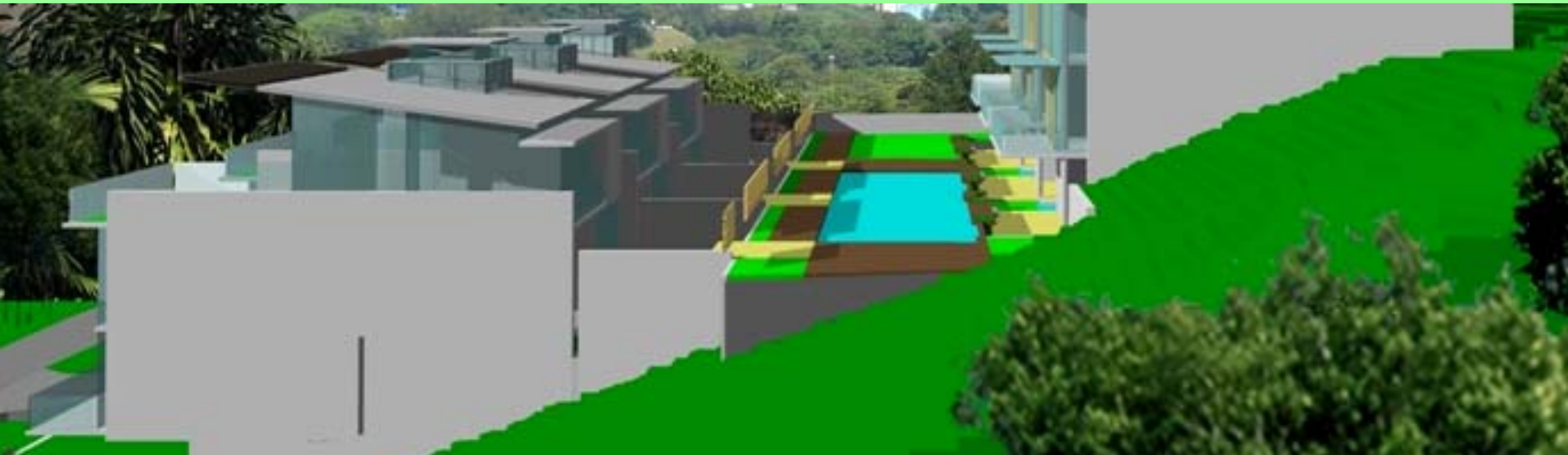


Eco Homes In Malaysia”
by
Poul E. Kristensen
Eco-Homes Malaysia Sdn Bhd

- Energy Efficiency in Buildings in Malaysia, overview
- Global Warming
- Sustainable housing, what is it
- Practical Sustainable Housing, how to
- Labeling of Sustainable Buildings
- A case study : Bukit Ledang, Kuala



Energy and Ecology in Tropical Buildings



The MEWC LEO Office Building



The PTM ZEO Office Building



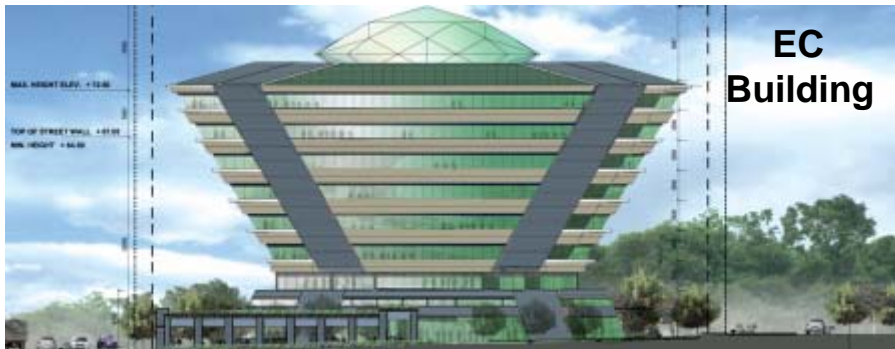
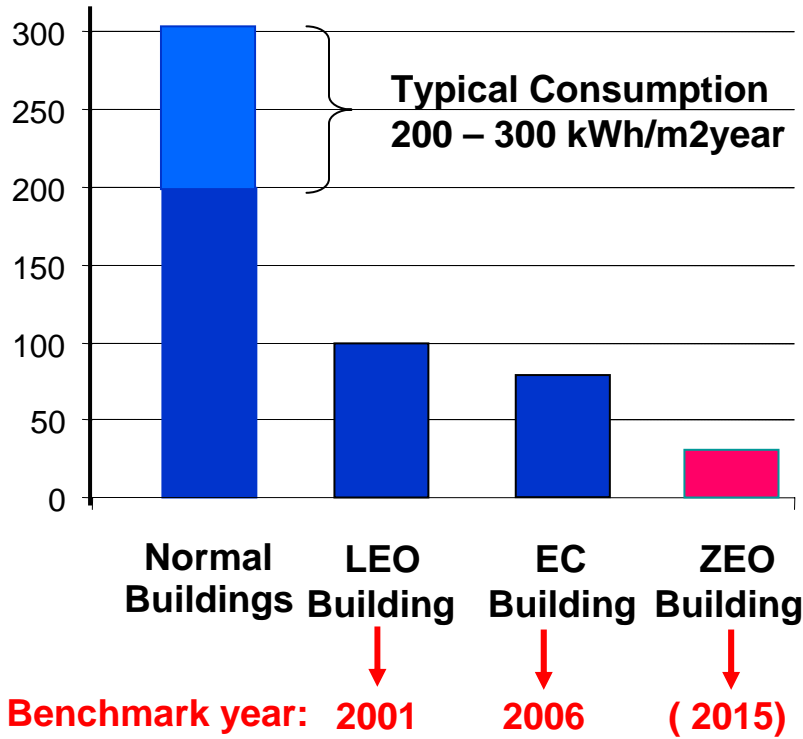
The ST Diamond Office Building



The ECO-Homes Housing Project

Continuous improvement of Energy Efficiency

Energy Indices, office buildings (kWh/m²year)



Malaysian Office Buildings



Global Warming

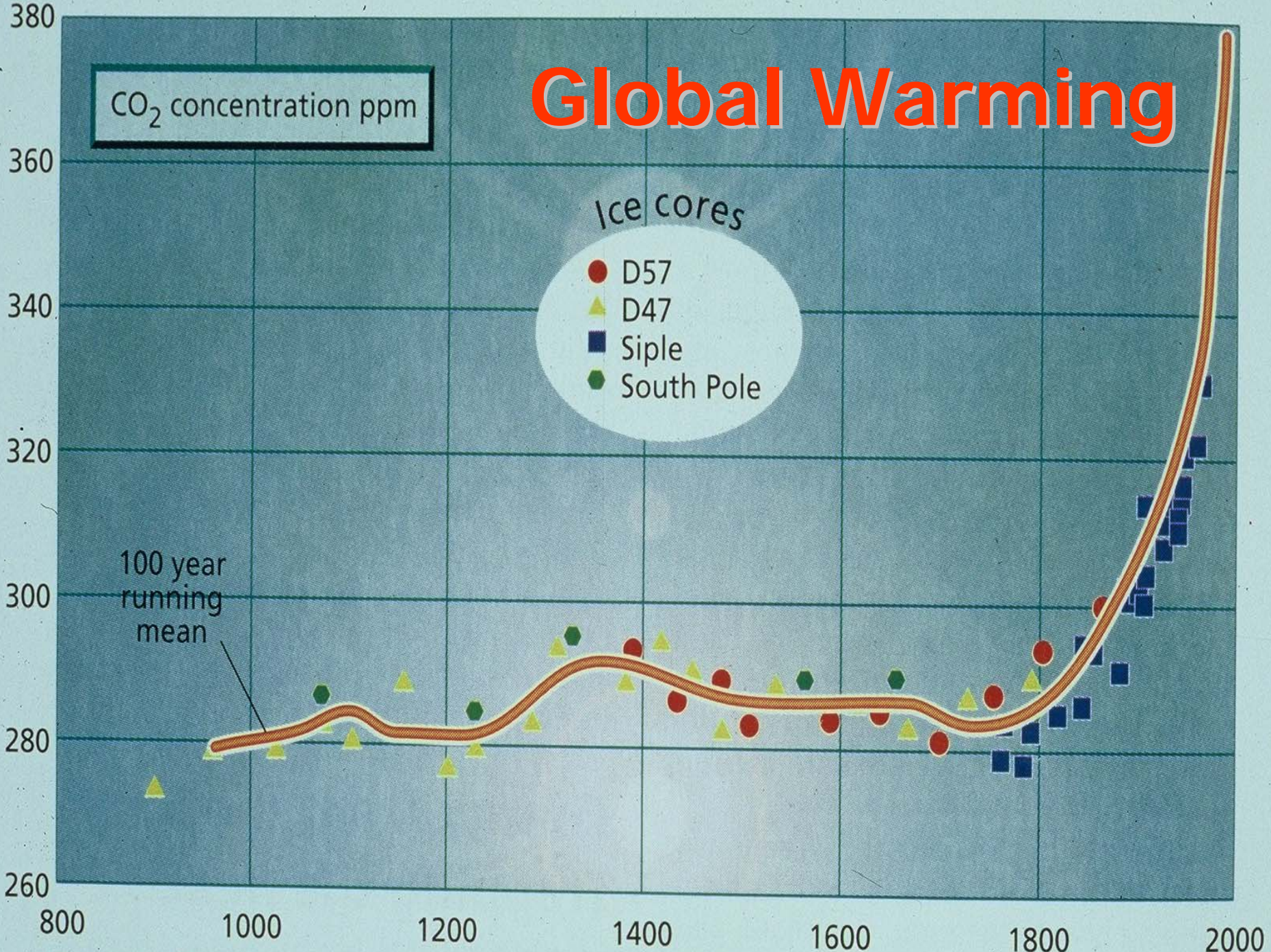


Figure 3: Change in CO₂ concentration over time

EVIDENCE

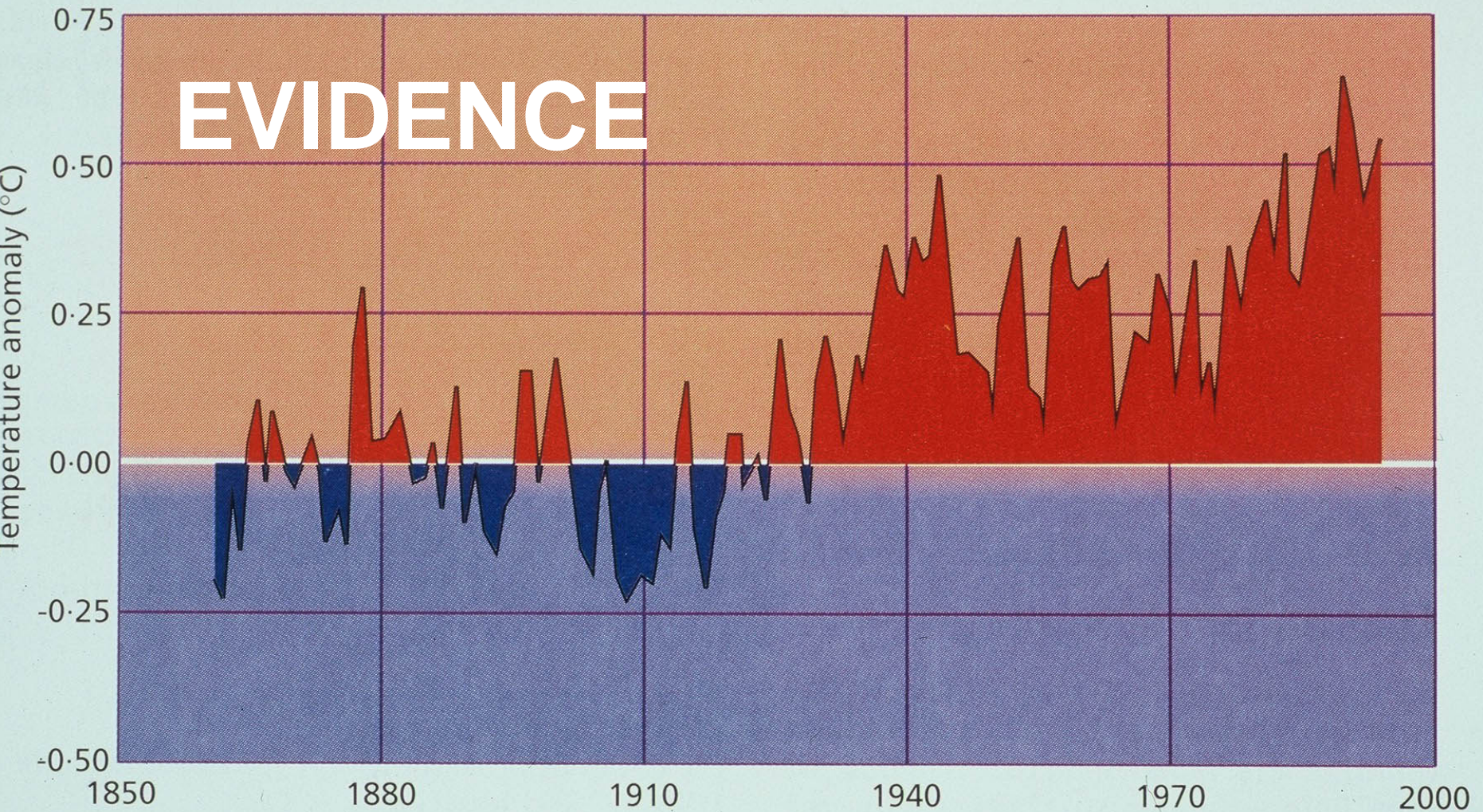
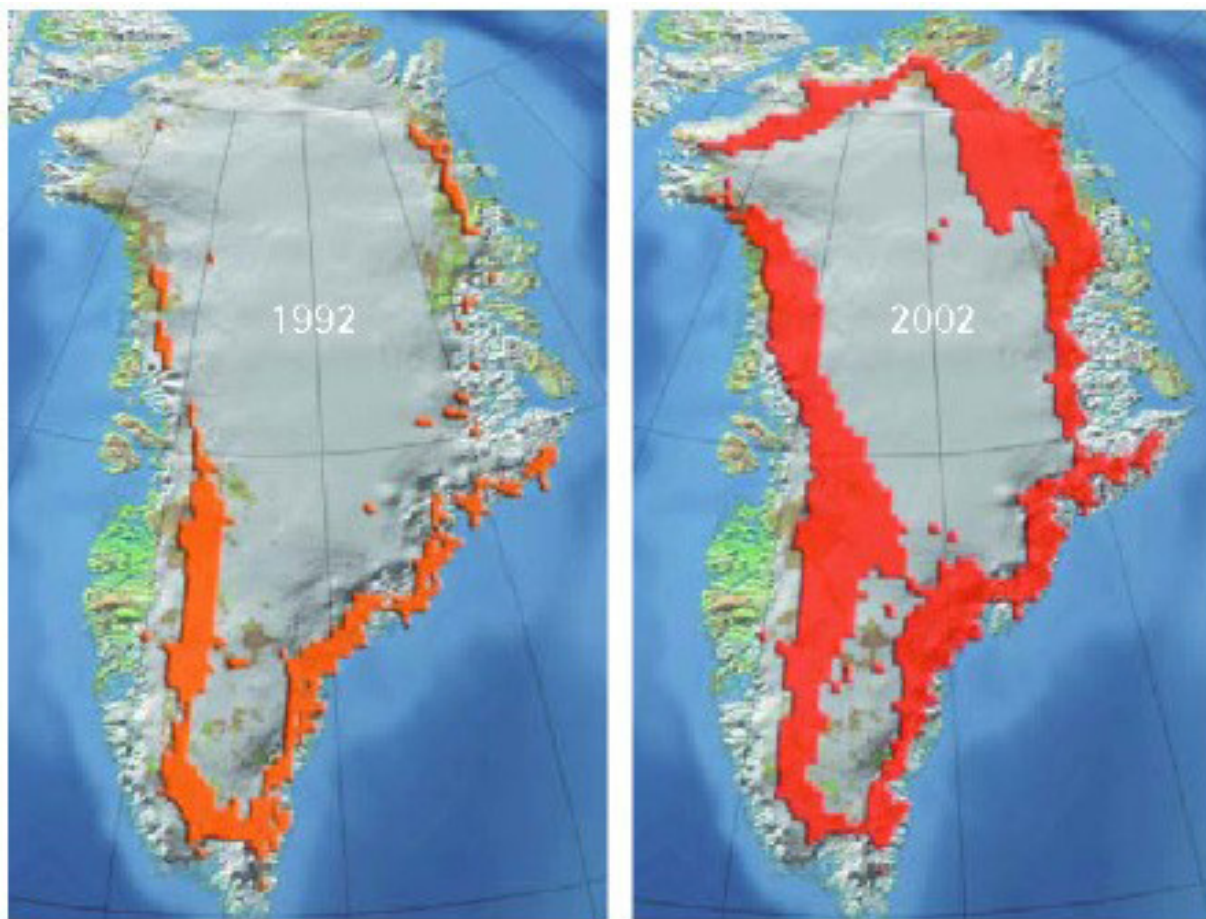


Figure 5: Observed changes in global mean temperature from 1861 to 1994. (Source: IPCC)

- There is no longer any doubt that the ecosphere is warming up due to human activity

Global Warming



Seasonal surface
melt extent of the
Greenland Ice Sheet

Source: Impacts of Arctic Warming, Cambridge Press, 2004

What is Sustainable Housing ?



- Reduction in use of fossil fuels
- Water conservation and re-use
- Use of sustainable materials
- Waste minimization and avoidance
- Indoor environmental quality
- Quality of local environment
- Build along the landscape

Meeting our present needs without compromising on the ability of the future generations to meet their needs

Brundtland Report, 1987

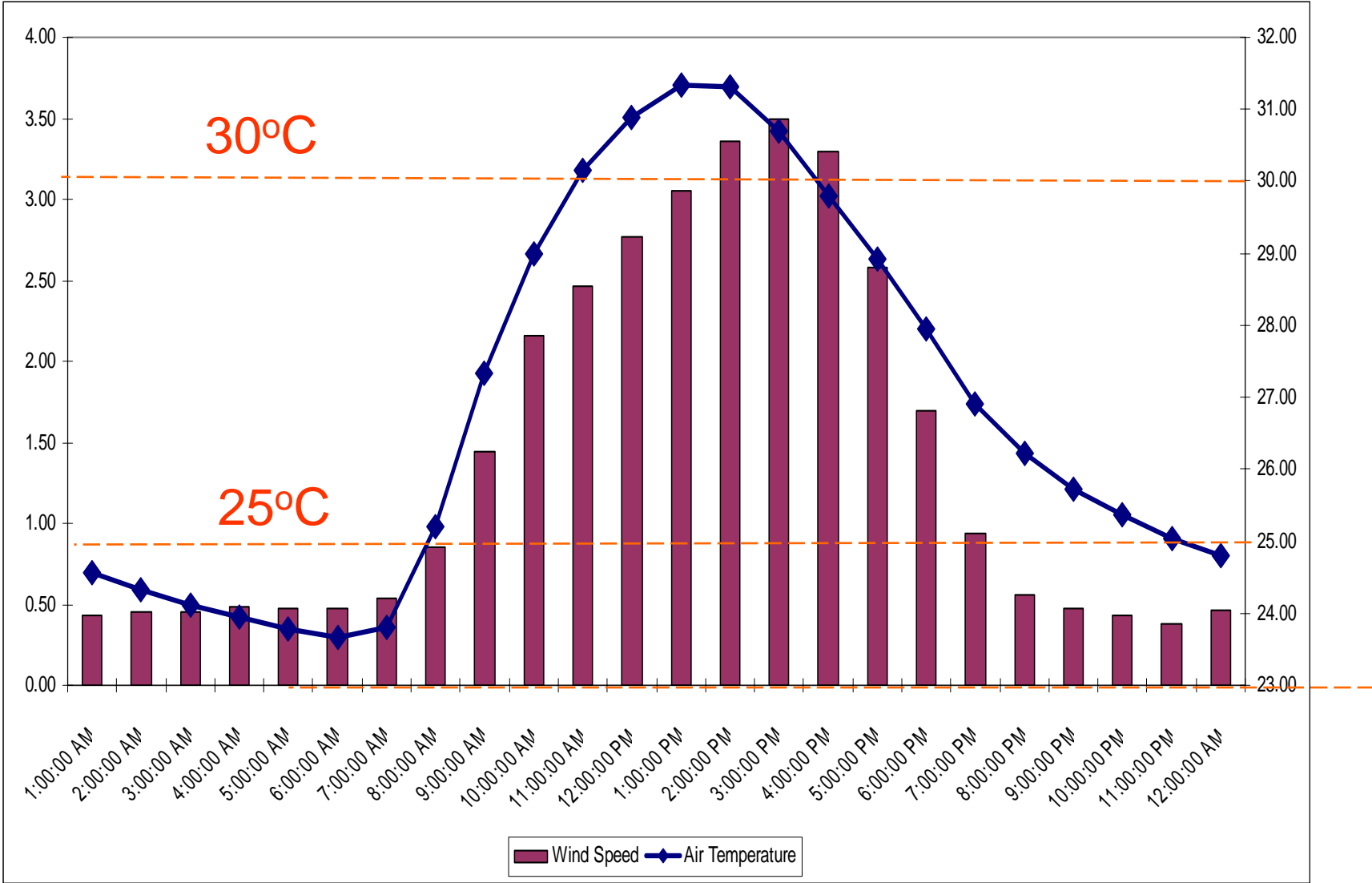
Tropical Hot and Humid : A very generous climate !

- ✓ Sunlight is available in abundance
- ✓ Daylight is available throughout the day
- ✓ Water is available in abundance
- ✓ Ambient temperature 25 – 35 °C only
- A high humidity 60 – 100%



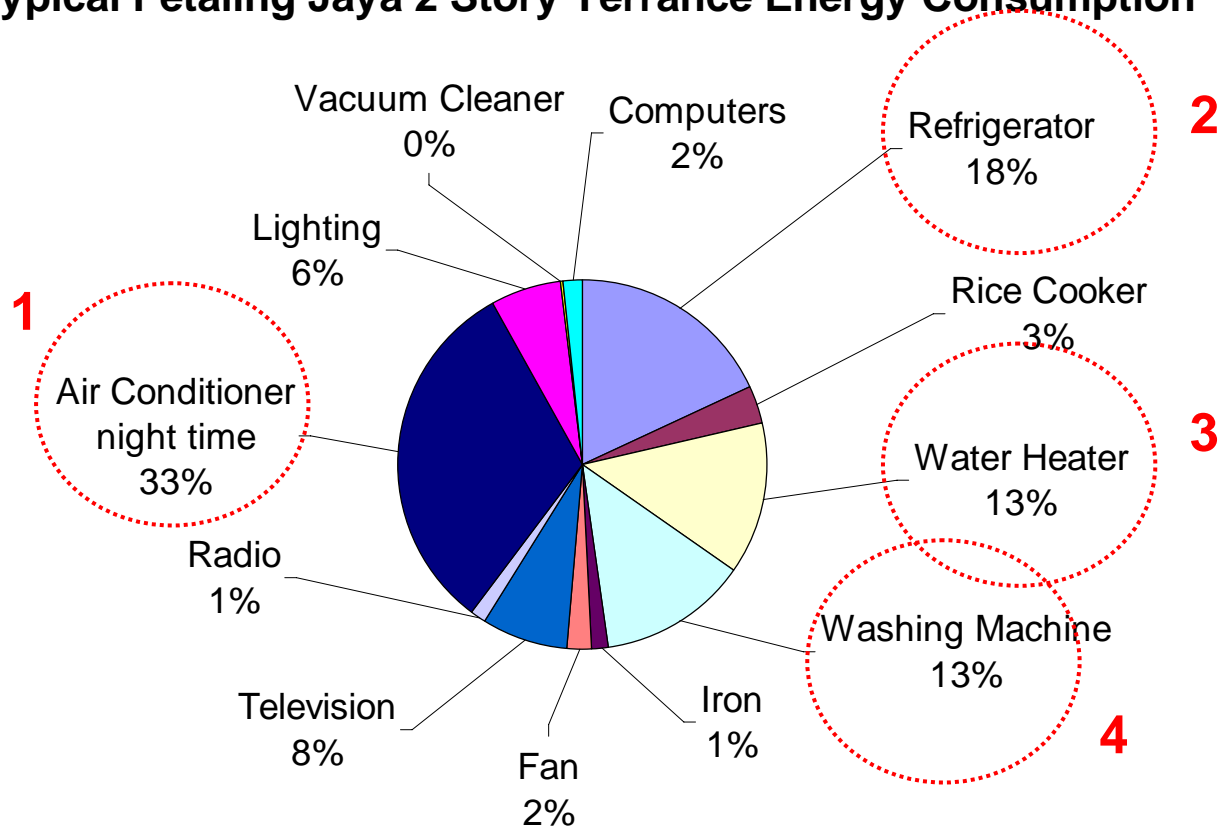
Hot and Humid Climate

Daytime Ventilation brings heat into the houses !



Energy Breakdown of a Typical House in P.J. Malaysia

Typical Petaling Jaya 2 Story Terrance Energy Consumption



A catalog survey in 2005 on 1 hp split unit air-con units

Brand	Model No	Btu/h Rating	EER	COP*
Panasonic (Super Deluxe)	CS-XC9DKH (Super Deluxe)	9390	11.9	3.49
Panasonic (Deluxe)	CS-C9DKH (Deluxe)	9210	11.0	3.22
Panasonic (Standard)	CS-PC9DKH (Standard)	9210	10.6	3.11
York (Cooling King)		10,000	11.4	3.33
Toshiba (Daiseikai)	Daiseikai (RAS10NKDX)	9210	11.3	3.31
Hitachi		10,000	11.5	3.37
Carrier (Alpha)	Alpha hi-wall	9076	11.1	3.25
MEC		9000	8.9	2.60
Sharp (Plasmacluster)		9000	10.9	3.20

25%

These are manufacturer claimed data. Test criteria from one manufacturer to another may be different. It is best to obtain such data from a 3rd Party such as the Energy Commission, Malaysia.

$$\text{COP} = \frac{\text{Cooling Energy Produced}}{\text{Electrical Energy Supplied}}$$

Energy Efficient Fridge

EE Fridge - Microsoft Internet Explorer

Address: <http://www.eefridge.com.my/available.htm>

Home | About Us | Products | Energy Saving Guide | Media | Links | Contest | Contact

EE Fridge - Available Fridge

switch to **ENERGY EFFICIENT** refrigerators and save millions of ringgit a year

Products/Available Fridge

Energy Efficient Refrigerator available in the market

Name	Model	Rating
Hitachi	R-479AM	☆☆☆☆☆
Samsung	RT30MASS	☆☆☆☆☆
Samsung	RA20FH1T	☆☆☆☆☆
Sharp	SJ-D25PSL	☆☆☆☆☆
Panasonic	NR-B331G	☆☆☆☆☆
Hitachi	R-180MDD4	☆☆☆☆☆

Suruhanjaya Tenaga
www.eest.net.my

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www.eefridge.com.my



**Best Fridge vs Worst Fridge
> 50% Savings**



Water Heater



Solar
Water
Heater

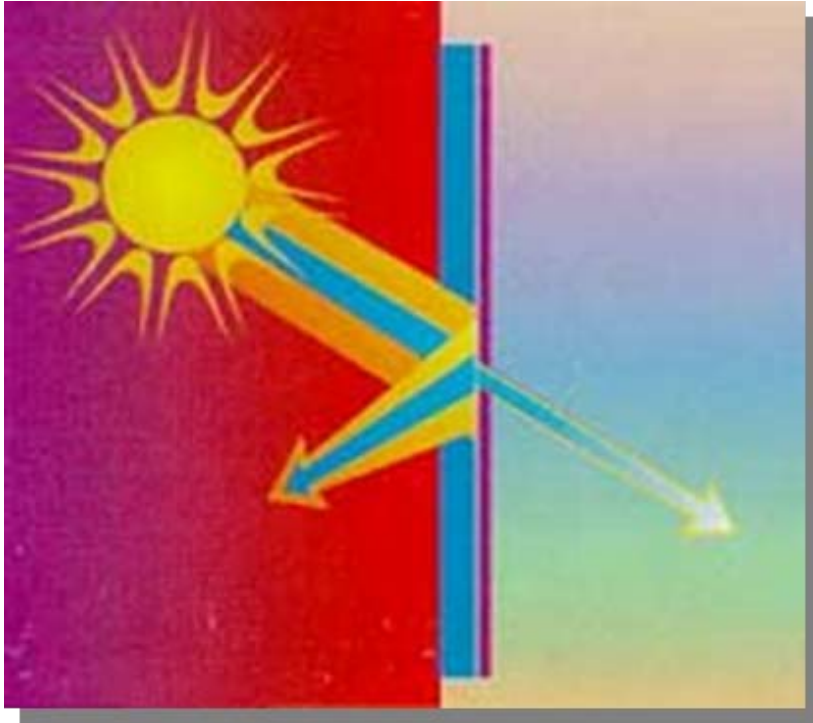
An advertisement for York WinterSpa heat recovery units. The background is a snowy mountain landscape. The York logo is at the top. Below it, the text reads "free Hot Water from Your Air-Conditioner". There are three inset photos: one of a living room with a window unit AC, one of a bedroom with a window unit AC, and one of a bathroom with a window unit AC. At the bottom, there are two York WinterSpa heat recovery units. The text "Cool air for your living room", "Cool air for your bedroom", and "Use hot water for your bathroom & kitchen" is placed near the respective photos. A small York logo is at the bottom left.

Heat
Recovery
from Air-
Conditioner

Advanced Glazing

Spectrally Selective Glazing :

Lets in the lights, blocks out the heat



Typical Values, Double Glazing

- Light 50% Transmission
- Heat 25 % Transmission

- Now available in the region -



The Costs of one kW

New Powerplant
Investment : 3500 RM/kW



Buildings need energy
More buildings need more energy



Energy Efficient Building
Investment : 600 RM/kW

Sustainability Evaluation – S U S T A I N A B I L I T Y



GREEN MARK RATING in Singapore

- The ST Building is proposed to be rated under the Green Mark building sustainability assessment scheme

- We strive to get the highest rating: Platinum

- The Green Mark was launched in Singapore in 2005. So far, 17 buildings have been evaluated under the scheme.

- The only two Platinum winners are:



Nanyang Polytechnic

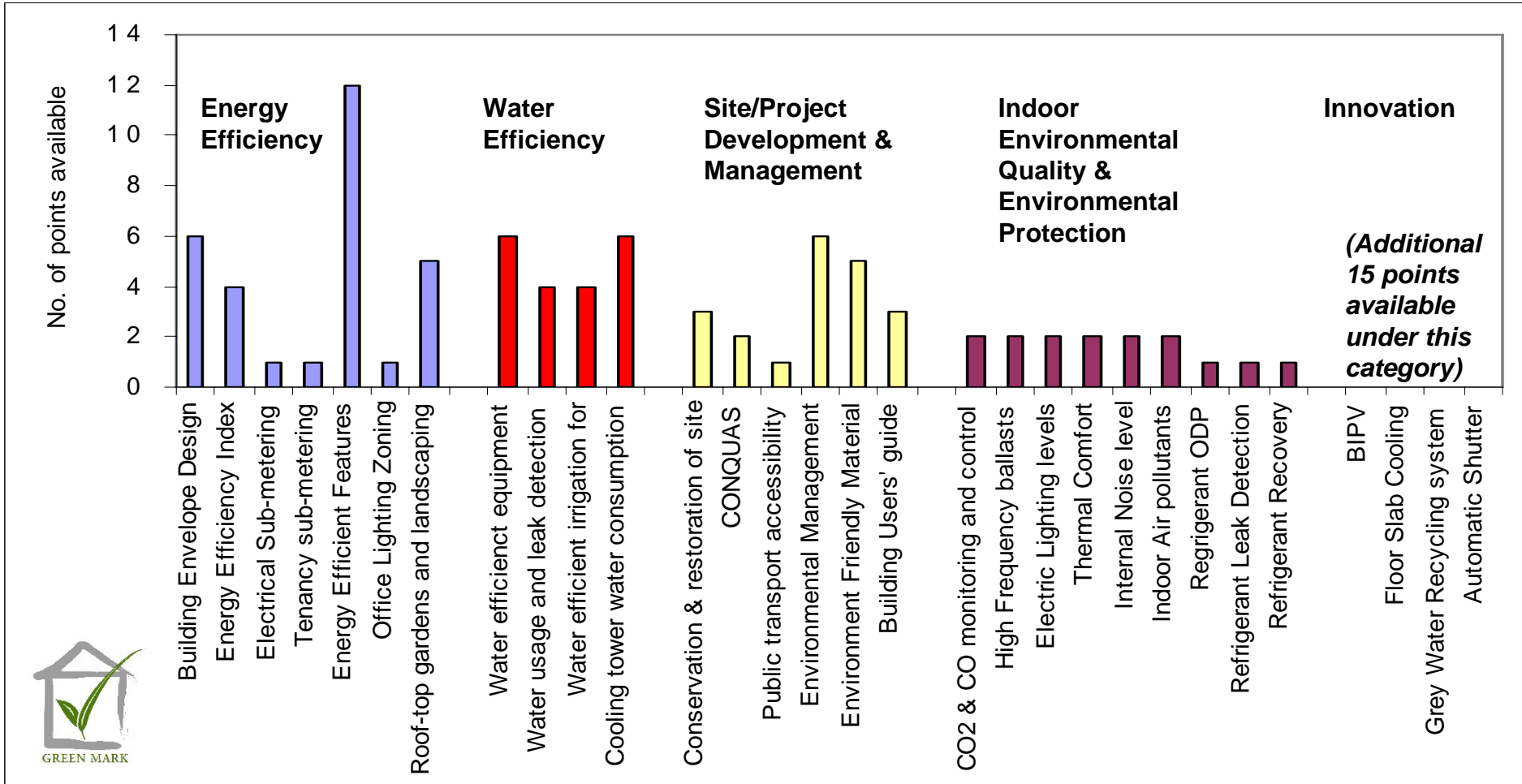


National Library

Green Mark Points	Green Mark Rating
85 to 100	Green Mark Platinum
70 to <85	Green Mark Gold
55 to <70	Green Mark Award

Sustainability Evaluation – S U S T A I N A B I L I T Y

GREEN MARK POINT ALLOCATION



ST Building: ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ NA ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ NA NA NA ✓ ✓ ✓ ✓

Sustainable Housing

An architectural rendering of a sustainable housing development. The scene shows several modern, multi-story residential buildings with large glass windows and flat roofs. The buildings are situated on a green, sloping hillside. In the background, a city skyline is visible under a blue sky with scattered white clouds. Key landmarks in the skyline include the Petronas Twin Towers and the Kuala Lumpur Tower. The overall atmosphere is bright and clear, suggesting a sunny day.

ECO – Homes Malaysia Sdn Bhd 2006

Why build sustainable homes?

Increasing market for sustainable homes:-

- Due to increasing oil prices
- Due to significant savings and resource conservation
- No sacrifice in comfort, convenience and style to the owners
- No need for complicated and expensive cutting edge technologies
- Minimize ozone depletion
- Reduce urban heat island effect



What Constitutes a Sustainable Home?



- Minimize environmental impact on the site
- Climate appropriate passive design to reduce the need for artificial cooling and lighting
- Energy efficient and use of renewable energy
- Reduce dependence on municipal water supply
- Use materials that are environmental friendly
- **Reduce, re-use and recycle materials**

Case Study

BUKIT LEDANG GARDEN *Damansara Heights, Kuala Lumpur*

Site Layout



Preservation of site, with houses stepped up the hill, therefore minimizing the cutting of the hills

Good Orientation

Quality of local environment



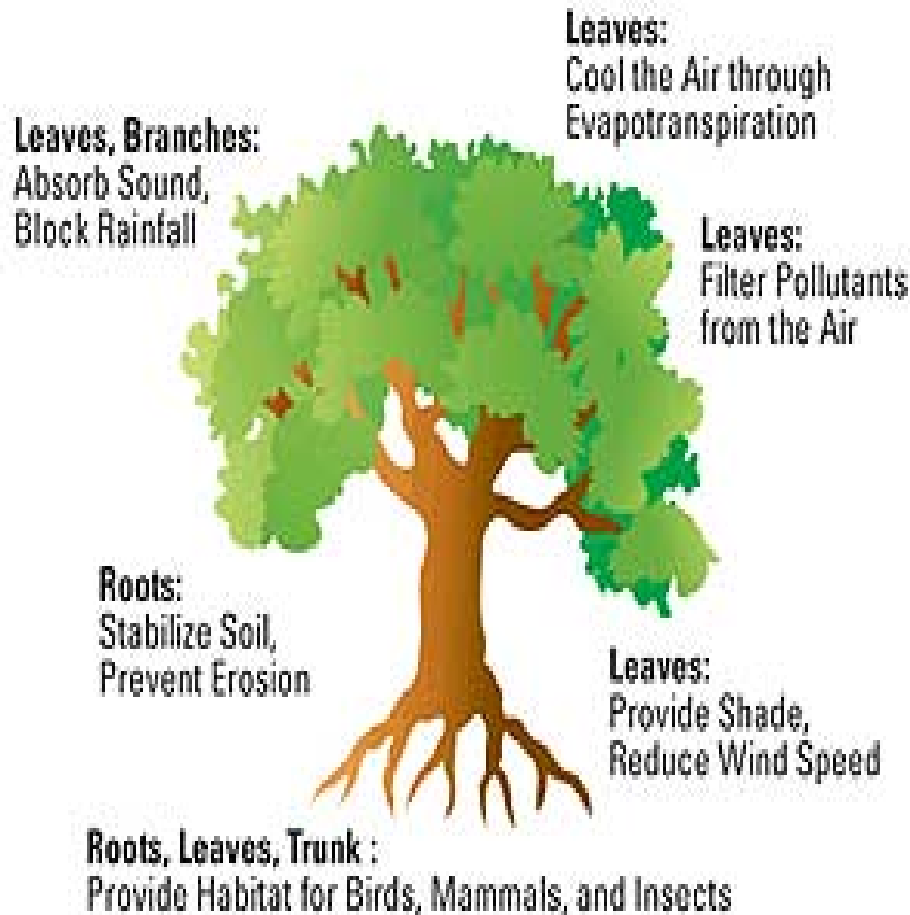
1. Landscape is an integral design element for shading and cooling the environment

2. Water garden which also helps to cool down the environment

3. Minimization of exposed heat absorbing hard surfaces

4. Waste heat dumped to swimming pool and to hot water tanks instead of being released to adjacent houses

Extensive Landscaping



Reduce heat island effect through planting of trees and vegetation

A mature tree with 9m crown transpires approximately 150 litres per day and that corresponds to evaporative cooling of about 8 kW ~ **three split aircon units.**
(~ 100W/m² of tree footprint area)

Trees provide shade for people and buildings

“The surrounding environment around the house is green to reduce temperature, rather than paved areas which absorb heat and increase the ambient temperature”

[Back](#)

Features to reduce use of fossil fuel



1. Well insulated roof and walls

2. Shading Element

3. Solar control glass

4. Air Tight Sliding door

5. Movable sun screen

1. Well insulated walls and roofs to minimize heat gain into the house
2. Shading element to block direct solar radiation
3. Solar control glass to minimize heat gain through radiation
4. Air tight sliding door gives the flexibility of having natural ventilation or a well sealed air conditioned space
5. Movable sun screen helps to provide exterior shading

Features to reduce use of fossil fuel

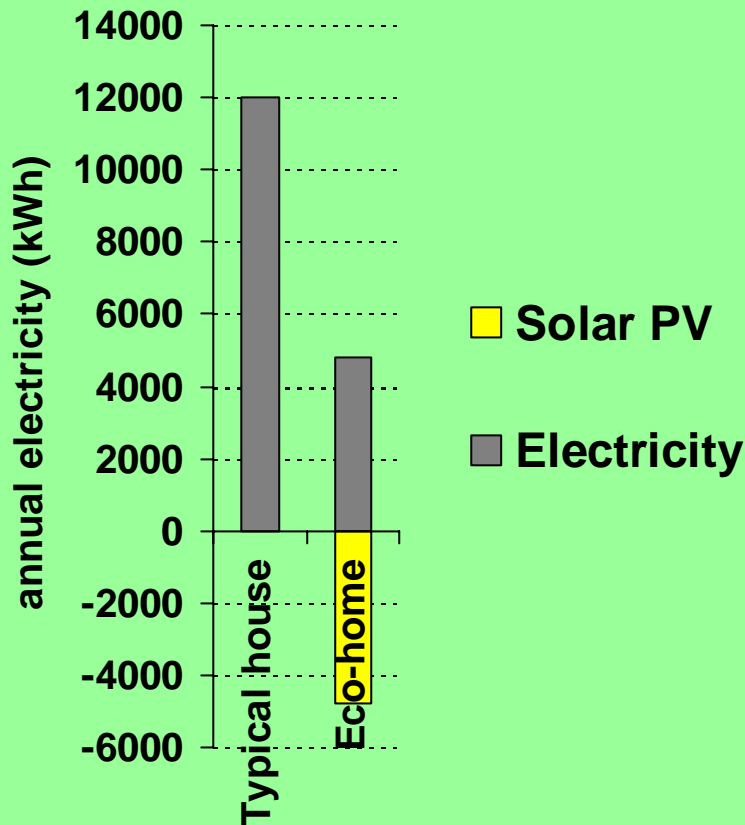


4 KW Solar PV System

1. Green Roof Terrace and courtyard

2. Extensive landscaping, minimum hardscape

Solar PV System on the Eco-Homes in Bukit Ledang



4 kW Solar PV system produces 4,800 kWh electricity in a typical year. Enough to power an entire energy efficient Eco-home.

The electricity consumption for a typical house is 1,000 kWh per month or 12,000 kWh per year.

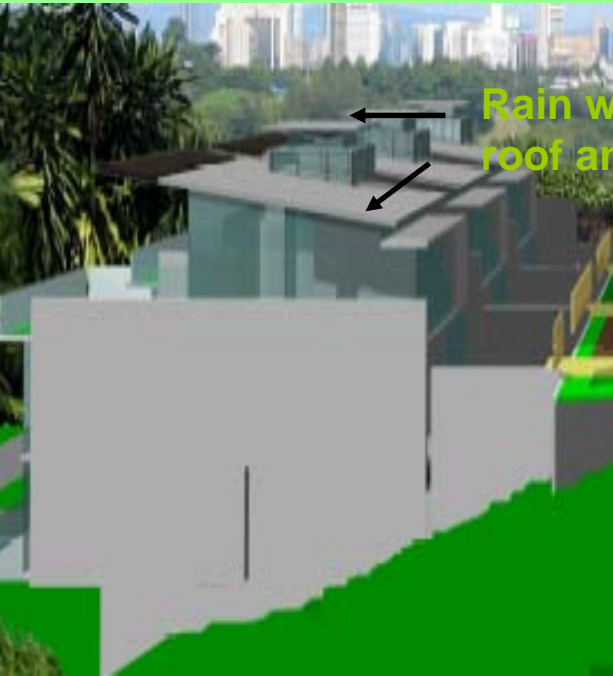
Producing electricity from solar is environmentally friendly so no pollution is created

Does not contribute to local and global warming because no fossil fuel is burnt.

The PV cells are maintenance free.

Water conservation and re-use

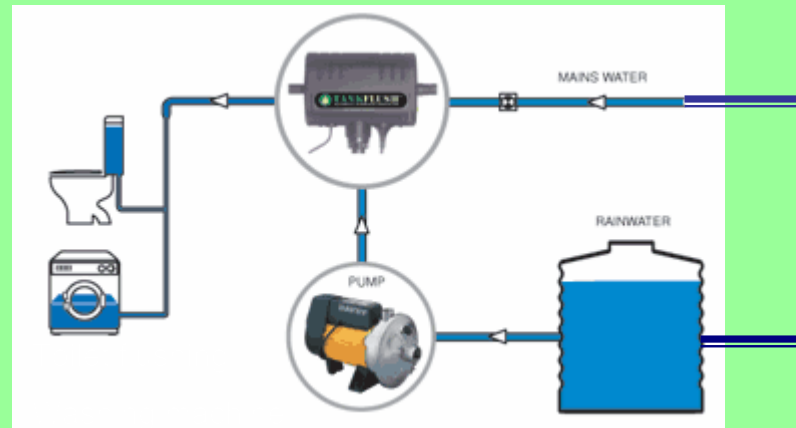
Rain water Harvesting



Rain water collected on roof and PV



Malaysia (Kuala Lumpur) has an average rainfall of 94.2 inches annually. Rain water is abundant and free.



Water Efficient Fixtures



Low flow dual flush cisterns:
3 and 4.5litres/flush



Constant flow regulator installed at taps

Recycling during construction

Construction Stage

On-site separation of materials



Concrete with re-bars can be crushed and recycled separately

Material sorting policy



Containers to be clearly labeled and construction personnel trained in material sorting policies

Recycling during use

Malaysians generate 15,000 tonnes of waste a day.

About half of the garbage is domestic waste

Only 5% of the waste is recycled, with the rest ending up at the dump site

The Strait Times, April 2003



A recycling corner will be set up where the occupants can separate the different types of trash which are recyclable.

Indoor Environmental Quality

- Visual Comfort

- Daylight is maximized (without admittance of sunlight, no glare no heat)
- Greenery in the surrounding also makes it pleasant to the eyes
- Good orientation and shading prevents glare and allows the enjoyment of view to outside

- Thermal Comfort

- Designed to be naturally ventilated and then complemented with air conditioning as and when required

Indoor Environmental Quality

- Indoor Air Quality
- Air is clean and fresh due to lots of greenery in the surrounding environment
- Materials, Finishes and Furnishings used are natural and non toxic
- Materials, Finishes and Furnishings with no Volatile Organic Compounds (VOCs) and no formaldehyde emissions are used

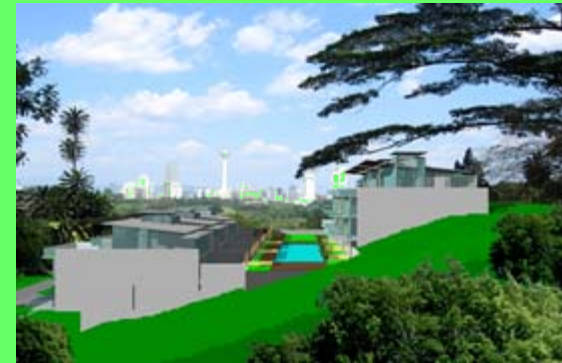
Sustainable Materials

- **1. Paints and primers used are low in Volatile Organic Compounds (VOCs) and environmental friendly.**
- Examples include Nippon Odour-less paint and HP Deco Fresh 202 water-based low VOCs anti bacterial paint
- **2. Materials with recycled content**
- This includes steel, aluminium and wood whenever possible.
- **3. Products which contain Persistent Bioaccumulative Toxic Chemicals (e.g. lead, mercury, cadmium) are avoided.**
- Careful selection of products which include paints, varnishes, vinyl covering, sealants etc.

Sustainable Housing

- ✓ Reduces our negative impact on the local environment
- ✓ Reduces our impact on the global environment
- ✓ Sustainable houses are more comfortable and more healthy to live in
- ✓ Sustainable housing are affordable

**Sustainable Housing because
we cannot afford not to**



*Meeting our present needs without compromising on the ability
of the future generations to meet their needs*

**Thanks You,
Poul E. Kristensen**

www.ecohomes.com.my Eco Homes Malaysia Sdn Bhd
www.ien.com.my IEN Consultants Sdn Bhd