

Annex A: Green Mark Certification

The Green Mark certification scheme was launched in January 2005. It is a green building rating system designed to evaluate a building's environmental impact and performance. It provides a comprehensive framework for assessing the overall environmental performance of new and existing buildings to promote sustainable design, and best practices in construction and operations in buildings.

The assessment framework comprises a comprehensive scoring system and verification process to determine how environmentally friendly your building or project is.

The total number of points obtained will provide an indication of the environmental friendliness of the building design and operation. Depending on the overall assessment and point scoring, the building will be certified to have met the respective Green Mark rating.

Table 1. BCA Green Mark Award Rating

Green Mark Rating
Green Mark Platinum
Green Mark Gold ^{PLUS}
Green Mark Gold
Green Mark Certified ³

For more information on Green Mark Scheme, visit <https://www1.bca.gov.sg/buildsg/sustainability/green-mark-certification-scheme>

i. Green Mark for Super Low Energy Building (GM SLEB)

BCA introduced the BCA Green Mark for Super Low Energy Building (GM SLEB) during International Green Building Conference 2018 (IGBC 2018) on 5 September 2018. This voluntary certification framework targets new and existing non-residential buildings such as offices, commercial/retail, industrial, institutions and schools, including demonstration projects from Research & Innovation efforts. The scheme aims to encourage industry to push boundaries on energy efficiency to achieve best-in-class building energy performance in a cost-effective manner. It is applicable for new and existing non-residential buildings including commercial, industrial and institutional buildings as well as schools.

³ Green Mark Certified rating is available only for some of the GM schemes such as Existing Non-Residential Buildings, Existing Residential Buildings, Existing Data Centres, User Centric schemes and Beyond Buildings schemes.

Under BCA Green Mark for SLEB, there are three building categories: (a) Super Low Energy buildings, (b) Zero Energy buildings and (c) Positive Energy buildings (refer to Table 2)

Table 2. GM SLE Building Categories

Categories	Description
Super Low Energy Building (SLEB)	Best-in-class energy performing building that achieves at least 40%* energy savings based on prevailing code *(equivalent to 60% energy savings above the 2005 building code)
Zero Energy Building (ZEB)	Best-in-class energy performing building with all energy consumption, including plug load, supplied from renewable sources
Positive Energy Building (PEB)	Best-in-class energy performing building with 115% of energy consumption, including plug load, supplied from renewable sources

Green Mark Gold rating is the minimum requirement for SLE and ZE buildings in order to meet the holistic environmental sustainability indicators, such as greenery, indoor environmental quality and other non-energy aspects. This ensures the overall environmental sustainability performance indicators are being looked at holistically, while pushing the boundaries in terms of building energy performance.

For more information, visit www1.bca.gov.sg/GreenMark/GM_SLE.html

Green Mark SLEB Award Recipients

A total of 22 projects will receive the GM SLEB Award this year. Some examples of the type of technologies employed in achieving best-in-class energy efficiency areas are as follows:

New developments include the **aircraft hangar** for the Republic of Singapore Air Force's A330 Multi-Role Tanker Transport (MRTT) at **Changi Air Base** designed by the Defence Science and Technology Agency. The hangar will use solar panels as a source of renewable energy and will be able to generate 1,225MWh of electricity a year, enough to power 273 4-room HDB households. In addition to the naturally ventilated hangar space, LED lightings and an energy-efficient air-conditioning system are employed to conserve electricity. The hangar also recycles rainwater for water

conservation and used sustainable building materials such as certified green materials and eco-friendly products. The project is the Singapore Armed Forces' first net positive energy building.

Existing buildings have also hopped on the bandwagon. **One Raffles Link**, a super low energy commercial building has made several retrofitting works to attain an overall cooling system efficiency of 0.6 kW/RT - equivalent to savings of \$120,000 per annum. Some examples of such works include utilising a high efficiency chiller system, Air Handling Units (AHU) retrofit with high efficiency fans and replacing of existing lifts to an energy re-generative model. Additionally, End of Trip (EOT) facilities (such as bicycle parking with shower facilities) for green transport users was also introduced to reduce carbon footprint.

JTC Space @ Tuas Biomedical Park is located at the heart of Singapore's biomedical park. The specialised development for the biomedical sector employs passive design strategies that include natural ventilation, use of daylight and lush landscape and greenery to ensure occupants' comfort by maximising airflow and mitigating heat. In addition, JTC installed energy efficiency LED lightings at the common areas such as lift lobbies and carpark to minimise energy usage.

Table 3. GM SLEB Award Recipients for FY19

S/N	Building Name	Developer/ Building Owner	Award
1	Changi Naval Base Addition	DSTA	Green Mark Gold (Positive Energy Building)
2	Choa Chu Kang Columbarium	NEA	Green Mark Platinum (Positive Energy Building)
3	Hangar Complex	DSTA	Green Mark Platinum (Positive Energy Building)
4	Administration Building	NTU	Green Mark Platinum (Zero Energy Building)
5	Block N1.1	NTU	Green Mark Platinum (Zero Energy Building)
6	Nanyang House	NTU	Green Mark Platinum (Zero Energy Building)

7	A&A to Existing Block LT5	NUS	Green Mark Platinum (Super Low Energy Building)
8	Block N3 (MAE)	NTU	Green Mark Platinum (Super Low Energy Building)
9	Block N2	NTU	Green Mark Platinum (Super Low Energy Building)
10	COM3	NUS	Green Mark Platinum (Super Low Energy Building)
11	Central Library	NUS	Green Mark Platinum (Super Low Energy Building)
12	Knowledge Hub	NUS	Green Mark Platinum (Super Low Energy Building)
13	NUS Institute of System Science	NUS	Green Mark Platinum (Super Low Energy Building)
14	One Raffles Link	HKL Pte Ltd	Green Mark Platinum (Super Low Energy Building)
15	Reconstruction of Existing Single Storey Petrol Station	Chevron Singapore Pte Ltd	Green Mark Platinum (Super Low Energy Building)
16	SMU A-South 3	SMU	Green Mark Platinum (Super Low Energy Building)
17	Tiong Bahru Market	NEA	Green Mark Platinum (Super Low Energy Building)
18	Tuas Biomedical Park	JTC Corporation	Green Mark Gold Plus (Super Low Energy Building)
19	Ulu Pandan Bus Depot	LTA	Green Mark Platinum (Super Low Energy Building)
20	United World College of South East Asia	UWCSEA	Green Mark Platinum (Super Low Energy Building)
21	United World College of South East Asia- East	UWCSEA	Green Mark Platinum (Super Low Energy Building)
22	LogisTech	CapitaLand Group	Green Mark Platinum (Super Low Energy Building)

Annex B: BCA Green Mark Champion Award

The **BCA Green Mark Champion Award** was launched at BCA Awards 2008. This award recognises developers with strong commitment towards corporate social responsibility and outstanding achievements in environmental sustainability. It is given to developers who have a substantial number of Green Mark buildings at Gold level and higher.

Total no. of buildings rated	BCA Green Mark Champion	BCA Green Mark Platinum Champion	
		Platinum Champion	Platinum ^{STAR} Champion
Green Mark Gold & above	At least 10	At least 50	-
Green Mark Gold ^{PLUS} & above	At least 6	At least 30	-
Green Mark Platinum	At least 3	At least 15	At least 50

Green Mark | Platinum Champion



Rochester Commons



LogisTech

CapitaLand Group

CapitaLand is one of Asia's largest diversified real estate groups. Its global portfolio spans across diversified real estate classes which includes commercial, retail; business park, industrial and logistics; integrated development, urban development; as well as lodging and residential. It has presence across more than 220 cities in over 30 countries. As a responsible global real estate company, CapitaLand places sustainability at the core of what it does by contributing to the environmental and social well-being of its communities as it delivers long-term economic value.

In Singapore, 97% of CapitaLand's existing offices, malls, integrated developments and serviced residences (by m²) have achieved a green rating by 31 Dec 2019. Notably, LogisTech is Singapore's first logistics building to receive BCA Green Mark Platinum Super Low Energy (SLE) Award. This is one of the highest accolades for energy efficiency in the BCA Green Mark Award scheme. Five other properties have received BCA Green Mark Platinum Award including retail malls Bugis+ and JCube; a data centre 9 Tai Seng Drive; an industrial property Corporation Place; and an upcoming integrated development Rochester Commons. Rochester Commons comprises a 17-storey Grade A office tower, hotel, 12 heritage bungalows and a Shared Executive Learning Centre. To date, CapitaLand has over 130 Green Mark Awards for its properties and sites in Singapore, Australia, China, Malaysia and Vietnam (including 24 Green Mark Platinum⁴ and 40 Green Mark Gold^{PLUS} awards).

CapitaLand installed rooftop solar panels atop six Singapore properties, potentially avoiding over 4,300 tonnes of carbon emissions every year. The clean energy generated will enable it to power its corporate headquarters in Singapore with 100% renewable energy by 2020.

For its sustainability efforts, CapitaLand remains listed in the Global 100 Most Sustainable Corporations in the World 2020 and The Sustainability Yearbook 2020. It also retained listing on the Dow Jones Sustainability World Index for the 11th year and regained Global Sector Leader status in the Diversified sector for the Global Real Estate Sustainability Benchmark.

Reinforcing CapitaLand's commitment towards responsible growth, the Group has raised 2.82 billion through sustainable finance to date and has achieved interest saving as a result of meeting its sustainability targets. CapitaLand has also obtained S\$1.2 billion in green loans to be used towards green building certifications pegged to BCA Green Mark ratings.

⁴ This figure excludes properties which were subsequently divested.

Green Mark | Champion



Police Cantonment Complex



Woodlands Police Division Headquarters

Singapore Police Force (SPF)

The Singapore Police Force (SPF) is a uniformed organisation under the purview of the Ministry of Home Affairs. The mission of the SPF is to prevent, deter and detect crime to ensure the safety and security of Singapore. This is done through its focus on the five broad areas of Police work – Frontline Policing, Counter and E-services, Investigation, Community Engagement and Public Security & Order.

As a socially responsible organisation, the SPF actively promotes environmental sustainability in the development of Police infrastructure through the deliberate adoption of sustainable design methods and use of environmentally-friendly products.

The Woodlands Police Division Headquarters has been designed as an energy-conserving building. The façade design and materials include the use of sustainable and recycled materials certified by the Singapore Green Building Council and Singapore Green Labelling Scheme, which allow low heat transfer through the external walls and double glazed windows. Other key green features include an energy-efficient central chiller plant, LED lightings with motion sensors, water-efficient fittings and roof top greenery.

Energy and water efficiency measures have also been implemented at the Police Cantonment Complex. The central air-conditioning system has been retrofitted with energy efficient chillers, pumps, variable speed drives, auto-tube cleaning system and an Energy Management System. These measures help to improve energy efficiency and reduce carbon footprint.

SPF is honoured to receive the Green Mark Champion Award and will continue to play our part in building a sustainable future for Singapore.

Green Mark | Champion



Senja Hawker Centre



Choa Chu Kang Columbarium

The National Environment Agency (NEA)

The National Environment Agency (NEA) is a statutory board under the Ministry of Sustainability and the Environment (MSE). Formed on 1 July 2002, NEA is responsible for ensuring a clean and green environment, and the sustainable development of Singapore. It is responsible for the planning, design and development of new hawker centres, after-death facilities and services as well as management of the facilities maintenance, cyclical repairs and redecoration works of MSE-owned hawker centres. NEA seeks to leverage and explore new technologies and innovation solutions in our development projects to ensure sustainability.

Senja Hawker Centre adopts design strategies to ensure energy efficiency and usage of sustainable products certified under the Singapore Green Labelled Scheme. The hawker centre also uses low carbon concrete and energy-efficient LED lightings, and features a rooftop garden that reduces heat gain into the building. This year, Senja Hawker Centre is pleased to receive BCA Green Mark Platinum Award for its environmentally sustainable design that leads to at least 30% in energy savings.

Choa Chu Kang (CCK) Columbarium houses some 147,000 niches across 18 four-storey blocks. Its design allows natural light into niche rooms and utilizes prevailing wind conditions to achieve ample ventilation within the buildings. Efforts have been put in place to reduce the total building energy usage. This includes setting realistic energy reduction targets and regular energy consumption monitoring each year as well as installation of solar panels to achieve the eventual target of 100% conventional energy source replacement. This year, CCK Columbarium is pleased to receive BCA Green Mark Platinum Award for its environmentally sustainable design and efforts in reducing the total building energy usage.

NEA is honoured to be recognised with the Green Mark Champion Award. We will continue our strong commitment to shaping a green and sustainable built environment in our existing and future developments.

Green Mark | Champion



Pan Pacific Orchard (artist's impression)



Novena Square

UOL Group Limited

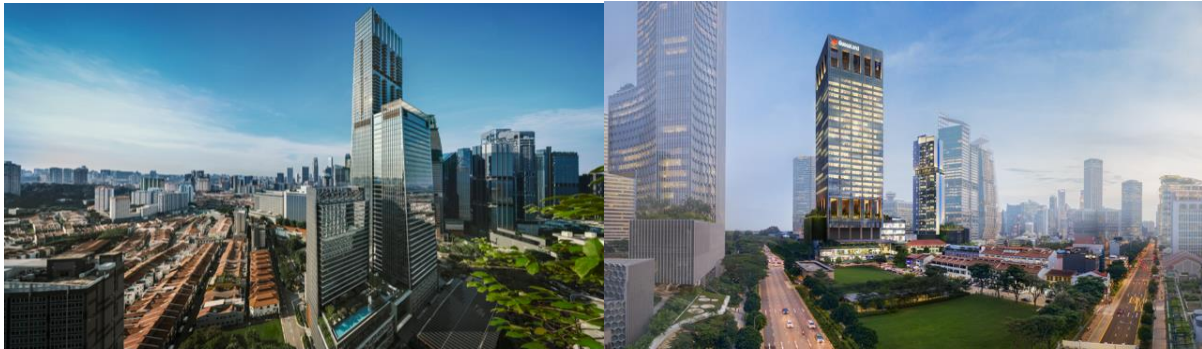
UOL Group Limited (UOL) has a diversified portfolio of development and investment properties, hotels and serviced suites in Asia, Oceania, Europe and North America. Through hotel subsidiary Pan Pacific Hotels Group Limited, UOL owns three acclaimed brands namely “Pan Pacific”, PARKROYAL COLLECTION and PARKROYAL.

As a leading property and hospitality group, we recognise that we have a role to play in protecting and conserving the environment. We set energy and water reduction targets to manage our carbon footprint across all our commercial and hospitality properties in Singapore, and seek to improve their environmental performance through ongoing maintenance and fit-out. We also set targets to attain Green Mark Gold for the development of new investment properties in Singapore. Green design has always been the hallmark of our development projects, as we recognise the well-being benefits that a green building brings to the occupiers, along with the energy and water savings. We also deploy building technologies such as Prefabricated Prefinished Volumetric Construction method to minimise the impact of construction to the environment and improve productivity.

To date, about 10 of our Singapore properties have been recognised by the BCA Green Mark scheme. More recently, our 347-key Pan Pacific Orchard, which is targeted to open in 2021, was awarded Green Mark Platinum in January 2020. The hotel will offer rooms with eco-friendly features, and its landscapes are designed to be self-sustaining with minimal reliance on energy and water resources.

Our existing property Novena Square underwent an extensive retrofitting to improve water and energy efficiencies. The mixed development was awarded Green Mark Gold Plus in 2018. UOL is supportive of the Government’s vision to achieve a low-carbon and sustainable future Singapore. We are committed to improve the sustainability performance of the Group.

Green Mark | Champion



Guoco Tower

Guoco Midtown

GuocoLand

GuocoLand is known for its high-end residential projects and integrated mixed developments. Its projects are conceived with sustainability principles as the foundation. It was also one of the first real estate developers to receive the Green Mark Platinum award from the Building and Construction Authority.

Guoco Tower, GuocoLand's flagship integrated development at Tanjong Pagar, is Singapore's tallest building at a height of 290m. As "a vertical city" within the Central Business District, Guoco Tower brings together 890,000 sq ft of premium Grade A office space with exciting dining and retail options, an urban park and community space, a 5-star business hotel and the 181-unit Wallich Residence at the apex.

Guoco Tower has received two of the highest achievable certifications in the industry – the Green Mark Platinum award by BCA and the Leadership in Energy and Environment Design (LEED) Platinum certification label by the U.S. Green Building Council. Guoco Tower has brought a new level of sustainable designs and green performance building technology to the Tanjong Pagar district. It has also uplifted the image and offerings of the district, thereby contributing to its rejuvenation.

GuocoLand is now developing Guoco Midtown, another transformative project in the CBD. It will comprise 770,000 sq ft of premium Grade A office space with different retail and public spaces on the ground level and the Midtown Bay residential tower, as well as a new residential cum commercial development at Tan Quee Lan Street. Guoco Midtown will connect the three major office micro-markets of City Hall, Marina Centre and Bugis and introduce new concepts of live, work and play.

GuocoLand will continue to strive towards developing buildings that will take on innovative concepts and contribute to the sustainable development objectives of Singapore.

Annex C: BCA-HPB Green Mark for Healthier Workplaces Scheme

Background

The health and well-being of building occupants is increasingly becoming a major value proposition for the adoption of green buildings and interior spaces. This awareness is echoed by business leaders and companies that place growing emphasis on employee health and well-being to differentiate themselves as the employer of choice. In line with global trend and increasing demand for green and healthy buildings, the **BCA Green Mark has been placing greater emphasis on the quality of indoor environments as well as the health, comfort and well-being of the users and occupants.**

To strengthen the business case for energy-efficient, resource efficient and healthier interior spaces **BCA collaborated with the Health Promotion Board (HPB) to develop the new BCA-HPB Green Mark for Healthier Workplaces scheme (GM HW: 2018). The scheme was launched at the Breakfast Talk for CEOs on 7 Sep 2018.**

Rationale

With international studies⁵ indicating that 90% of the business operating costs are related to human capital costs, staff's productivity would be of paramount interest and concern to any company. The GM HW would appeal to companies that place emphasis on both health and well-being in addition to environmental sustainability in the office. GM HW aims to provide a clearer and stronger business case for office sustainability by placing occupants' health, well-being and comfort at the forefront of office design and daily operations. It also seeks to create a supportive environment through the establishment of workplace health structures, policies and programmes. With the inclusion of criteria that also looks at the health and well-being, we hope that this will make the value proposition for green interior more compelling and personal from the user's angle.

Enhancements and Key Highlights of GM HW: 2018

To align with the latest Green Mark Schemes, the 5 key sections of GM HW: 2018 will guide companies through the thought process of space selection and office design, operation and maintenance, as well as occupant engagement and empowerment: **(i) Sustainable Design and Management, (ii) Energy and Resource Management, (iii) Office Environment, (iv) Workplace Health and Well-Being, and (v) Advanced Green and Health Features.** The BCA-HPB Green Mark for Healthier Workplaces (GM HW: 2018) scheme has replaced the BCA Green Mark for Office Interior (Version 1.1) scheme with effect from 1 Apr 2019.

⁵ Source: World Green Building Council's reports on "Building the Business Case: Health, Wellbeing and Productivity in Offices" (Oct 2016) and "Health, Wellbeing and Productivity in Offices: The Next Chapter for Green Buildings" (Sep 2014)

BCA-HPB Green Mark for Healthier Workplaces (Platinum)

BCA-HPB Green Mark | for Healthier Workplaces (Platinum)



csuites

Client/Developer: Space Lab One Pte Ltd

Architect: Hassell Design (Singapore) Pte Ltd

M&E Engineer: WSP Consultancy Pte Ltd

Green Mark Consultant: WSP Consultancy Pte Ltd

Acoustic Consultant: Alpha Acoustics Pte Ltd

Main Contractor: Lendlease Singapore Pte Ltd

About:

csuites is distilled from Lendlease's proven track record and experience of creating, owning and operating workplaces for leading corporations globally.

Key Features:

- Ultra-low power lighting of 4.3 W/m², more than 50% reduction vs SS530:2014
- All water fittings in the project are rated 3 ticks under PUB Water Efficiency Labelling Scheme
- Acoustical Treatment – All office suites and meeting rooms are sound-proofed and feature noise-cancelling duct works to ensure maximum privacy and minimal distraction
- Base building is awarded Green Mark Platinum
- Active Workspace Elements - *csuites* features height-adjustable desks, high quality ergonomic furniture and fixtures, and a diverse workplace typology to meet the needs of today's dynamic workforce
- Biophilic Design – Full glass ceiling-to-floor facades provide an abundance of natural lighting, while natural elements such as wood and ample plants create a healthy, green and well-ventilated space
- Extensive use of materials certified by Singapore Green Building Council and Singapore Green Labelling Scheme

Annex D – GreenA Consultants

GreenA Consultants is an environmental sustainability consultancy focused on the built environment. The company is committed to creating a more sustainable world by looking for better ways for things to be done, and better technology and materials to work with. GreenA is currently involved in 4 Super Low Energy projects and has participated in more than 15 overseas Green Mark projects.

Some of GreenA's prominent project include PSA Corporation's Tuas Port, Changi Airport Terminal 4, DSTA Changi Hangar, CBRE Paya Lebar Quarter, IKANO Group Toppen Shopping Centre (Malaysia), Oxley Towers, Sofitel and Jumeirah Residences (Malaysia), New Bugesera International Airport (Rwanda), Kigamboni Housing Estate (Tanzania) and WIK (Macedonia).

Other projects include Galleries Lafayette Shanghai (China), The Lofts Silom (Thailand), as well as working with the Ministry of Health Malaysia for an environmental feasibility study, and with the Panama City Municipality for the development of an Eco-protocol programme that serves that facilitate all government and new buildings in Panama City to meet minimum sustainable building guidelines.