The Green Mark scheme was launched in 2005 to assess the environmental friendliness of buildings. In general, Green Mark buildings have adopted energy efficient features and water conservation measures which set them apart from other buildings. They have also made substantial use of greenery in their projects and ensured that a good indoor environmental quality is provided for their users.

ADVISORY COMMITTEE

Chairman:
Mr Lee Chuan Seng
Chairman
Beca Carter Hollings & Ferner (SEA) Pte Ltd

Members:

Mr Abdul Rashid Bin Ibrahim
Mr Chng Chee Beow
Mr Fung John Chye
Mr Vincent Han Kim Siew
A/Prof Lee Siew Eang
Mr Ong Seng Eng
Mr Peng Kah Poh
Mr Howard Shaw
Mr Tony Tay Chye Teck
Prof Wong Yew Wah
Mr Tan Tian Chong
Mr Wong Wai Ching

Energy Market Authority
Wing Tai Land Pte Ltd
Point Architects
Vincent Han & Associates
National University of Singapore
National Environmental Agency
Public Utilities Board
Singapore Environment Council
Parsons Brinckerhoff Consultants Pte Ltd
Nanyang Technological University
Building and Construction Authority
Building and Construction Authority
Key Green Features

- Eco-rest rooms fitted with “very good” to “excellent“ rating under PUB’s Water Efficiency Labeling Scheme.
- Twin chute (organic & inorganic waste) pneumatic waste disposal system.
- Real time display of indoor environmental performance for public awareness.
- Priority parking for Hybrid cars.
- Basement carpark fitted with motion sensors to control lighting level.

Eco-Precinct at Punggol

- Residential blocks are generally north-south oriented, thus minimising heat gain. Ventilation is also maximised as blocks also face the prevailing winds. Design of the residential units also attempts to maximise daylight and provide effective cross-ventilation, thus reducing energy usage.
- Extensive green provided to some areas of the rooftop to help reduce heat gain to the topmost residential units.
- Residential units are installed with water-efficient fittings, such as the dual flushing cum integrated basin-toilet pedestal system.
- Rainwater is harvested at the rooftop of each residential block to help reduce the usage of potable water at common areas.
- Solar panels are provided at the rooftop to harvest solar energy and motion sensors are provided at strategic locations to help reduce energy consumption from the Grid.
- Recycling is encouraged via the convenient provision of a centralised refuse chute for recyclable waste at every residential block. Recycling bins are also provided along common areas.
Key Green Features

- Sunpath analysis – computer simulation of sunpath, solar insulation and daylighting studies are used to determine the effectiveness of building and interior layouts. Planters, balconies, canopy and sunscreen covered about 92% of external walls.
- Extraction of heat from air-conditioning condensers for generating hot water for club house use.
- Installation of motion sensors for lighting of common areas such as private lift lobbies and clubhouse.
- Rainwater harvesting system for irrigation of landscape.
- Use of pre-fabricated bathroom units designed to reduce construction waste.
- First in Singapore using “Pontos Grey Water Recycling System” for recycling water from apartment showers, baths and washing basins for clubhouse toilet and landscape watering.
- Installation of a twin-chute pneumatic waste conveyance system (for separation of domestic waste and recyclable items).
Key Green Features

• Use of high performance low-emissivity double glazing unit for all external windows and full height ‘shop-front’ glass.

• Innovative use of heat pipe and dessicant dehumidifier.

• Maximise day lighting into office floors by limiting floor depth to not more than 10 metres; this also enhances visual connectivity with external natural environment.

• Extensive uses of low VOC paint and zero-formaldehyde-emission carpet improve indoor air-quality.

• Extensive use of T5 lights in offices, car park and operational floors.

• Use of motion detection system integrated with lighting in meeting rooms, toilets, car park and staircases.

• Use of centralised lighting management system which is linked to building management system via IT backbone.

• Use of solar cum heat pump hot water system.

• Use of recycled condensate water for landscape irrigation.
**Prototypes Glasshouses**

<table>
<thead>
<tr>
<th>Role</th>
<th>Company/Board</th>
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<tbody>
<tr>
<td>Client / Developer</td>
<td>Gardens by the Bay, National Parks Board</td>
</tr>
<tr>
<td>Architect</td>
<td>CPG Consultants Pte Ltd</td>
</tr>
<tr>
<td>M&amp;E Engineer</td>
<td>CPG Consultants Pte Ltd</td>
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<tr>
<td>Civil and Structural Engineer</td>
<td>CPG Consultants Pte Ltd</td>
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<tr>
<td>Quantity Surveyor</td>
<td>CPG Consultants Pte Ltd</td>
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<tr>
<td>Builder</td>
<td>Planar One &amp; Associates Pte Ltd</td>
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<tr>
<td>Green Consultants</td>
<td>CPGreen @ CPG Consultants Pte Ltd</td>
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<tr>
<td>Energy System Development</td>
<td>Tuas Power Ltd</td>
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<tr>
<td>Climate Engineers</td>
<td>Transsolar (Munich, Germany)</td>
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</tbody>
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**The Seafront on Meyer**

<table>
<thead>
<tr>
<th>Role</th>
<th>Company/Board</th>
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<tbody>
<tr>
<td>Client / Developer</td>
<td>CRL Realty Pte Ltd</td>
</tr>
<tr>
<td>Project Manager</td>
<td>CapitaLand Residential Singapore</td>
</tr>
<tr>
<td>Design Architect</td>
<td>Cox Architects &amp; Planners</td>
</tr>
<tr>
<td>Project Architect</td>
<td>TSP Architects + Planners</td>
</tr>
<tr>
<td>M&amp;E Engineer</td>
<td>Parsons Brinckerhoff Pte Ltd</td>
</tr>
<tr>
<td>Structural Engineer</td>
<td>P&amp;T Consultants Pte Ltd</td>
</tr>
<tr>
<td>Quantity Surveyor</td>
<td>Davis Langdon &amp; Seah Singapore Pte Ltd</td>
</tr>
<tr>
<td>Landscape Consultant</td>
<td>ICN Design International</td>
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</tbody>
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**Key Green Features**

- Balconies, planter boxes, vertical trellies and RC ledges are provided to shade the building’s envelope. Aluminium sliding screens are further added to shade the master bedroom window openings.
- Water heater incorporated with an energy saving device fitted onto storage water heating tank.
- Use of solar panels to extract the sun’s energy and turn it into usable energy — electricity for guard house and landscape lightings’ power.
- Energy efficient light fittings and lamps which are made of recycled material are extensively used for common areas.
- Early construction of permanent substation to provide power for the construction needs. This reduces the reliance of diesel supply generator set and therefore reducing noise and air pollution.
**Key Green Features**

- The building orientation is north south oriented, minimising the west facing facades. West facing facades are designed mainly as RC gable end walls, which are applied with cool paint.
- Rainwater is harvested to be used for irrigation purposes. Drip irrigation is also used as an efficient form of irrigation.
- Environmentally friendly materials are extensively used. These include precast drains, wheel stoppers and road kerbs using recycled aggregates; playground equipment and wood products using recycled material; recycled milled waste for earth control measures.
- Green walls and green roof are located at the club house. A green educational corner is also designed at the club house to educate the residents on the green features in the development.
- Pneumatic waste collection system with recycling facilities is used.

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**People’s Association Headquarters**

- **Client / Developer**: People’s Association
- **Architect**: Architects 61 Pte Ltd
- **M&E Engineer**: Squire Mech Pte Ltd
- **Structural Engineer**: JS Tan & Associates
- **Quantity Surveyor**: Davis Langdon and Seah Singapore Pte Ltd
- **Builder**: Poh Lian Construction Pte Ltd
- **Landscape Design & Build**: Tropical Environment Pte Ltd

**Key Green Features**

- A concerted effort was made to naturally ventilate the double-volume entrance foyer and 5-storey central atrium. By orientating the buildings towards the Northeast, the strongest prevailing wind is encouraged to cross ventilate through the entrance foyer, central atrium and sky garden. Openings in the atrium skylight also promote stack effect, capitalising on the pressure differentials for air circulation within the atrium. 38% of the total GFA is naturally ventilated, contributing to great savings in energy conservation using passive cooling.
- Extensive landscaping is provided in the new headquarters, such as the open field, internal courtyards and roof gardens, constituting 52% of the total site area.
- Rain sensor which is linked to the automatic irrigation system, rain water harvesting system and drip irrigation system are implemented for water conservation.
Key Green Features

- ‘Parabienta’ Green wall system is used to vertically green part of the building facade on 2nd floor of the Development along footpath adjacent to Orchard Boulevard. The system is lightweight and provides consistent greening.

- Photocell sensors are used along building perimeter in Observation Deck and Art Exhibition space to reduce lighting levels by dimmers in response to amount of available daylight.

- 1.5m deep planters are provided at the Environmental Deck at roof level of the Retail Podium for landscape lush shrubs and trees and to minimise heat transfer to carpark and podium areas below.

- Transparent Media Wall using LED lights with separation gaps admits daylight into the retail interiors and achieves visual transparency.

Key Green Features

- ‘Parabienta’ Green wall system is used to vertically green part of the building facade on 2nd floor of the Development along footpath adjacent to Orchard Boulevard. The system is lightweight and provides consistent greening.

- Photocell sensors are used along building perimeter in Observation Deck and Sky Garden to reduce lighting levels by dimmers in response to amount of available daylight.

- Rain sensors at Environment Deck are provided to control and limit extent of watering time by water-efficient Timer controlled Drip-Irrigation System.
Key Green Features

• Carpark ventilation design incorporating natural air vents, minimisation of air ducts, jet fans and CO monitoring system helps save $550,000 of energy a year.

• UVC emitters improve air quality and keep the air-conditioning system’s cooling capacity to an optimal level.

• Facilities Booking System to automate the booking of 57 meeting rooms, a large auditorium and retail mall area. This system is fully integrated with the IBMS, office automation system (i.e. Lotus email system), accounting system, HVAC and lighting control, card access and intelligent display system to save energy and automate billing. This has cut down unnecessary wastage.

PLAZA SINGAPURA

Building Owner : CapitaMall Trust

Key Green Features

• Low-e argon-filled double-glazed atrium skyroof for superior performance against heat and glare, while tapping desired level of daylight.

• The introduction of high performance chillers. The performance monitoring exercise has revealed approximately 20% energy savings.

• Travellators are installed with energy conservation devices.
**Key Green Features**

- Thermal insulating paint to all external walls for entire development to reduce solar heat gain and energy consumption.
- Use of energy efficient equipment such as energy efficient lightings in common areas, inverter air-conditioning system with energy green labels and motor-roomless lifts.
- Rainwater harvesting integrated with automated irrigation system enabling savings in water usage.
- Use of pneumatic waste conveyance system.

**Key Green Features**

- Extensive landscape at e-deck, planters on building façade and sky garden at 22nd storey provide a total of 8,106m² greenery for the development.
- Rainwater harvesting system channels rainwater from the roof to rainwater collection tanks located at 22nd storey. The water is used for automatic irrigation of landscaped areas.
- Energy efficient light fittings, with lamps made of recycled material, are extensively used for common areas.
- The use of environment friendly and recycled materials manufactured locally or overseas for doors, wardrobes, lamps, rubber floorings, waterproof membrane and dry wall partitions.
Key Green Features

- Extensive landscaping, sky terraces and gardens to lower local ambient temperature.
- Pneumatic chute conveyance system with dual chute for recycling.
- Use of seawater for ground improvement works with substantial water savings.

**Key Green Features**

- Residential blocks are generally north-south oriented, thus minimising heat gain. Ventilation is also maximised as blocks also face the prevailing winds. Design of the residential units also attempts to maximise daylight and provide effective cross-ventilation, thus reducing energy usage.
- All common staircases and the clubhouse are equipped with motion sensors to control the lightings and reduce energy usage.
- Rainwater is harvested with a 24 cubic metres rainwater tank to help reduce the usage of potable water for common area washing and landscape irrigation.
- Daku roof garden system is used for the rooftop garden on the clubhouse. Extensive landscaping was done for the development with around 1,500 trees planted.
- Recycling is also encouraged via a dual-chute pneumatic waste collecting system with collection points on every level as well as at the common area.
Key Green Features

- Provision of motion sensors at all toilets and staircases and use of light sensors at canteen and VIP car park.
- Collection of rainwater and provision of rain sensor for irrigation of landscaping.
- Collection of condensate from all AHUs as make-up water for cooling tower.
- Use of heat pump at cafeteria for production of hot water.
ASCOTT RAFFLES PLACE

Client / Developer: Ascott Raffles Place Pte Ltd
Architect: RSP Architects Planners & Engineers (Pte) Ltd
M&E Engineer: Squire Mech Pte Ltd
Structural Engineer: RSP Architects Planners & Engineers (Pte) Ltd
Quantity Surveyor: Davis Langdon & Seah Singapore Pte Ltd
Builder: Tiong Aik Construction Pte Ltd

RAFFLES CITY SINGAPORE

Building Owner: HSBC Institutional Trust Services (S) Limited as Trustee-Manager of RCS Trust
Property Manager: RCS Trust

WANG JING MALL, BEIJING

Building Owner: CapitaRetail China Trust

UBIPLEX I

Building Owner: Housing & Development Board
THE QUARTZ

Client / Developer: GuocoLand Group
Architect: P&T Consultants Pte Ltd
M&E Engineer: Rankine & Hill (S) Pte Ltd
Structural Engineer: DE Consultants (S) Pte Ltd
Quantity Surveyor: WT Partnership
Builder: China Construction (South Pacific) Development Co. Pte Ltd
Landscape Consultant: Site Concepts International Pte Ltd

ONE LEICESTER

Client / Developer: Frasers Centrepoint Limited
Project Manager: FCL Management Services Pte Ltd
Architect: S.H. Lim Architects Pte Ltd
M&E Engineer: Belmacs Pte Ltd
Structural Engineer: DE Consultants (S) Pte Ltd
Quantity Surveyor: Davis Langdon & Seah Singapore Pte Ltd
Builder: China Construction (South Pacific) Development Co. Pte Ltd
Landscape Consultant: Site Concepts International Pte Ltd

4/6 ONTARIO AVENUE

Client / Developer: Asia Polyurethane Manufacturing Pte Ltd
Architect: A+ Project Consultant
Structural Engineer: BK Consulting Engineers
Quantity Surveyor: P.Q.S Consultants
Builder: A.N.A. Contractor Pte Ltd
Landscape Consultant: Sin Guan Teck Trading & Construction

HSBC BUILDING

Client / Developer: HSBC Institutional Trust Services (S) Limited as Trustee of CapitaCommercial Trust
Project Manager: J. Roger Preston (S) Pte Ltd
Architect: Elton – Roade Architects
M&E Engineer: Parsons Brinckerhoff Pte Ltd
Structural Engineer: Meinhardt (Singapore) Pte Ltd
Quantity Surveyor: Faithful & Gould
Builder: Wah Loon Electrical Engineering Pte Ltd (M&E), GH Engineering Pte Ltd (Façade)