Environmental Friendly

Items purchasing and usage Guide for Home Owners

60 MILLION SQUARE FEET CERTIFIED GREEN BUILDINGS

*Image from Green Building Index

This is an in detail guideline for residential end user to understand better on environmental friendly items and the current incentives available before purchasing them. A Green building would not be complete without its end users supporting its cause.

Interior equipment ranging from mechanical or electronic items or even finishes or furniture, can contribute to the carbon footprint of your residential home significantly. The benefit for purchasing environmental friendly items does not only decrease your electricity and water usage, but saving you financially and improve your indoor environment quality.

DID YOU KNOW THAT....

Building Users who pay attention to improve their home surrounding by reading the building user manual or environmental friendly purchasing guide or self initiative are found to be more productive at home and have better sense of responsibility over their home and mother nature.

CONTENT

1. LIGHTING

1.1 Energy Saving Lightings

Investing into Energy Efficient Lighting is one of the cheapest and fastest ways of recovering the initial investment cost and cutting down your household carbon footprint.

DID YOU KNOW THAT....

Choosing the right light bulb is not only about saving energy but essential to a healthier living environment for everyone?

The usage of a correct light bulb can offer a lot of ergonomic benefit; it could affect your eyesight and also working performance. Spend some time analyzing the packaging before purchase. There is a lot of information to help you on decision making. Here are some guides:

i) Purpose & Light Fixture

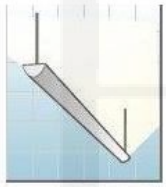
The performance of bulbs depends on which kind of light fixtures are they fixed upon, and what purpose are they used for. It depends if it is a functional task lighting, general or ambient lighting. The more transparent the lighting fixture is, the higher luminious (*measurement of brightness*) efficacy.

Shading the light will normally decrease efficacy but increase the directionality and the visual comfort probability. Thus choose a lightbulb based on the lighting fixture design to ensure it delivers the lighting performance you desire for.


Task Lighting, Fixed and Furniture Integrated


Portable Task Lighting


- Decorative Pendant Downward Light


Suspended Linea Fluorescent Luminaire


Recessed Round Downlight


- Recessed Square Downlight

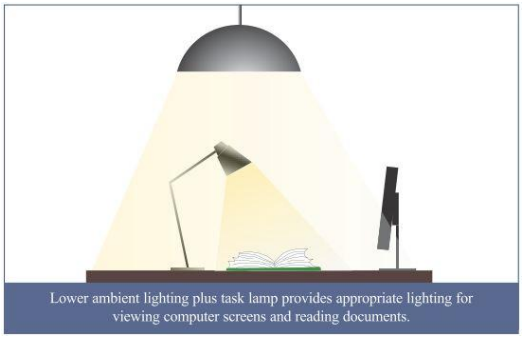
ii) User

Different users have different lighting preference according to their own eyes capability. However, lighting plays an important role for the elderly. Insufficient lighting due to the aging of eyes and the physical disability that restricts them from natural lighting could affect their health, such as sleeping disorders and depression. They may require from 2, up to 3 times more intense lighting requirement compared to the general lighting recommendations.

iii) Brightness

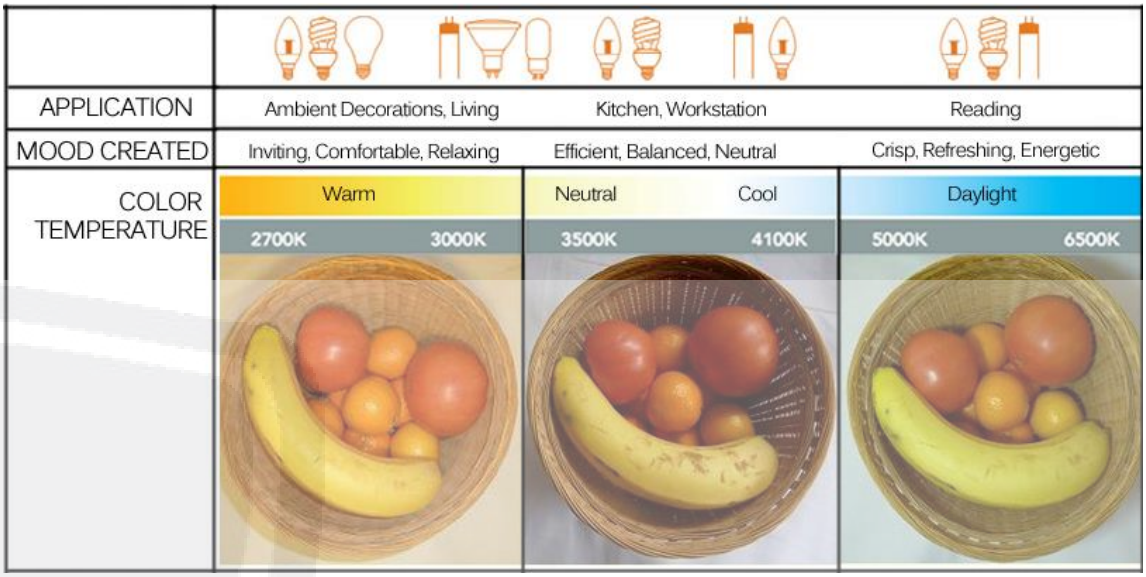
The brightness of a source will direct the focus of the user. Do consider the duration of usage as the specific light source as over a longer span of time it may strain your eye instead.

Choose to have a contrast setting of light when it is long duration of work and also remember that desktops or television are also source of light, thus surrounding ambient lighting is advisable to be dimmed.


Lower ambient lighting plus task lamp provides appropriate lighting for viewing computer screens and reading documents.

iv) Lighting Temperature

One of the characteristic of any light bulb is light color temperature; Light color is measured on a temperature scale referred to as Kelvin (K). Contradicting to common belief, CFL Compact Fluorescent Light Bulbs today have a wide range of color temperature available to suit your needs. This is a guideline of choosing light bulb prior to lighting color.



DID YOU KNOW THAT....

The unit for power is Watt (W). A 60W bulb, for example, uses much more electricity than an 11W bulb. But wattage is NOT a measure of how much light you get – only how much energy is consumed. To find out how much light is emitted, you must look at the number of lumen or candela.

v) Energy Efficient

Buying an Energy Efficient light bulb does not only help you to reduce carbon footprint but your electricity bill too! But choosing to use CFL instead of traditional incandescent, you can save up to 3 times of electricity bill and also avoiding frequent change of light bulb.

DID YOU KNOW THAT....

CFLs are made of glass and can break if roughly handled. Always screw and unscrew the light bulb by its base and avoid forcefully twisting it. Dispose CFL bulbs carefully by recycling it to the nearby available facility. CFL contains mercury vapor that is harmful to the environment and ourselves.

	Incandescent Bulbs	CFL Compact Fluorescent Lights	LED Light Emitting Diodes
Cost	Very Low <RM5	Slightly Expensive >RM10	More Expensive >RM30
Lifespan (Hours)	1200	8000	50000
Watts estimated to produce 1000 lumens (Brightness)	90	20	10
Efficiency	10% Light, 90% Heat	3-4 times less energy than incandescent.	2-3 times more efficient than CFL, up to 10 times more efficient than incandescent.
Remarks	Unnecessary Heat affecting room temperature hotter.	Care must be taken if breaks, contains a small amount of mercury.	Least amount of heat release, durable, but may not be right for all applications.

1.2 Timers

It is essential for us to activate aesthetic purpose lightings only at necessary hours, rather overnight. Timers have buttons or a knob that turns on a light for a preset amount of time. Timer switches can be programmed in various ways and occupants shall study the most effective activating hours. Such exampels are:

- Switching on lights only during evening with a seasonal algorithm.
- Switching on your air-cond only for the first hour upon entering room for sleep.
- Other related purpose to saving electric energy by consuming it only when required, switching equipment on, off, or both at times required by some process.

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1.3 Sensors

Sensor functions to the purpose of regulating the activation of something only when there is a need to it. It can be used for a lot of purpose, such as lighting, ventilation or water levels. The potential saving from these devices range from 15% to 90%, depends on how do you utilize and program it. There are various sensors program differently:

- Motion Sensor

  Motion Sensor is suitable to be placed in Low Traffic Room such as closets, guest rooms, storage rooms, bathrooms and your outdoor area. This is good when you accidentally turn on the light for a long period. The usage is also appropriate for security provisions, for example lighting up an area outside the balcony or garden if any motion is detected.

- Lighting Level Sensor

  Light Sensor assists you in making sure that you do not switch on lights at unnecessary brightness level. This will make sure that your room is sufficiently lit if it is dark. The master switch can be overwritten to deactivate it when your presence is absence.

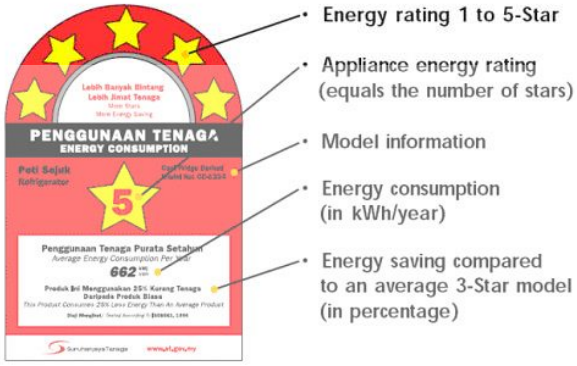
2. MECHANICAL AND ELECTRICAL APPLIANCES

2.1 Energy Labelling

The Energy Label shows the energy efficiency rating and the energy consumption of the appliance.Occupants are encouraged to purchase any appliances or devices that has energy/eco labels endorsed. There are various Energy Labels for Energy Appliances in Malaysia here are the 3 common types:

i. Malaysia Star Label

Malaysia's Star Label is managed by Energy Commission of Malaysia, the energy efficient products that are categorized to Refrigerators, Fans, Televisions, Air Conditioners (Single Split wall Mounted Type) and Lamps. Kindly visit their website at *WWW.ST.GOV.MY*.



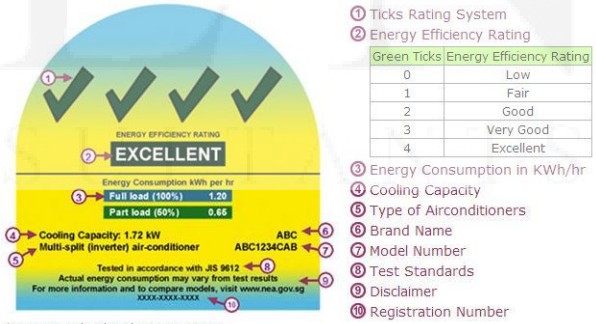
The least energy efficient products are labelled with a "One star" and the most efficient products with a "Five Star" rating. The "Star" rating for each model is shown by the comparative label that will be used for models approved by the Energy Commission.

An Endorsement label by Energy Commission will used and only applicable for products with the approved "Five Star" rating. These labels would be affixed on energy efficient refrigerators by the manufacturers. The comparative ranking of refrigerators was based on the results of energy performance of refrigerators that had been tested by SIRIM

ii. Singapore Green Label

The Energy label is issued by Singapore's National Environment Agency NEA and is mandatory for registered suppliers of air conditioners, refrigerators and clothes dryers to affix the Energy Label on their appliances.

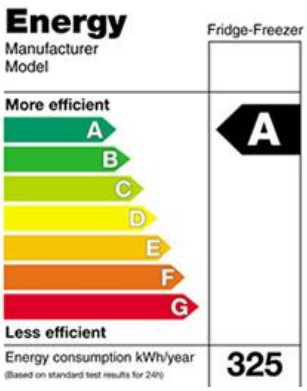
The energy efficiency rating is expressed in green ticks: 0 ticks (low), 1 tick (Fair), 2 ticks (Good), 3 ticks (very Good), and 4 ticks (Excellent). Visit *APP2.NEA.GOV.SG* for more info.



* Source: National Environment Agency

iii. European Union Energy Label

EU Energy label was initiated since the mid of 2010. The efficiency is rated from A to G which is from the most efficient to the least efficient.



2.2 Refrigerator

During Buying

- **Refer to the Energy Labeling or the Power Consumption**
  Usually Energy Efficient Refrigerator at the capacity of 200litres will range below 250kWh/year, while 400litres below 350kwh/year. *(Check http://www.st.gov.my for recommendations)*

- **Consider buying a refrigerator with a top-mounted freezer.**
  Models with top-mounted freezers use 10–25% less energy than bottom-mount or side-by-side models.
- **Purchase an appropriately sized refrigerator.**
  Generally, the larger the refrigerator, the greater the energy consumption needed.
- **Consider skipping the ice-maker and dispenser.**
  Automatic ice-makers and through-the-door dispensers increase energy use by 14–20%.

During Usage

- **Set the appropriate temperature.**
  Keep your refrigerator at 3 to 5°C (37 to 41°F) , freezer at −18 °C (−0 °F).
- **Place your fridge in a cool place.**
  Position your refrigerator away from a heat source such as an oven, a dishwasher, or direct sunlight from a window.
- **Allow air circulation behind the fridge.**
  Leave a few inches between the wall and the refrigerator, and keep the condenser coils clean if you have an older model. Read the user's manual to learn how to safely clean coils. Coil cleaning brushes can be purchased at most hardware stores.
- **Check the door seals.**
  Make sure the refrigerator seals around the door are airtight. If not, replace them.
- **Keep the door closed.**
  Minimize the amount of time the refrigerator door is open

Simple Calculation guideline for Refrigerator Energy Efficient Factor:

$$\text{Energy Efficiency Factor (EEF)} = \frac{\text{Adjusted Volume (liters)}}{\text{Energy consumed per day (kWh)}}$$

EEFaverage (1 door) = 1:37 Vadj - 62.1

EEFaverage (2 door) = 0.33 + 66.2 Vadj

The STAR Index values for the Star Ratings, as shown below:

Star Rating	STAR Index Value
5	+25% ≤ STAR Index
4	+10% ≤ STAR Index <+25%
3	-10% ≤ STAR Index <+10%
2	-25%≤ STAR Index <-10%
1	STAR Index <-25%

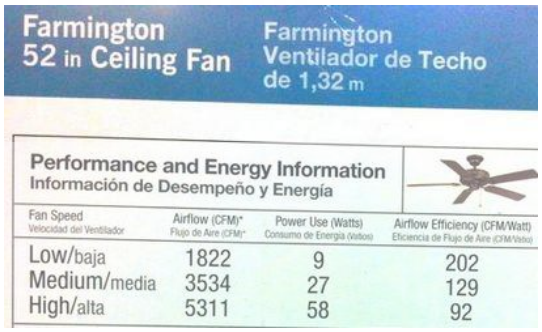
DID YOU KNOW THAT....

Refrigerator accounts for up to as much as HALF of your household energy usage. Any heating/cooling devices consumes the most energy usage and shall be avoided if unnecessary.

2.3 Fans

During Buying

- **Refer to the Energy Labeling or the Power Consumption**
  (Check http://www.st.gov.my for recommendations)
- **Choose a fan with high airflow efficiency**
  Choose a fan with high airflow efficiency (CFM/watt), this means that more air flow can be delivered with the same amount of energy. Ceiling fan airflow is measured in cubic feet per minute (CFM) or cubic meter per minute (m3/min). Power use is measured in watts.
  Energy Star's minimum airflow requirement is 1250 CFM with an efficiency of 155 CFM/watt.
  At high speed the requirement is 5000 CFM and 75 CFM/watt.
- **Choose programmable fans**
  Some ceiling fans are programmed for a variation of fan speeds as so the usage of high fan speed, typically not efficient, can be reduced.



During Usage

- **Switch off the fans when leaving room**
  Fans do not cool air, they cool people.
- **Clean the fan blades frequently**
  Accumulated dust affects the air flow performance of the fan.

DID YOU KNOW THAT....

It is NOT necessary to switch on your fans all the time, this is possible by ensuring sufficient ventilation through your room by opening all windows and doors to provide you air movement to cool your surroundings.

Simple Calculation Guide for COP. COP is Coefficient of Performance, which is also the efficiency of fan.

$$COP = \frac{\text{Air Delivery (m3/min)}}{\text{Input Power (W)}}$$

$35ft^3 = 1m^3$

The Star rating, based on the COP values is as shown beside:

(A) Ceiling Fans

Star Rating	COP (m3/min/W)
1	2:50 to 2:57
2	2:58 - 2.65
3	2.66 - 2.73
4	2.74 - 2.99
5	≥ 3.00

(B) pedestal, Wall and Table Fans

Star Rating	COP (m3/min/W)
1	1:00 to 1:03
2	1:04 to 1:07
3	1:08 to 1:11
4	1:12 to 1:19
5	≥ 1.20

2.4 Television

During Buying

- **Refer to the Energy Labeling or the Power Consumption**
  (Check http://www.st.gov.my for recommendations)

  Generally an energy efficient 40-42 inch LED television should have an annual Energy Use (kWh) around 100. While for 48-52 inch should be around 125kWh. (Assuming 5hours of TV use per day)

- **Size Consideration.**
  Bigger size does not only consume more electricity but giving inappropriate viewing experience. Refer below for recommendations and buy only what is appropriate:
  Viewing Distance: .60-1.50 m/Screen Size: 21"-27" (53-68 cm)
  Viewing Distance: 1.8-2.4 m/Screen Size: 32"-37" (81-94 cm)
  Viewing Distance: 3.0-4.0 m/Screen Size: 42"-46" (106-117 cm)
- Most energy saving Television would be LCD with LED backlight, follow by LCD with fluorescent backlight and plasma subsequently.

During Usage

- Ensure you switch off your appliances completely when not in use. Remove the plugs as estimated 15% of energy is still running as standby loads.

STAR Index for Televisions can be calculated from the formula below:

$$\text{STAR Index} = \frac{EEF_{tested}}{EEF_{average}} - 1 \times 100\%$$

Where,

$$\text{Energy Efficiency Factor (EEF)} = \frac{\text{Screen Area (cm2)}}{\text{Annual Energy Consumption (kWh)}}$$

Annual Energy Consumption (kWh)

= 0.365x[(Ponx5)+(Ppsx(19-Tas)+(PasxTas)]

Pon = Power at on mode (W)
Pps = Power at passive standby mode (W)
Pas = Power at active standby mode (W)
Tas = Time on active standby mode (hour)
EEFaverage = 0.0012 x (screen area) + 6.322

Star Rating	STAR Index Value
5	+20%≤ STAR Index
4	+10%≤ STAR Index <+20%
3	-10%≤ STAR Index <+10%
2	-20%≤ STAR Index<-10%
1	STAR Index <-20%

2.5 Air Conditioner

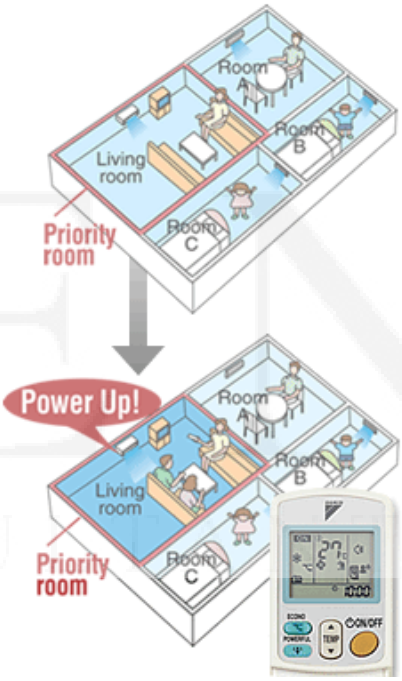
Air Conditioner is one of the highest household's energy consumption appliances. Instead of the conventional spilt air conditioning system, a multi split air contitioners a system that has one outdoor unit and multiple indoor units. The indoor units can be wall mounted splits, floor or ceiling consoles or even ducted bulkheads which can be concealed in small spaces.

Preferential Air Conditioning

The Priority Room Setting delivers preferential air-conditioning plus priority control over the 3 functions below to the selected room when using multi-split air conditioners.

When power operation is selected in the prioritized room, the capacity to that room's indoor unit is increased for 20 minutes by shifting the capacity from a unit in another room.
Note: Capacity in other rooms may decrease slightly.

The operation mode (cooling/heating) in the selected room is given priority. When the mode of a unit in another rooms is different than that, the other unit is placed on standby.
Note: The operation mode for the selected room cannot be changed from another room.



DID YOU KNOW THAT....

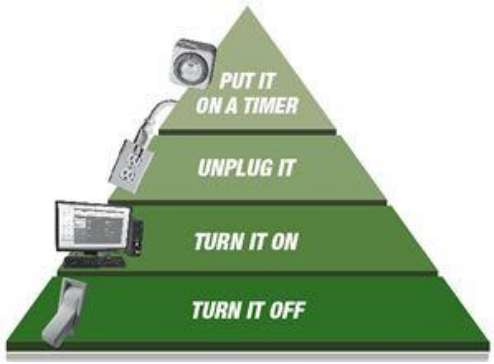
By putting your Air Conditioner on Timer program to be switched off after 1 hour of usage could save you up to 80% of your typical overnight air conditioner energy usage.

During Purchasing

- As for replacement, Users are to purchase multi split unit component to replace any unit upon defects.
- Purchase unit that has endorsement by Energy Label or Star Label.
- Understand the performance of air conditioner is determined by COP Coefficient of Performance. A larger COP means greater energy efficiency, resulting in less electricity used and thus saving energy and money.

COP = Capacity (kW) / Power Consumption (kW)
A good multi split air conditioner unit COP should be above 3.

2.6 Plug Loads



Plug load is the electric usage load from plugged-in devices (excluding heating and cooling systems or larger appliances like refrigerators) on household outlets. It typically accounts for 20 percent of a home's energy usage and includes devices that use electricity while they're plugged in, even when they're turned off (phantom load).

Besides purchasing Energy Efficient products, users are encouraged to reduce their plug loads by "Climbing the Plug Load pyramid". This can be applied in your workstation or entertainment system.

i) Turn it Off
- Turn off any Electrical Devices if you are not using them.

ii) Turn it On
- Enable Power Management on both your monitor and computer to drastically reduce their electricity use, e.g Set "Hibernate" mood to be automated activate after 2 minutes away from desktop.

iii) Unplug It
- Unplug your electronic equipment that won't lose any essential settings. Use a **Smart Power Strip** for easy unplugging of computer workstations. (See beside)

iv) Put it on a Timer
- Use a timer for electronic equipment you don't need all the time but want to be ready when you need to use it. Such as computer routers, tool chargers, or lights.

<u>Monitoring the loads</u>
Advance homes have pre installed Building Energy Management System that monitors the every aspect of energy usage in their home. However, you could do so too without it by having a good habit of monitoring and understanding how to reduce their plug load with the help of few simple appliances. These plug load meters can be purchased starting from RM80 in hardware stores.

3. Water Saving Features

Installing water efficient sanitary ware, appliances and devices can significantly lower the water consumed by a building. Devices can also be fitted to monitor and record water use in order to understand occupant usage pattern.

DID YOU KNOW THAT....

Malaysians use an average of 226 litres of water per person daily, which is way above our South-East Asia neighbours. Singaporeans use 154 litres (and intend to lower it to 147 litres by 2020) while the Thais manage with 90 litres.

Water efficient sanitary ware includes low flush, dual cistern WCs, motion sensor and dry urinals, low flow showers and taps with flow restrictors. Water flow performance is evaluated by **Litres Flow per Minute**. Following is a guide for you during purchasing water fittings.

FITTINGS	GOOD RATING	VERY GOOD RATING	EXCELLENT RATING
Shower Taps, Mixers & Showerheads (L/min)	>7 to 9	>5 to 7	5 or less
Basin Taps & Mixers (L/min)	>4 to 6	>2 to 4	2 or less
Sink/Bib Taps (L/min)	>6 to 8	>4 to 6	4 or less
Flushing Cisterns – Dual Flush Type (L/flush)	>4.0 - 4.5 (full flush) > 2.5 -3.0 (low flush)	>3.5 to 4.0 (full flush) > 2.5 – 3.0 (low flush)	3.5 or less [1] (full flush) 2.5 or less (low flush)
Urinals & Urinal Flush Valve (L/flush)	> 1.0 to 1.5	> 0.5 to 1.0	0.5 or less [2] Or waterless urinals

Sensor Programming

Sensor taps with a flow rate of 2litres/min can cut off water supply when the hands are removed from under the tap, or when the preset timing of 15 or 30 seconds is reached. Self closing taps also help to prevent running tap after use. Combinations of regulators and self-closing taps can achieve significant savings.

Install self-closing delayed action taps (timing of between 2 and 3 secs) at all wash basins. The Flow rate should be 2litres/min

Install self-closing delayed action shower tap (timing not exceeding 15 secs) at all showers. The flow rate should not exceed 7litres/min

Install constant flow regulators and adjust flow rate to less than 6 litres /min for all bib taps and sink/kitchen tap.

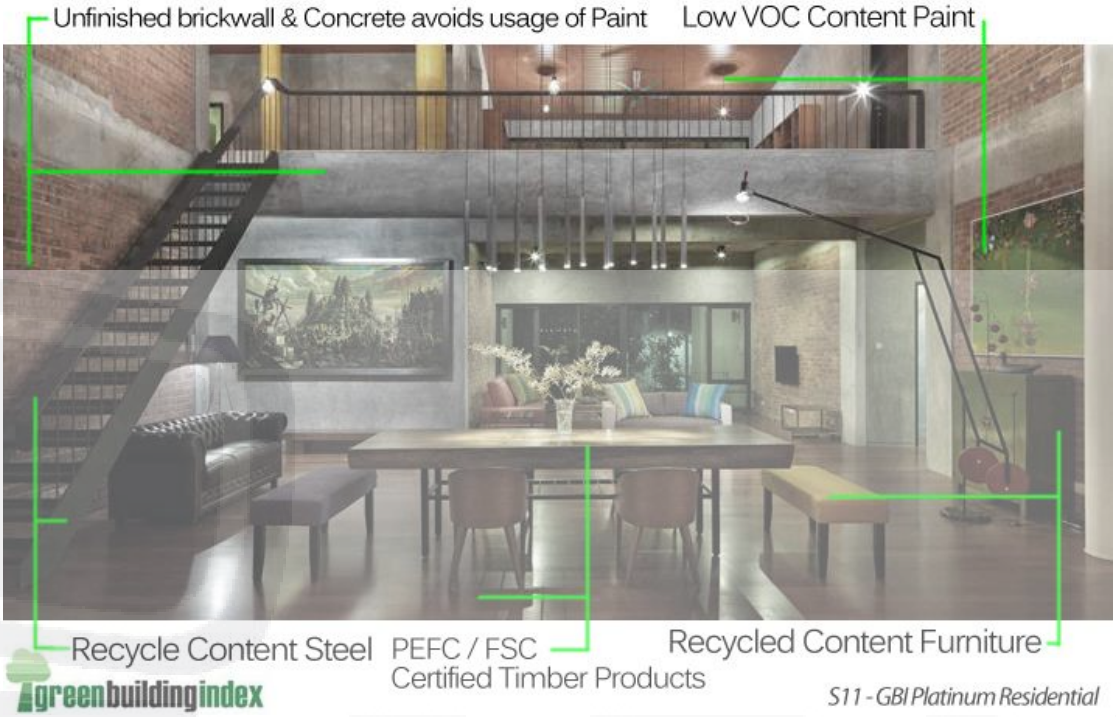
Dual Flush LCFCs

Dual flush low capacity flushing cisterns should be used. Each flushing should use 4.5 litres or less of water for a full flush and less than 3 litres for a half flush

Install aerators on all of your taps. An aerator is a small shield inside the tap, which aerates the water to reduce the flow without losing water pressure. They are cheap and effective.

4. Interior Design

Sustainable interior design is essential to ensure an overall low carbon footprint impact of a household and also a healthier living air quality. Even though it does not process your daily electricity and water quantity, these items have significant life cycle impact on how they were produced and going to be disposed after usage.



4.1 Low VOC

Volatile organic compounds (VOCs) such as chlorinated solvents and fuel components and other hazardous chemicals are contained in many construction materials and furnishings. They can be found in paints, adhesives, solvents, cleaning agents, caulks, wood products, carpets and sealants.

DID YOU KNOW THAT....

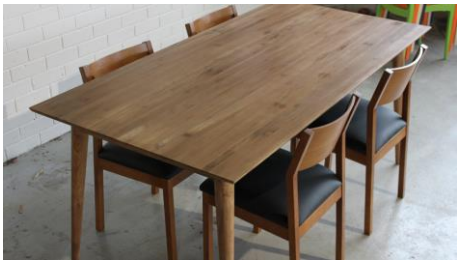
New homes and commercial buildings generally have VOC concentrations that are 2 to 10 times higher than comparable older structures.

These harmful substances which evaporize into the air we breath or the water we drink can be life threatening. Key signs or symptoms associated with exposure to VOCs include conjunctival irritation, nose and throat discomfort, headache, allergic skin reaction, dyspnea, declines in serum cholinesterase levels, nausea, emesis, epistaxis, fatigue, dizziness.

Low VOC products can be purchased easily as it is available widely in market. Refer to the packaging to search for the green labels or ask for more details.

4.2 Sustainable Timber

Support ecofriendly, sustainable timber by purchasing timber from companies with the endorsement of various responsible forestry management organizations. Timber certification is a market-linked tool to promote and encourage sustainable forest management as well as to provide an assurance to buyers that the timber products they buy come from sustainably managed forests.



Key Timber Certification Program Definitions

FSC : Forest Stewardship Council

- A global, independent, not for profit organization established to promote the responsible management of the World's forests.
- Develops forest management and chain of custody standards, delivers trademark assurance and provides accreditation services.
- FSC certified forest products are verified as responsibly harvested from the forest of origin through the supply chain.

PEFC : Program for the Endorsement of Forest Certification

- Similar to FSC in aims and offerings but slightly different approach.
- Certification system of choice for small, non industrial private forests .
- Certified 245 million ha, and 750,000 forest owners and having almost 10,000 various companies under Chain of Custody

MTCC: Malaysia Timber Certification Council

- An independent organisation established to develop and operate the Malaysian Timber Certification Scheme (MTCS).
- To provide independent assessments of forest management practices in Malaysia as well as to meet the demand for certified timber products.

<u>Chain of Custody</u>

By visiting *MTCC.COM.MY* , you can view the Chain of Custody certificate holders. The various label provides certification of the chain of links between the forest where a product originates and the consumer. For example with wood furniture, each of the following businesses involved in transforming a tree into a piece of furniture would have to be FSC certified in order for that furniture piece to be FSC certified. It's called the "chain of custody"

The Chain of Custody extends to various products for the end users, such as stationaries, furniture, wooden flooring, wooden deck, plywood finishing, all these could be purchase by certifications endorsed companies.

DID YOU KNOW THAT....

Malaysia has one of the fastest deforestation rate in the World. Total deforestation in Sarawak is 3.5 times as much as that for entire Asia, while deforestation of peat swamp forest is 11.7 times as much.

4.3 Local & Recycle Content Item

It is important to purchase local or recycle content material, as this will cut down the carbon footprint of the building significantly as it avoids shipping cost and also recycling prevents harvesting form natural resources unnecessary.

Buying Local Made Items

Locally harvested natural resources and local community produced products is not only environmental friendly by eliminating complicated logistics arrangement but socially benefit the local community too by sustaining local business.

Buying Recycled Content Items.

Recycled Content Item is not only environmental friendly by eliminating the carbon footprint of manufacturing phase of its life cycle analysis. Commercial recycled content items are equally good in quality as they go through machinery assembly procedure and the same finishing touch up as the conventional products



DID YOU KNOW THAT....

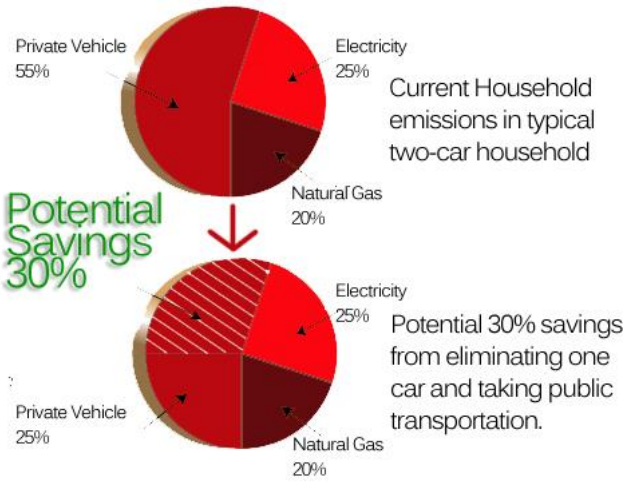
Many consumers are amazed at the options available when choosing recycled and remanufactured furniture. Instead of a pre-determined selection of colors, fabrics and finishes, remanufactured office furniture allows you and your designer complete creative freedom.

It is also commonly achieve by DIY "Do It Yourself" , which can be quite fun and satisfying as a family activity. It offers a unique aesthetic value to your interior design. Some example of DIY recyclable furniture made of wooden pallets, bamboo and steel pipes.



5. Transportation

Nevertheless our transportation accounts for the largest energy consumption in our daily lifestyle. This can be as much as half of the total household energy demand especially when each one has his own private car. We could save not only mother nature, but time for being stuck in traffic jams and money for the fuels by:



Participating Car Pooling & Public Transport & Bike

Car Pooling

Car Pooling does not only lessen the amount of cars on the roads and avoid traffic jam, it could save you financially if cost is being shared out. Also it is socially encouraging to have someone to share your daily routine experience on the way back.

Public Transport

Public Transport such as bus and LRT light rail transits can save you time and be worried free of the safety of your vehicle. However the efficiency depends on your journey, so make sure you plan your journey ahead from your home to your destination.

Having a smart phone can assist you in many ways today. From booking a taxi to checking bus route maps, all it takes is to learn how to be efficient within the duration of waiting for public transport.

Biking/Walking

Investing into a bicycle or foldable bicycle can help a lot if you are staying in the city center by complementing with public transportation. Foldable bike solves the last mile journey; however it depends on each individual's journey. Starting price is around RM800 and higher end models with lighter weight are usually more than RM1500.

DID YOU KNOW THAT....

Malaysia has the Highest vehicle ownership after the United States,
For just 28million people, with 11million cars and 9million motorcycles.
Our share of public transport in urban transportation is merely just 15%

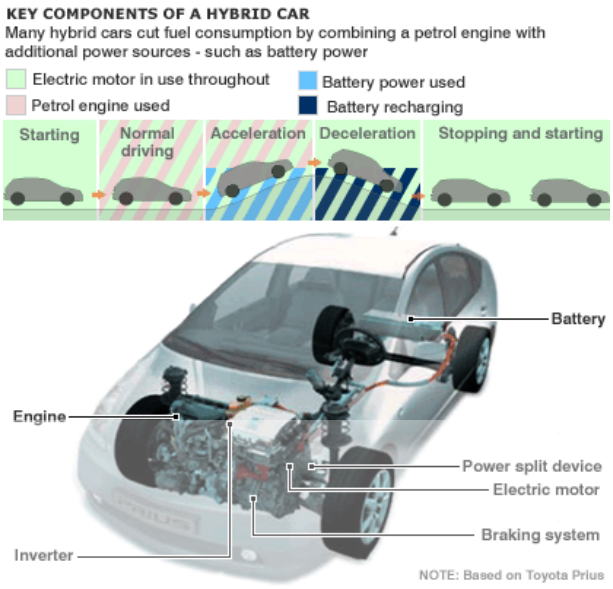
Purchasing Energy Efficient Transportation

Hybrid Car

A hybrid electric vehicle (HEV) is a type of hybrid vehicle and electric vehicle which combines a conventional internal combustion engine (ICE) propulsion system with an electric propulsion system.

Modern HEVs make use of efficiency-improving technologies such as regenerative braking, which converts the vehicle's kinetic energy into electric energy to charge the battery, rather than wasting it as heat energy as conventional brakes do.

If drive appropriately by utilizing the hybrid system, these cars fuel efficient can achieve as much as 34 miles per gallon (6.8 litres / 100km). Conventional cars mid size car use up to 11 L /100km, and a full size SUV will use up to 18L /100km. Thus you save up to HALF of your fuel consumption! Currently, more than 5.8 million hybrid EVs have been sold worldwide, led by companies such as Toyota, Lexus, Honda and Ford.



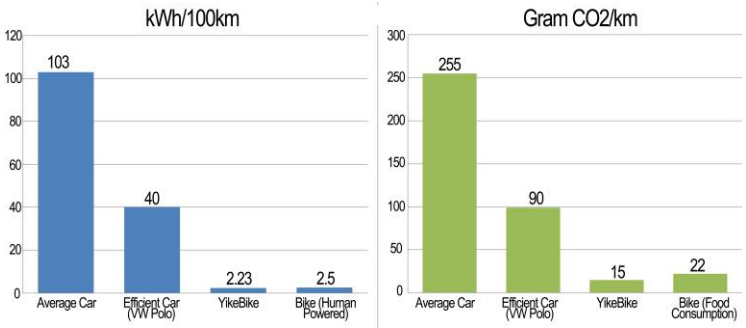
Electric Bike

Paddling during afternoon makes user sweat in this tropical humid country temperature, thus electric bike can be a good alternative for daily travelling with no sweating involve. Electric bike will be more fuel saving compared to electric car as they only transport a person and not the car's weight.

The market for electric bikes is growing in Malaysia and expecting a handful of product options soon. The battery pack can be taken out and be recharged at anywhere with a standard power outlet.

The world's smallest foldable electric bike is currently available in Malaysia. Yike Bike, weighing just 12kg and able to travel up to 10km per single charge which only cost RM0.10, this electric bike offers freedom of urban travelling with its mobility capability that could be folded within 15 seconds.

The Energy required and Carbon Footprint for different mode of transportation is illustrated below:



6. Energy and Water Auditing

Example of Energy Bill calculation

Since the electricity tariff are given in kWh (kilowatt hour), here is the formula to convert the Watt and Hour into kWh. ***W x Hours / 1000 = kWh***

Once we have the kWh, all we need to do now is to multiple with the rates given by Tenaga Nasional Berhad. Let us try calculating a few electrical appliances and see how much it cost to use them.

If you use a Philips 9W LED light bulb for 10 hours daily. How much would it cost per month?

1) First we need to get the kWh: -- **9W x 10Hours / 1000 = 0.09 kWh**

2) Once we have the kWh, we are able to calculate how much it cost to use per day.

0.09kWh x 21.8(rate) = 1.962sen per day

3) For a whole month, just multiply 1.962 with 30 because a month consists of 30 days.
1.962sen x 30days = 58.86sen

We can clearly see that the Philips 9W LED light bulb is truly an energy saver because it only cost 58.86 cents per month if we use it 10 hours a day.

DID YOU KNOW THAT....

A RM20 subsidy on monthly electric bills is provided by the Malaysian Government to all eligible TNB residential customers. This rebate has been offered since 1 October 2008. This rebate is offered to residential customers only. Electricity bills amounting to RM20 or less are eligible to receive this rebate, and this amount already includes any applicable discounts.

(Extracted from TNB website 1/2013 visit www.tnb.com.my for more details)

Example of Water Bill Calculation

Billing days : 33 days
Billing Period : 33 days/ 31 days (1 month) = 1.06 month:
Consumption : 40 m³

20 m³ x 33 days / 31 days	=	21.20 m³ x RM 0.57	=	RM 12.08
15 m³ x 33 days / 31 days	=	15.90 m³ x RM 1.03	=	RM 16.38
Remainder	=	2.90 m³ x RM 2.00	=	RM 5.80
TOTAL				RM 34.26

Billing days : 31 days
Billing Period : 31 days / 31 days (1 month) = 1.00 month
Consumption : 40 m³

20 m³ x 31 days / 31 days	=	20 m³ x RM 0.57	=	RM 11.40
15 m³ x 31 days / 31 days	=	15 m³ x RM 1.03	=	RM 15.45
Remainder	=	5 m³ x RM 2.00	=	RM 10.00
TOTAL				RM 36.85

Billing days : 27 days
Billing Period : 27 days / 31 days (1 month) = 0.87 month
Consumption : 40 m³

20 m³ x 27 days / 31 days	=	17.40 m³ x RM 0.57	=	RM 9.92
15 m³ x 27 days / 31 days	=	13.05 m³ x RM 1.03	=	RM 13.44
Remainder	=	9.55 m³ x RM 2.00	=	RM 19.10
TOTAL				RM 42.46

7. Electricity and Water Tariff Rates

DOMESTIC ELECTRICITY TARIFF RATE

"**Domestic Consumer**" means a consumer occupying a private dwelling, which is not used as a hotel, boarding house or used for the purpose of carrying out any form of business, trade, professional activities or services.

	TARIFF CATEGORY	UNIT	RATES
1.	**Tariff A - Domestic Tariff**		
	For the first 200 kWh (1 - 200 kWh) per month	sen/kWh	21.8
	For the next 100 kWh (201 - 300 kWh) per month	sen/kWh	33.4
	For the next 100 kWh (301 - 400 kWh) per month	sen/kWh	40.0
	For the first 100kWh (401 - 500 kWh) per month	sen/kWh	40.2
	For the next 100 kWh (501 - 600 kWh) per month	sen/kWh	41.6
	For the next 100 kWh (601 - 700 kWh) per month	sen/kWh	42.6
	For the next 100 kWh (701 - 800 kWh) per month	sen/kWh	43.7
	For the next 100 kWh (801 - 900 kWh) per month	sen/kWh	45.3
	For the next kWh (901 kWh onwards) per month	sen/kWh	45.4
	The minimum monthly charge is RM3.00		

**Electricity Rate obtain from Suruhanjaya Tenaga website dated 1/2013*

DOMESTIC WATER TARIFF RATE

WATER TARIFF

USAGE	TARIFF CODE	PRICE/CUM (RM)	MIN.PAYMENT (RM)
Domestic Usage 0-20 m³ 21-35 m³ 35 m³ and above	10	 0.57 1.03 2.00	 6.00
Commercial (Inclusive of Public Swimming Pool) 35 m³ 35 m³ and above	11	 2.07 2.28	 36.00
Government Department	12	1.61	17.00
Religious Places	13	0.46	6.00
Ship	14	4.23	
Charitable Organizations	15	0.58	6.00
* Condominium/Apartments	17	1.38	173.00
* Low Cost Flats/Apartments	18	0.80	35.00
* Army Camps/Estates/Govt. Quarters	21	1.00	12.00
* Applicable to bulk meter only.			

**Water Tariff Rate obtain from SYABAS website dated 1/2013*