GBI Hotel & Resort Tools

27th Feb 2014

Presented by:
Ir CHEN Thiam Leong
GBIAP Co-Chair

Greening Hotels & Resorts

Hotels/Resorts, being at the fore-front of international (guests) exposure, are expected to be responsive to the green initiative.

After all, with valuable experience gained in the past dealing with previous topical issues such as “Fire Safety Audit”, “Addressing harmful Ozone Depleting Substances”, “Promoting ECO practices” and so on, hotels/resorts have the upper hand to implement ***SUSTAINABILITY***.

Why green Hotels & Resorts ?

Going green pays ……..

- Greening strategies can translate into savings for energy and water
- Reduction in waste generation e.g. through recycling not only reduce operating costs but will also boost the hotel/resort image as a responsible outfit
- Achieve better indoor environmental quality which improves staff productivity and guest comfort

THE IMPACT OF THE BUILT ENVIRONMENT

Launch: 27 Feb 2014

NRNC: HOTEL **NREB: HOTEL**

NRNC: RESORT **NREB: RESORT**

GREEN BUILDING INDEX: NON-RESIDENTIAL (NC) HOTEL

GBI NRNC:HOTEL V1.0 27.2.14

DETAIL ASSESSMENT CRITERIA

Summary of Final Score

Part	Item	Maximum Points	Score
1	Energy Efficiency	35	
2	Indoor Environmental Quality	21	
3	Sustainable Site Planning & Management	16	
4	Material & Resources	11	
5	Water Efficiency	10	
6	Innovation	7	
TOTAL		**100**	
Green Building Index Classification:		86 to 100 points	**Platinum**
		76 to 85 points	**Gold**
		66 to 75 points	**Silver**
		50 to 65 points	**Certified**

GREEN BUILDING INDEX: NON-RESIDENTIAL (EB) HOTEL

GBI NREB:HOTEL V1.0 27.2.14

DETAIL ASSESSMENT CRITERIA

Summary of Final Score

Part	Item	Maximum Points	Score
1	Energy Efficiency	38	
2	Indoor Environmental Quality	21	
3	Sustainable Site Planning & Management	10	
4	Material & Resources	9	
5	Water Efficiency	12	
6	Innovation	10	
TOTAL		100	
Green Building Index Classification:		86 to 100 points	**Platinum**
		76 to 85 points	**Gold**
		66 to 75 points	**Silver**
		50 to 65 points	**Certified**

GREEN BUILDING INDEX: NON-RESIDENTIAL (NC) RESORT

GBI NRNC : RESORT V1.0 27.2.14

DETAIL ASSESSMENT CRITERIA

Summary of Final Score

Part	Item	Maximum Points	Score
1	Energy Efficiency	35	
2	Indoor Environmental Quality	16	
3	Sustainable Site Planning & Management	15	
4	Material & Resources	13	
5	Water Efficiency	12	
6	Innovation	9	
TOTAL		**100**	
Green Building Index Classification:		86 to 100 points	**Platinum**
		76 to 85 points	**Gold**
		66 to 75 points	**Silver**
		50 to 65 points	**Certified**

GREEN BUILDING INDEX: NON-RESIDENTIAL (EB) RESORT

GBI NREB: Resort V1.0 27.2.14

DETAIL ASSESSMENT CRITERIA

Summary of Final Score

Part	Item	Maximum Points	Score
1	Energy Efficiency	38	
2	Indoor Environmental Quality	16	
3	Sustainable Site Planning & Management	10	
4	Material & Resources	9	
5	Water Efficiency	14	
6	Innovation	13	
TOTAL		100	
Green Building Index Classification:		86 to 100 points	**Platinum**
		76 to 85 points	**Gold**
		66 to 75 points	**Silver**
		50 to 65 points	**Certified**

GBI NRNC & NREB (Hotel)

Part	Criteria	Item	Max Points	
	EE	**Energy Efficiency**	**NRNC**	**NREB**
	EE1	Minimum EE Performance	1	2
	EE2	Lighting Zoning	3	3
	EE3	Electrical Sub-metering	1	2
	EE4	Renewable Energy	5	5
1	EE5	Advanced Energy Performance - BEI	15	15
	EE6	Enhanced Commissioning	3	4
	EE7	Post Occupancy Commissioning	2	2
	EE8	EE Monitoring & Improvement	2	2
	EE9	Sustainable Maintenance	3	3
		EE total	**35**	**38**

EE2	Lighting Zoning		3
	Provide flexible lighting controls to optimise energy savings:-		
	All individual or enclosed spaces to be individually switched; and the size of individually switched lighting zones shall not exceed 30m² for 90% of the NLA; with switching clearly labelled and easily accessible by building occupants.	1	
	Provide auto-sensor controlled lighting in conjunction with daylighting strategy for all perimeter zones and daylit areas.	1	
	Provide motion or occupancy sensors or equivalent to complement lighting zoning equivalent to at least 25% NLA. For guestroom, master switch or access card switch or equiv to switch off all lights, fan, tv and airconditioning when room is not occupied will qualify as occupancy sensor.	1	

GBI NRNC & NREB (Hotel)

Part	Criteria	Item	Max Points	
	EE	**Energy Efficiency**	**NRNC**	**NREB**
	EE1	Minimum EE Performance	1	2
	EE2	Lighting Zoning	3	3
	EE3	Electrical Sub-metering	1	2
	EE4	Renewable Energy	5	5
1	EE5	Advanced Energy Performance - BEI	15	15
	EE6	Enhanced Commissioning	3	4
	EE7	Post Occupancy Commissioning	2	2
	EE8	EE Monitoring & Improvement	2	2
	EE9	Sustainable Maintenance	3	3
		EE total	**35**	**38**

EE5	Advanced or Improved EE Performance
	Exceed Energy Efficiency (EE) performance better than the baseline minimum to reduce energy consumption in the building. Achieve Building Energy Intensity (BEI) as defined by GBI for the following corresponding credit points. The default operating hours for Hotel is 24/7. Non-electricity fuel energy is excluded in the BEI calculation. BEI_1 values listed below apply to Hotel consisting of minimal supporting facilities such as budget type hotel, hotel rated 3-Star & below, and service apartments. BEI_2 values apply to Hotel rated 4-Star & above and where not less than 25% of its GFA (excluding carpark area) comprises Back-of-the-House (BOTH) facility and other high energy intensity facilities such as F&B outlets, convention halls, ballroom/s, function rooms, etc.

GBI NRNC (Hotel)			
Criteria	**Hotel (basic)**	**Hotel (4/5-star)**	**GBI Points**
EE5	**ADVANCED EE PERFORMANCE**		
	$BEI_1 \leq 200$	$BEI_2 \leq 290$	2
	$BEI_1 \leq 190$	$BEI_2 \leq 270$	3
	$BEI_1 \leq 175$	$BEI_2 \leq 250$	5
	$BEI_1 \leq 160$	$BEI_2 \leq 233$	8
	$BEI_1 \leq 150$	$BEI_2 \leq 212$	10
	$BEI_1 \leq 135$	$BEI_2 \leq 195$	12
	$BEI_1 \leq 120$	$BEI_2 \leq 175$	15

OR demonstrate over last 3 years, BEI improved by;

GBI NREB (Hotel)			
Criteria	**Hotel (basic)**	**Hotel (4/5-star)**	**GBI Points**
EE5	**ADVANCED EE PERFORMANCE**		
	≥ 20% AND BEI_1 ≤ 267	≥ 20% AND BEI_2 ≤ 387	2
	≥ 25% AND BEI_1 ≤ 228	≥ 25% AND BEI_2 ≤ 324	3
	≥ 30% AND BEI_1 ≤ 200	≥ 30% AND BEI_2 ≤ 290	5
	≥ 40% AND BEI_1 ≤ 190	≥ 40% AND BEI_2 ≤ 270	8
	≥ 50% AND BEI_1 ≤ 175	≥ 50% AND BEI_2 ≤ 250	10
	≥ 60% AND BEI_1 ≤ 160	≥ 60% AND BEI_2 ≤ 233	12
	≥ 70% AND BEI_1 ≤ 150	≥ 70% AND BEI_2 ≤ 212	15

GBI NRNC & NREB (Hotel)				
Part	**Criteria**	**Item**	**Max Points**	
	EE	**Energy Efficiency**	**NRNC**	**NREB**
1	EE1	Minimum EE Performance	1	2
	EE2	Lighting Zoning	3	3
	EE3	Electrical Sub-metering	1	2
	EE4	Renewable Energy	5	5
	EE5	Advanced Energy Performance - BEI	15	15
	EE6	Enhanced Commissioning	3	4
	EE7	Post Occupancy Commissioning	2	2
	EE8	EE Monitoring & Improvement	2	2
	EE9	Sustainable Maintenance	3	3
		EE total	**35**	**38**

Local Building Services Industry

1st Class Design

2nd Class Installation

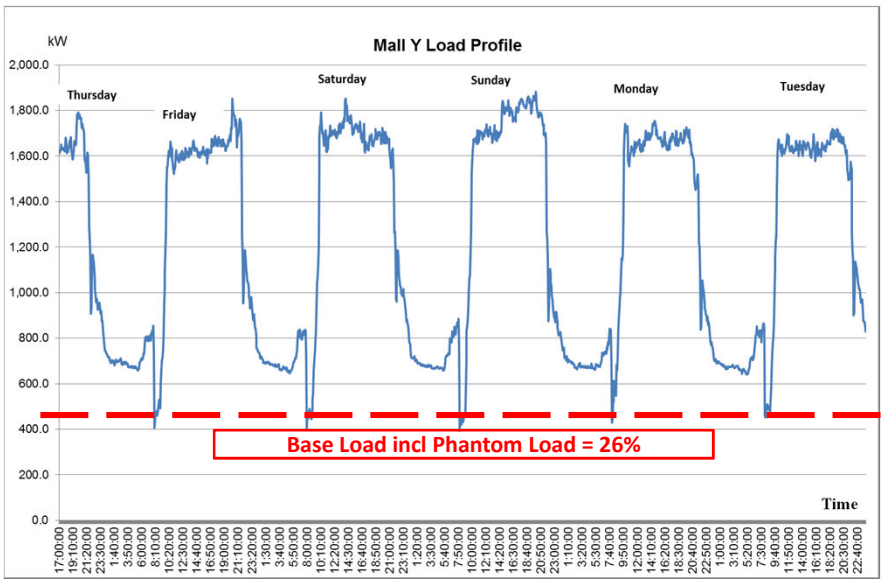
3rd Class Commissioning

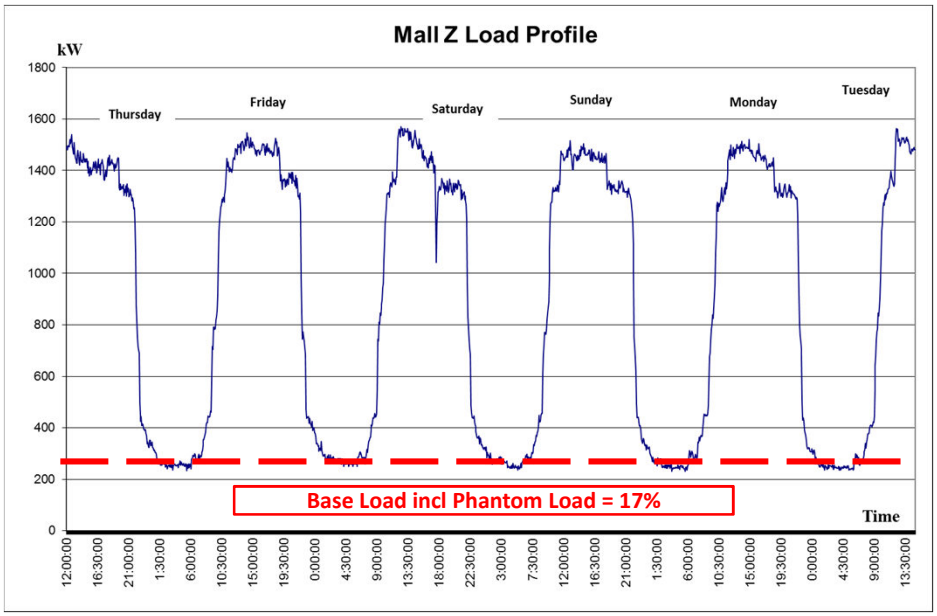
Low Class Maintenance

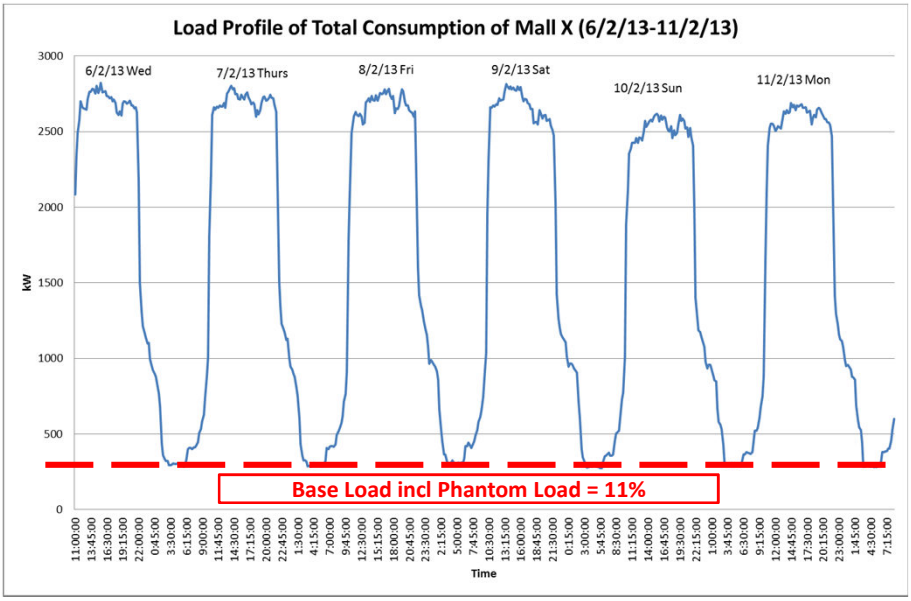
The best designed and best installed building services last only until the end of the Defects Liability Periodperiod

EE5: Understanding BASE LOADS & PHANTOM LOADS

EE8: Understanding Maximum Demand Limiting Programming




Mall Z Load Profile
kW
Thursday
Friday
Saturday
Sunday
Monday
Tuesday
Base Load incl Phantom Load = 17%
Time


Load Profile of Total Consumption of Mall X (6/2/13-11/2/13)
6/2/13 Wed
7/2/13 Thurs
8/2/13 Fri
9/2/13 Sat
10/2/13 Sun
11/2/13 Mon
kW
Base Load incl Phantom Load = 11%
Time

	EQ	Indoor Environmental Quality	NRNC	NREB
2	EQ1	Minimum IAQ Performance	1	1
	EQ2	Environmental Tobacco Control	1	1
	EQ3	CO_2 Monitoring & Control	1	1
	EQ4	Indoor Air Pollutants	2	2
	EQ5	Mould Prevention	1	1
	EQ6	Thermal Comfort	2	2
	EQ7	Air Change Effectiveness	1	1
	EQ8	Daylighting	2	2
	EQ9	Daylight Glare Control	1	1
	EQ10	Electric Lighting Levels	1	1
	EQ11	High Frequency Ballasts	1	1
	EQ12	External Views	2	2
	EQ13	Internal Noise Levels	1	1
	EQ14	IAQ Before & During Occupancy	2	2
	EQ15	Post Occupancy Comfort Survey	2	2
		EQ total	**21**	**21**

EQ7	Air Change Effectiveness
	Provide effective delivery of clean air through reduced mixing with indoor pollutants in order to promote a healthy indoor environment. Demonstrate that the Air Change Effectiveness (ACE) meets the following criteria for at least 50% of the NLA (excluding Guestroom Floors and Back-of-the-House Areas):

	EQ	Indoor Environmental Quality	NRNC	NREB
2	EQ1	Minimum IAQ Performance	1	1
	EQ2	Environmental Tobacco Control	1	1
	EQ3	CO_2 Monitoring & Control	1	1
	EQ4	Indoor Air Pollutants	2	2
	EQ5	Mould Prevention	1	1
	EQ6	Thermal Comfort	2	2
	EQ7	Air Change Effectiveness	1	1
	EQ8	Daylighting	2	2
	EQ9	Daylight Glare Control	1	1
	EQ10	Electric Lighting Levels	1	1
	EQ11	High Frequency Ballasts	1	1
	EQ12	External Views	2	2
	EQ13	Internal Noise Levels	1	1
	EQ14	IAQ Before & During Occupancy	2	2
	EQ15	Post Occupancy Comfort Survey	2	2
		EQ total	**21**	**21**

EQ8	Daylighting	
	Provide good levels of daylighting for building occupants:-	
	Demonstrate that ≥ 30% of the NLA has a daylight factor in the range of 1.0 – 3.5% as measured at the working plane, 800mm from floor level, OR	1
	Demonstrate that ≥ 50% of the NLA has a daylight factor in the range of 1.0 – 3.5% as measured at the working plane, 800mm from floor level	2
	Ballrooms and function rooms which require 'black out' conditions are exempted from Daylighting NLA computation	

	EQ	Indoor Environmental Quality	NRNC	NREB
2	EQ1	Minimum IAQ Performance	1	1
	EQ2	Environmental Tobacco Control	1	1
	EQ3	CO_2 Monitoring & Control	1	1
	EQ4	Indoor Air Pollutants	2	2
	EQ5	Mould Prevention	1	1
	EQ6	Thermal Comfort	2	2
	EQ7	Air Change Effectiveness	1	1
	EQ8	Daylighting	2	2
	EQ9	Daylight Glare Control	1	1
	EQ10	Electric Lighting Levels	1	1
	EQ11	High Frequency Ballasts	1	1
	EQ12	External Views	2	2
	EQ13	Internal Noise Levels	1	1
	EQ14	IAQ Before & During Occupancy	2	2
	EQ15	Post Occupancy Comfort Survey	2	2
		EQ total	**21**	**21**

EQ12	External Views	
	Reduce eyestrain for building occupants by allowing long distance views and provision of visual connection to the outdoor. Ballrooms and function rooms which require 'black out' conditions are exempted from this NLA computation.	
	Demonstrate that ≥ 60% of the NLA has a direct line of sight through vision glazing at a height of 1.2m from floor level.	1
	Demonstrate that ≥ 75% of the NLA has a direct line of sight through vision glazing at a height of 1.2m from floor level.	2

	EQ	Indoor Environmental Quality	NRNC	NREB
2	EQ1	Minimum IAQ Performance	1	1
	EQ2	Environmental Tobacco Control	1	1
	EQ3	CO_2 Monitoring & Control	1	1
	EQ4	Indoor Air Pollutants	2	2
	EQ5	Mould Prevention	1	1
	EQ6	Thermal Comfort	2	2
	EQ7	Air Change Effectiveness	1	1
	EQ8	Daylighting	2	2
	EQ9	Daylight Glare Control	1	1
	EQ10	Electric Lighting Levels	1	1
	EQ11	High Frequency Ballasts	1	1
	EQ12	External Views	2	2
	EQ13	Internal Noise Levels	1	1
	EQ14	IAQ Before & During Occupancy	2	2
	EQ15	Post Occupancy Comfort Survey	2	2
		EQ total	**21**	**21**

	SM	Sustainable Site Planning & Management	NRNC	NREB
3	SM1	Site Selection	1	
		GBI Rated Design & Construction		1
	SM2	Brownfield Redevelopment	1	
		Building Exterior Management		1
	SM3	Dev Density & Community Connectivity	2	
		Integrated Pest Mgt, Erosion Ctrl & Landscape Mgt		1
	SM4	Environment Management	2	
		Green Vehicle Priority		1
	SM5	Earthworks – Construction Activity Pollution Control	1	
		Parking Capacity		1
	SM6	QLASSIC	1	
		Greenery & Roof		4
	SM7	Workers' Site Amenities	1	
		Building User Manual		1
	SM8	Public Transport Access	1	
	SM9	Green Vehicle Priority	1	
	SM10	Parking Capacity	1	
	SM11	Stormwater Design – Quantity & Quality Control	1	
	SM12	Greenery & Roof	2	
	SM13	Builder User Manual	1	
		SM total	**16**	**10**

	MR	Materials & Resources	NRNC	NREB
4	MR1	Materials reuse and selection	2	1
	MR2	Recycled content materials	2	1
	MR3	Regional Materials	1	
		Sustainable Timber		1
	MR4	Sustainable Timber	1	
		Sustainable Purchasing Policy		1
	MR5	Storage, Collection & Disposal of Recyclables	1	3
	MR6	Construction Waste Management	2	
		Refrigerants & Clean Agents		2
	MR7	Refrigerants & Clean Agents	2	
		MR total	**11**	**9**
5	**WE**	**Water Efficiency**	**NRNC**	**NREB**
	WE1	Rainwater Harvesting	2	3
	WE2	Water Recycling	2	2
	WE3	Water Efficient – Irrigation / Landscaping	2	2
	WE4	Water Efficient Fittings	2	3
	WE5	Metering & Leak Detection System	2	2
		WE total	**10**	**12**

	IN	Innovation	NRNC	NREB
6	IN1	Innovation in Design & Environmental Design Initiatives	6	9
	IN2	Green Building Index Facilitator	1	1
		IN total	**7**	**10**
		TOTAL	**100**	**100**

IN1	Innovation & Environmental Initiatives
	Provide design team and project the opportunity to be awarded points for exceptional performance above the requirements set by GBI rating system:
	1 point for each approved innovation and environmental design initiative up to a maximum of 6/9 points, such as (refer to GBI website for updates and details);
	Condensate water recovery (accounting for at least 50% of total AHUs/FCUs);
	Thermal / PCM / Thermal Mass storage system (accounting for at least 25% of total required capacity);
	Solar thermal technology / Solar Airconditioners (generating at least 10% of total required capacity);
	Heat pipe technology (for at least 75% of PAHUs for purpose of RH control/improvement);
	Auto-condenser tube cleaning system (for 100% of chilled water system);
	Advanced air filtration technology (serving at least 50% of the NLA);
	Refrigerant leak detection and recovery facility;
	Fire System Water Recycling during regular testing;
	Car park mechanical ventilation fans provided with VSD and controlled by CO_2/CO sensors.

GBI NRNC & NREB (Resort)

Part	Criteria	Item	Max Points	
	EE	**Energy Efficiency**	**NRNC**	**NREB**
	EE1	Minimum EE Performance	1	2
	EE2	Lighting Zoning	3	3
	EE3	Electrical Sub-metering	1	2
	EE4	Renewable Energy	5	5
1	EE5	Advanced Energy Performance - BEI	15	15
	EE6	Enhanced Commissioning	3	4
	EE7	Post Occupancy Commissioning	2	2
	EE8	EE Monitoring & Improvement	2	2
	EE9	Sustainable Maintenance	3	3
		EE total	**35**	**38**

EE2	Lighting Zoning		3
	Provide flexible lighting controls to optimise energy savings:-		
	All individual or enclosed spaces to be individually switched; and the size of individually switched lighting zones shall not exceed 30m²; with switching clearly labelled and easily accessible. Guestrooms to be provided with multi-light switches.	1	
	Provide auto-sensor controlled lighting in conjunction with daylighting strategy for all perimeter zones and daylit areas, including external corridors/compounds, common areas, porch etc.	1	
	Provide motion or occupancy sensors or equivalent to complement lighting zoning equivalent to at least 25% NLA. For guestroom, master switch or access card switch or equiv to switch off all lights, fan, tv and airconditioning when room is not occupied will qualify as occupancy sensor.	1	

GBI NRNC & NREB (Resort)				
Part	**Criteria**	**Item**	**Max Points**	
	EE	**Energy Efficiency**	**NRNC**	**NREB**
1	EE1	Minimum EE Performance	1	2
	EE2	Lighting Zoning	3	3
	EE3	Electrical Sub-metering	1	2
	EE4	Renewable Energy	5	5
	EE5	Advanced Energy Performance - BEI	15	15
	EE6	Enhanced Commissioning	3	4
	EE7	Post Occupancy Commissioning	2	2
	EE8	EE Monitoring & Improvement	2	2
	EE9	Sustainable Maintenance	3	3
		EE total	**35**	**38**

EE3	Electrical sub-metering
	Monitor energy consumption of key building services as well as major Resort facilities:-
	Provide sub-metering for all energy uses ≥ 100kVa and demonstrate suitability of metering for energy monitoring and improvement. (There shall be a minimum of 3 sub-meters for the 3 biggest energy components).

GBI NRNC & NREB (Resort)

Part	Criteria	Item	Max Points	
	EE	**Energy Efficiency**	**NRNC**	**NREB**
1	EE1	Minimum EE Performance	1	2
	EE2	Lighting Zoning	3	3
	EE3	Electrical Sub-metering	1	2
	EE4	Renewable Energy	5	5
	EE5	Advanced Energy Performance - BEI	15	15
	EE6	Enhanced Commissioning	3	4
	EE7	Post Occupancy Commissioning	2	2
	EE8	EE Monitoring & Improvement	2	2
	EE9	Sustainable Maintenance	3	3
		EE total	**35**	**38**

EE5	Advanced or Improved EE Performance		15
	I) Exceed Energy Efficiency (EE) performance better than the baseline minimum to reduce energy consumption in the building. Achieve Building Energy Intensity (BEI) as defined by GBI for the following corresponding credit points. The default operating hours for Resort is 24/7. Non-electricity fuel energy is excluded in the BEI calculation.		
	BEI ≤ 245, OR	2	
	BEI ≤ 230, OR	3	
	BEI ≤ 212, OR	5	
	BEI ≤ 196, OR	8	
	BEI ≤ 181, OR	10	
	BEI ≤ 165, OR	12	
	BEI ≤ 148	15	
	OR		
	II) Demonstrate Energy savings over the last 3 years from Existing Building historical BEI baseline, to improve by:		
	≥ 20% AND with resultant BEI ≤ 327	2	
	≥ 25% AND with resultant BEI ≤ 276	3	
	≥ 30% AND with resultant BEI ≤ 245	5	
	≥ 40% AND with resultant BEI ≤ 230	8	
	≥ 50% AND with resultant BEI ≤ 212	10	
	≥ 60% AND with resultant BEI ≤ 196	12	
	≥ 70% AND with resultant BEI ≤ 181	15	

GBI NRNC & NREB (Resort)

Part	Criteria	Item	Max Points	
	EE	**Energy Efficiency**	**NRNC**	**NREB**
1	EE1	Minimum EE Performance	1	2
	EE2	Lighting Zoning	3	3
	EE3	Electrical Sub-metering	1	2
	EE4	Renewable Energy	5	5
	EE5	Advanced Energy Performance - BEI	15	15
	EE6	Enhanced Commissioning	3	4
	EE7	Post Occupancy Commissioning	2	2
	EE8	EE Monitoring & Improvement	2	2
	EE9	Sustainable Maintenance	3	3
		EE total	**35**	**38**

	EQ	Indoor Environmental Quality	NRNC	NREB
2	EQ1	Minimum IAQ Performance	1	1
	EQ2	Environmental Tobacco Control	1	1
	EQ3	Indoor Air Pollutants	2	1
	EQ4	Mould Prevention	1	2
	EQ5	Air Movement for Comfort	1	1
	EQ6	Thermal Comfort	2	2
	EQ7	Daylighting	2	1
	EQ8	Electric Lighting Levels	1	2
	EQ9	High Frequency Ballasts	1	1
	EQ10	Internal Noise Levels	1	1
	EQ11	IAQ Before & During Occupancy	1	1
	EQ12	Post Occupancy Comfort Survey	2	2
		EQ total	**16**	**16**

EQ5	Air Movement for Comfort
	Provide air movement for indoor comfort and to reduce airconditioning use in guestrooms:-
	For guestrooms, provide ceiling fan and contact switch at balcony door/window to switch off airconditioner unit when relevant door/window is opened to prevent wastage of conditioned air.

	EQ	Indoor Environmental Quality	NRNC	NREB
2	EQ1	Minimum IAQ Performance	1	1
	EQ2	Environmental Tobacco Control	1	1
	EQ3	Indoor Air Pollutants	2	1
	EQ4	Mould Prevention	1	2
	EQ5	Air Movement for Comfort	1	1
	EQ6	Thermal Comfort	2	2
	EQ7	Daylighting	2	1
	EQ8	Electric Lighting Levels	1	2
	EQ9	High Frequency Ballasts	1	1
	EQ10	Internal Noise Levels	1	1
	EQ11	IAQ Before & During Occupancy	1	1
	EQ12	Post Occupancy Comfort Survey	2	2
		EQ total	**16**	**16**

	SM	Sustainable Site Planning & Management	NRNC	NREB
3	SM1	Site Selection	1	
		GBI Rated Design & Construction		1
	SM2	Brownfield Redevelopment	1	
		Building Exterior Management		1
	SM3	Community Connectivity	1	
		Integrated Pest Mgt, Erosion Ctrl & Landscape Mgt		1
	SM4	Environment Management	3	
		Resort Guests Transportation - Green Vehicle		1
	SM5	Earthworks – Construction Activity Pollution Control	1	
		Staff Mobility - Non motorised transportation		1
	SM6	QLASSIC	1	
		Greenery & Roof		4
	SM7	Workers' Site Amenities	1	
		Building User Manual		1
	SM8	Resort Guests Transportation - Green Vehicle	1	
	SM9	Staff Mobility - Non motorised transportation	1	
	SM10	Stormwater Design – Quantity & Quality Control	1	
	SM11	Greenery & Roof	2	
	SM12	Builder User Manual	1	
		SM total	**15**	**10**

Resort Guests' Transportation - Green Vehicle

Use of only green vehicles for guests' transport (e.g. airport/port transfer or transportation hubs) and for movement of guests within the resort (such as electric buggies and trishaws).

Staff Mobility - Provision of green transportation

Provide bicycles and/or other forms of non motorised transportation for staff movement within the resort

	SM	Sustainable Site Planning & Management	NRNC	NREB
3	SM1	Site Selection	1	
		GBI Rated Design & Construction		1
	SM2	Brownfield Redevelopment	1	
		Building Exterior Management		1
	SM3	Community Connectivity	1	
		Integrated Pest Mgt, Erosion Ctrl & Landscape Mgt		1
	SM4	Environment Management	3	
		Resort Guests Transportation - Green Vehicle		1
	SM5	Earthworks – Construction Activity Pollution Control	1	
		Staff Mobility - Non motorised transportation		1
	SM6	QLASSIC	1	
		Greenery & Roof		4
	SM7	Workers' Site Amenities	1	
		Building User Manual		1
	SM8	Resort Guests Transportation - Green Vehicle	1	
	SM9	Staff Mobility	1	
	SM10	Stormwater Design – Quantity & Quality Control	1	
	SM11	Greenery & Roof	2	
	SM12	Builder User Manual	1	
		SM total	**15**	**10**

	MR	Materials & Resources	NRNC	NREB
4	MR1	Materials reuse and selection	3	1
	MR2	Recycled content materials	3	1
	MR3	Regional Materials	1	
		Sustainable Timber		1
	MR4	Sustainable Timber	1	
		Sustainable Purchasing Policy		1
	MR5	Storage, Collection & Disposal of Recyclables	1	3
	MR6	Construction Waste Management	2	
		Refrigerants & Clean Agents		2
	MR7	Refrigerants & Clean Agents	2	
		MR total	**13**	**9**
5	**WE**	**Water Efficiency**	**NRNC**	**NREB**
	WE1	Rainwater Harvesting	3	4
	WE2	Water Recycling	3	3
	WE3	Water Efficient – Irrigation / Landscaping	2	2
	WE4	Water Efficient Fittings	2	3
	WE5	Metering & Leak Detection System	2	2
		WE total	**12**	**14**

	IN	Innovation	NRNC	NREB
6	IN1	Innovation in Design & Environmental Design Initiatives	8	12
	IN2	Green Building Index Facilitator	1	1
		IN total	**9**	**13**
		TOTAL	**100**	**100**

Condensate water recovery (accounting for at least 50% of total AHUs/FCUs) for use e.g., as cooling tower make-up water etc;
Solar thermal technology / Solar Thermal Cooling (generating at least 10% of total required capacity);
Innovative Kitchen Grease & Waste Disposal;
Educational Sorting centre for recycleables;
Beach Erosion Maintenance;
Rehabilitation of unsuitable sandy soil for greenery;
Environmental activities promotion;
Staff eco-awareness training programmes;
Environmental effluent control;
Use of eco-friendly products (bio-degradable soap, shampoo and cleaning agents) throughout resort;
ISO14001 practice with dedicated Sustainable Team
Solar hot water heaters for at least 90% of guestrooms;

NON-RESIDENTIAL BUILDINGS

Rating Tools	Energy Effy	IEQ	Sustainable Site	Materials & Resources	Water Effy	Innovation
BREEAM 2008	19%	*13%	*37%	*17%	5%	*9%
LEED V2.2	25%	22%	20%	19%	7%	7%
Green Mark V3	62%	5%	*20%		9%	4%
Green Star V3	20%	19%	*33%	16%	8%	4%
GBI V1.0	35%	21%	16%	11%	10%	7%
LEED V3	35%	15%	26%	14%	10%	*10%

* Denotes adjusted or amalgamated figures

Does *green* pay off (in USA)?

LEED	Certified	Silver	Gold	Platinum
LEED Points	23 - 27	28 - 33	34 - 44	45 - 61
Energy Savings	25 – 35%	35 – 50%	50 – 60%	> 60%
Annual Utility Savings	US$0.40/ft^2	US$0.60/ft^2	US$0.80/ft^2	US$1.00/ft^2
Typ Payback	< 3 yrs	3 – 5 yrs	5 – 10 yrs	10+ yrs
Incremental Construction Cost				
Small bldgs	3%	7%	10%	15%
Large bldgs	1%	3%	5%	8%

Source: Enermodal Engineering, Denver, USA

Green Cost Premium (Singapore)

Green Mark	Certified	Gold	Gold^{plus}	Platinum
Points	50 - 74	75 - 84	85 - 89	90 - 100
Cost Premium	0.3 - 1%	1 - 2%	1 - 3%	2 - 8%
Payback Period	2 - 5 yrs	2 - 6 yrs	2 - 6 yrs	2 - 8 yrs

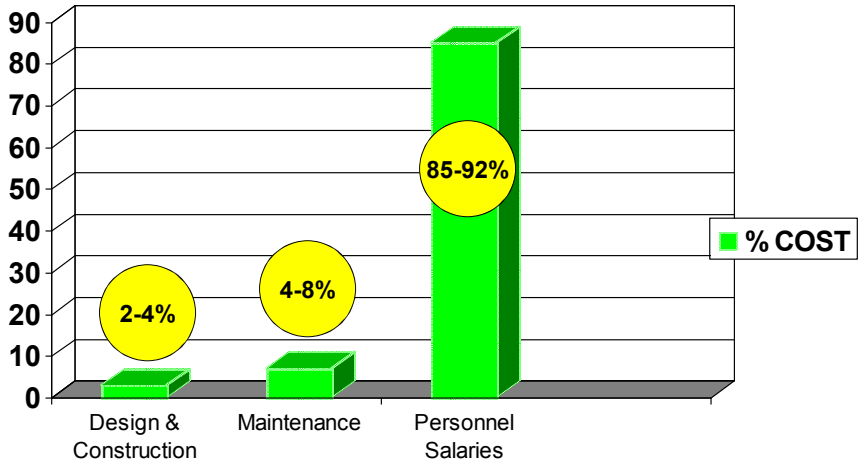
Source: BCA Singapore 2008

Does *green* pay off (in Malaysia)?
- Non-Residential Buildings -
projected data by Ir TL Chen (not verified:2009)

Green Building Index Rating	Average M'sian Bldg	Meets MS1525	GBI Certified	GBI Silver	GBI Gold	GBI Platinum
BEI kWh/m².year	250	200 - 220	150 - 180	120 - 150	100- 120	<100
Energy Savings %	Base	10 - 20	30 - 40	40 -50	50 – 60	> 60
Incremental construction cost %	Base	1 – 3 (0 – 3)*	5 – 8 (1 – 5)*	8 – 12 (3 – 8)*	12 – 15 (5 – 10)*	>15 (6 – 13)*

* Denotes revised projection in 2011

Life Cycle Cost
30 year cost of a *building*



POINTS	GBI RATING	INFERENCE
50 to 65	GBI CERTIFIED	Good Practice
66 to 75	GBI SILVER	Excellent Practice
76 to 85	GBI GOLD	National Excellence
86 +	GBI PLATINUM	Global Excellence

THANK YOU

www.greenbuildingindex.org
www.mgbc.org.my
tlchen55@gmail.com