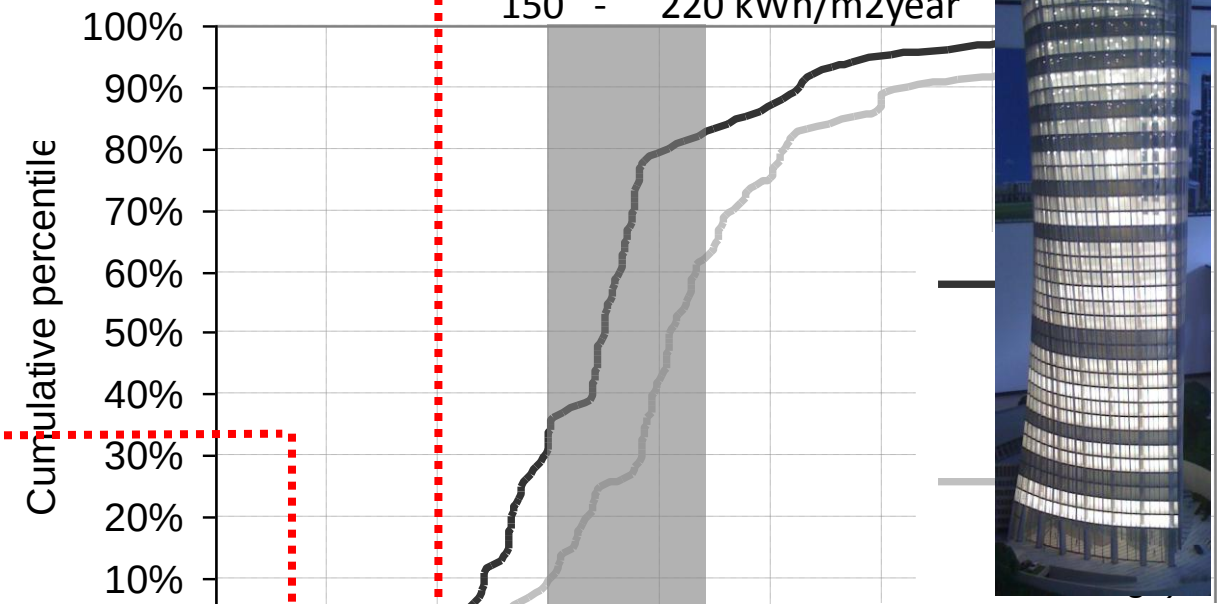


Demo Projects in Malaysia – status January 2011

LEO Building
Low energy office building
Malaysia, 2004
100 kWh/$m_2$year

GEO Building
Super Low Energy office building
35 kWh/$m_2$year

Diamond Building 2010
85 kWh/$m_2$year



Ministry of Works
Low energy office building
Malaysia, 2010 – 2013
100 kWh/$m_2$year

Source: EAEF Project 64
Project leader: National Univ

Shell Building Cyberjaya 2010
100 kWh/$m_2$year

Low Carbon/Carbon Neutral Demo Projects in Malaysia : Projects 2011 - 2012

Projects confirmed by Tan Sri Mustapha Kamal, MK Land :

- New 25 story Corporate HQ for MK Land in Damansara Perdana
- The Rafflesia development in Damansara Perdana (110 Semi D bungalows)
- The Setia Haruman Mixed Development in Cyberjaya

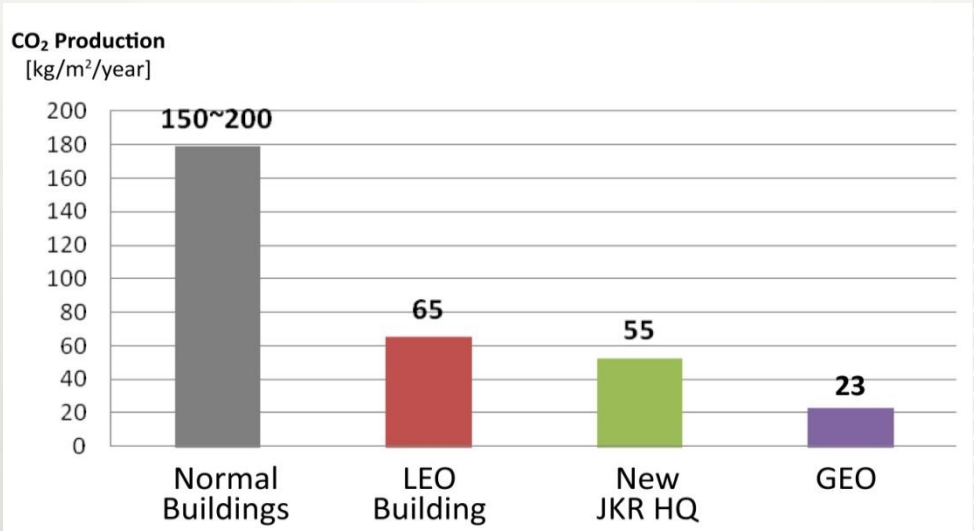
Shell IT Headquarter in Malaysia by MK Land
Completed November 2010

The Client and the Design Team on Zero Carbon Study Tour in London and Freiburg November 2010

The SBN Project on Tropical Zero Carbon Buildings

Opportunities

- Buildings in the tropics can be very energy efficient.
- 50 - 75 % savings can be achieved using best practices, available technologies and EE architectural design.
- PV technology : cost effective over the coming 5 – 10 years



Market Pull for Low Carbon Buildings

The growing interest in Green Buildings and Environmental Labeling (LEED)

❖. The SBN Project 2011 - 2014

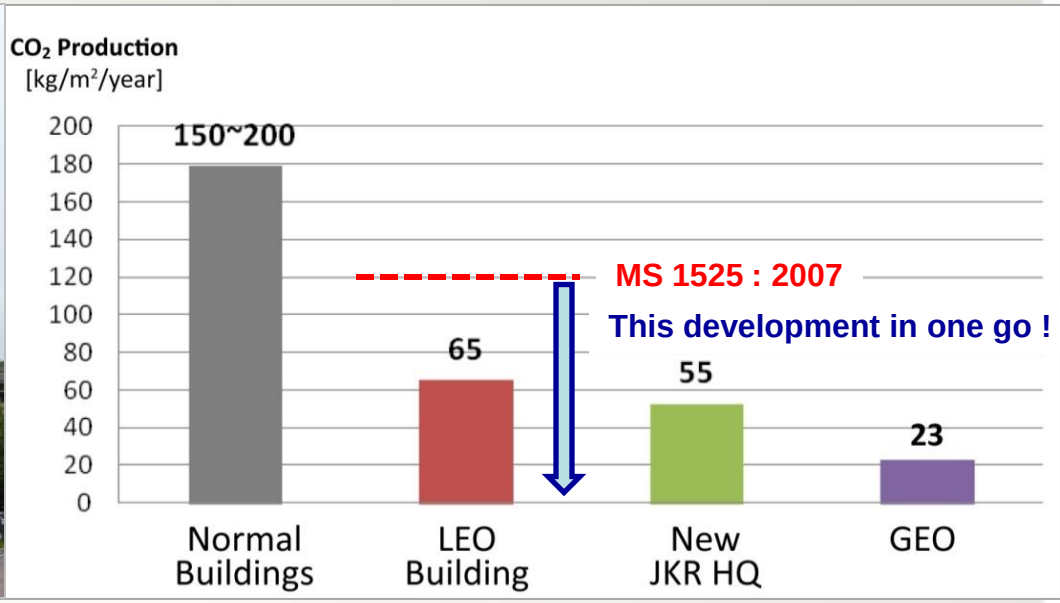
Develop good practice guidelines for low carbon buildings and coaching of demo projects

- Promote Carbon Neutral Demonstration Projects to Developers in SE Asia
- Capacity building and awareness among architects and engineers.
- Coaching project teams on Design and Implementation of Carbon Neutral Buildings in SE Asia
- Demonstration projects 2011 - 2014
  - with savings of 60 – 80 % CO_2 emissions
  - with PV on roof/facades: 80 – 100% savings
- Performance Monitoring of Demo Buildings

❖ Standards and Codes of Practice for Low Carbon/Zero Carbon Buildings 2015 -

❖ Legislation : Zero Carbon buildings by 2020

The Strategy – How to accelerate the standard towards Zero CO_2 Buildings in the Tropics



Experience : The Low Energy Office Building of the Ministry of Energy, Malaysia

1. Design and construction : 2001 - 2004
2. Monitoring and documentation of performance : 2004 - 2006
3. Code of Practice for Energy Efficiency in Non-Domestic Buildings : 2007
4. Implementation of the 2007 Code of Practice as legislation : 2011

SBN Hot & Humid – Carbon Neutral : **The partners**

- The Property Developers of projects : for both private and public clients
- The Building Industry : the main sponsors
- The clients for the projects : at least one governmental and one private per country
- The Carbon Neutral Expert Team : Private companies
  Universities
  NGO’s
- IPEEC – SBN : for expert feedback, intellectual support and for dissemination

SBN Hot & Humid – Carbon Neutral

Deliverables :

1. Carbon Neutral buildings in the tropics : a Brochure for Developers and investors
2. Design Guide for low carbon/zero carbon buildings : for architects and engineers
3. Workshops for developers and investors
4. Workshops for architects and engineers
5. Coaching of low carbon/carbon neutral *demonstration project teams*
6. Low Carbon – Zero Carbon Demonstration Projects (2 – 3 per country)
7. Summary of energy performance achieved for demo projects, annually
8. An annual status report to IPEEC : Executive summary, and technical report on the performance of Actual Low/Zero Carbon Buildings

SBN Hot & Humid – Carbon Neutral : **The Resources**

Sponsors : The Building Industry

The Budget :

- Development of Guidelines and Brochures
- Implementing workshops for clients and designers : two per country, 10 in total
- Coaching concrete projects, 2 – 4 per country, 15 in total
- Collection of performance data, analysis and presentation
- Project administration, general dissemination, IPEEC meetings

➢ A Five Year Program : ~ 300.000 US$/year

3 – 4 Zero Carbon Demonstration Buildings per country developed and built during 2011 - 2014

The Carbon Neutral Buildings Core Team

- Malaysia : IEN Consultants, coordinators
- National University of Singapore
- Indonesia : To be decided
- Thailand : Chulalongkorn University
- Philippines : To be decided
- Vietnam : ENERTEAM, Saigon

The SBN Project on Tropical Zero Carbon Buildings

An accelerated program to achieve carbon neutral buildings by 2020

Summary

- There is an urgent need to promote low carbon buildings
- Low Carbon/Zero Carbon Buildings are feasible in the tropics
- Normal Top Down Development is too slow
- There is a need for an accelerated development :
  Zero Carbon Demonstration Buildings is the vehicle

1. We seek SBN / IPEEC endorsement and support to the project
2. Mobilization of the Carbon Neutral Core Team
3. Promotion and Demonstration Projects by 2011 - 2015

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4. Norms and legislation : 2015 - 2020

The Carbon Neutral Tropical Buildings *Hot-Humid CO_2 Neutral*

We seek SBN / IPEEC <u>endorsement and support</u> to the project :

- ❑ IPEEC to provide intellectual and institutional support to project
- ❑ IPEEC to assist in engaging the private sector in the project
- ❑ IPEEC to participate in a stakeholders workshop in SE Asia
- ❑ An annual progress report to be presented to IPEEC
  - Feedback on the performance of Actual Low/Zero Carbon Buildings

IPEEC is asked to provide an umbrella and :

- ➢ Help open doors
- ➢ Support credibility
- ➢ Thereby help speed up implementation
- ➢ Provide a platform for dissemination

SBN /IPEEC Hot & Humid – Carbon Neutral

A Program that is Urgently Needed to Reduce Carbon Emissions from Buildings in the Tropics

Let us protect our common environment