



BCA GREEN MARK

**BCA Green Mark for Landed Houses
Version LH/1.0**

Point Allocations - BCA Green Mark for Landed Houses (Version LH/1.0)

Category	Point Allocations
Part 1 : Energy Efficiency	
(A) Passive Design for the Tropics	
LH 1-1 Optimized Building Orientation	5
LH 1-2 Window to Wall Ratio	3
LH 1-3 Shading Device Design	7
LH 1-4 Maximum Permissible Wall U- Value	4
LH 1-5 Maximum Permissible Shading Coefficient (SC) Value of Glass	2
LH 1-6 Cross Ventilation for Habitable Rooms	6
LH 1-7 Open Spaces with Greenery Provision	4
LH 1-8 Covered Parking Space	1
LH 1-9 Daylighting Provision	3
LH 1-10 Cool/ Green Roof	3
LH 1-11 Cool Hardscaped Areas	2
LH 1-12 Sustainable Landscape Design	2
Sub-Category Score - Part 1(A)	42
(B) Active System Efficiency	
LH 1-13 Active System Design	12
LH 1-14 Artificial Lighting	3
LH 1-15 Domestic Hot Water Heating System	3
LH 1-16 Other Appliances	4
Sub-Category Score - Part 1(B)	22
(C) Renewable Energy	
LH 1-17 Use of Solar Energy	10
Sub-Category Score - Part 1(C)	10
CATEGORY SCORE FOR PART 1 – ENERGY EFFICIENCY	74
Part 2 : Water Efficiency	
LH 2-1 Water Efficient Fittings	3
LH 2-2 Water Efficient Landscaping	5
CATEGORY SCORE FOR PART 2 – WATER EFFICIENCY	8
Part 3 : Environmental Protection	
LH 3-1 Sustainable Construction	14
LH 3-2 Construction Waste Management	1
LH 3-3 Environmental Management Practices	3
LH 3-4 Stormwater Management	2
CATEGORY SCORE FOR PART 3 – ENVIRONMENTAL PROTECTION	20
Part 4 : Indoor Environmental Quality	
LH 4-1 Indoor Air Quality (IAQ) Management in Habitable Spaces	10
CATEGORY SCORE FOR PART 4 – INDOOR ENVIRONMENTAL QUALITY	10
Part 5 : Other Green Features	
LH 5-1 Green Features and Innovations	8
CATEGORY SCORE FOR PART 5 – OTHER GREEN FEATURES	8
Green Mark Score (Max) :	120

BCA Green Mark Award Rating

Green Mark Score	Green Mark Rating
95 and above	Green Mark Platinum
85 to < 95	Green Mark Gold ^{Plus}
75 to < 85	Green Mark Gold
50 to < 75	Green Mark Certified

Pre-requisite Requirements for BCA Green Mark Platinum Rating

For multi-unit landed housing development, ventilation simulation or wind tunnel testing is to be carried out to identify and implement the most effective building design and layout which facilitate better thermal comfort and ventilation.

BCA Green Mark for Landed Homes (Version LH/1.0)

Part 1 – Energy Efficiency	
(A) Passive Design for the Tropics	Green Mark Points
<p>LH 1-1 Optimized Building Orientation</p> <p>Enhance the building orientation to achieve improved thermal comfort thus reducing the need for auxiliary cooling.</p> <p>(a) (East façade area + West façade area/Total façade area < 50% (2 points); or</p> <p>(b) (East façade area + West façade area/Total façade area < 30% (5 points)</p>	Up to 5 points
<p>LH 1-2 Window to Wall Ratio (WWR)</p> <p>Optimal window to wall ratio (WWR) for east and west facades to facilitate better ventilation and minimise heat gain to the building.</p> <p>(a) WWR ≤ 0.3 (3 points); or</p> <p>(b) 0.3 < WWR < 0.5 (2 points); or</p> <p>(c) WWR = 0.5 (1 point)</p>	Up to 3 points
<p>LH 1-3 Shading Device Design</p> <p>Provision of external shading devices over openings to reduce heat gain to the building.</p> <p>(a) For North and South facades (2 points) Simple horizontal overhangs that meet at least 30% shading</p> <p>(b) For other facades (Up to 5 points) Effective shading provision via possible strategies that achieves at least 30% shading (3 points); or 40% shading (4 points); or 50% shading or more (5 points)</p>	Up to 7 points
<p>LH 1-4 Maximum Permissible Wall U-Value</p> <p>Better thermal transmittance (U-value) of external walls with appropriate thermal mass to reduce cooling load.</p> <p>(a) U value of the wall ≤ 1.5 W/m²K (2 points); or</p> <p>(b) U value ≤ 1 W/m²K (3 points); or</p> <p>(c) Finishes on external wall surface with a high Solar Reflectance Index value of 70 or more (4 points)</p>	Up to 4 points

Part 1A : Passive Design for the Tropics – Cont'd	Green Mark Points
<p>LH 1-5 Maximum Permissible Shading Coefficient (SC) Value of Glass</p> <p>Effective control of heat flow through windows with better glass selection.</p> <p>(a) SC value of glass not more than 0.5 (2 points); or (b) SC value of glass not more than 0.7 (1 point)</p>	Up to 2 points
<p>LH 1-6 Cross Ventilation for Habitable Rooms</p> <p>Enhance design to facilitate cross ventilation by reducing barriers to air paths through the buildings and maximising exposure to prevailing wind direction.</p> <p>(a) Provision of designated inlet and outlet openings (exclude door) (2 points) (b) Distance between the inlet and outlet openings is not more than 12 m (2 points) (c) Microclimatic study to identify prevailing wind direction & variation for design (2 points)</p>	Up to 6 points
<p>LH 1-7 Open Space with Greenery Provision</p> <p>Encourage greater use of greenery, restoration of trees to reduce local heat island effect.</p> <p>(a) Restoration of trees on site, conserving or relocating of existing trees on site (1 point); and/ or (b) Provision of open space above regulatory requirements (i) 20% more open space (1 point); or (ii) 30% more open space (2 points); or (iii) 40% more open space (3 points).</p> <p><i>Note : Roof gardens can be considered part of the open space of similar footprints</i></p>	Up to 4 points
<p>LH 1-8 Covered Parking Space</p> <p>Provision of covered parking space <i>Note : Basement car parks can be considered</i></p>	1 point
<p>LH 1-9 Daylighting provision</p> <p>Encourage the use of daylighting to enhance visual comfort.</p> <p>(a) Windows for all habitable rooms and common areas (1 point) (b) Glare control in the perimeter through appropriate design of shading devices (1 point) (c) Internal finishes with high reflectance to enhance daylighting levels in the space(1 point)</p>	Up to 3 points

Part 1A : Passive Design for the Tropics – Cont'd	Green Mark Points
<p>LH 1-10 Cool / Green Roof</p> <p>Provision of hardscaped roof that is finished with materials/ finishes with Solar Reflectance Index (SRI) values of more than 40 OR provision of green roof to reduce local heat island effect.</p> <p>(a) 50% of the roof area (2 points); or</p> <p>(b) 75% of the roof area (3 points)</p>	Up to 3 points
<p>LH 1-11 Cool Hardscaped Areas</p> <p>All hardscaped non-roof areas are to be finished with materials or finishes with a Solar Reflectance Index (SRI) value of 29 or more.</p>	2 points
<p>LH 1-12 Sustainable Landscape Design</p> <p>(a) Landscape design that uses tropical plants/locally adaptive species that suits the climate and soil conditions. (1 point)</p> <p>(b) Plants that require very minimal irrigation. (1 point)</p>	Up to 2 points
Sub-Category Score for Part 1(A) :	42 points
Part 1B : Active System Efficiency	Green Mark Points
<p>LH 1-13 Active System Design</p> <p>Encourage the use of better energy efficient cooling system to minimise energy consumption.</p> <p>(a) Split air conditioning systems with four ticks and modularity based on occupancy OR VRV systems with modularity and a high part load efficiency (8 points)</p> <p>and/or</p> <p>(b) Use of fan as the mechanical cooling system (12 points)</p>	Up to 12 points
<p>LH 1-14 Artificial lighting</p> <p>Encourage the use of better efficient lighting to minimise energy consumption from lighting usage while maintaining proper lighting level.</p> <p>(a) Energy efficient lights for habitable spaces (2 points)</p> <p>(b) LED/ CDM lights for ambient lighting purposes (1 point)</p>	Up to 3 points

Part 1B : Active System Efficiency – Cont'd	Green Mark Points
<p>LH 1-15 Domestic Hot Water Heating System</p> <p>Use of innovative domestic hot water heating system</p> <p>(a) Centralised gas water heaters (2 points); or (b) Solar water heaters (3 points)</p>	Up to 3 points
<p>LH 1-16 Other Appliances</p> <p>Use of energy efficient household appliances that are certified under the Singapore Energy Labelling Scheme or equivalent.</p> <p>(a) Refrigerator with 4 ticks (2 points) (b) Others (Up to 2 point)</p>	<p>Up to 4 points</p> <p>For Item (b) 1 point for high impact items 0.5 point for low impact items</p>
Sub-Category Score for Part 1(B) :	22 points
Part 1C : Renewable Energy	Green Mark Points
<p>LH 1-17 Use of Solar Energy</p> <p>Encourage the use of solar energy to supply a significant proportion of the building's energy demand.</p> <p>(a) Minimum 3 KWp system capacity installation (3 points); or (b) 3 – 5 KWp system capacity (5 points); or (c) 5 – 10 KWp system capacity (8 points); or (d) System capacity installed can potentially offset the total energy usage (10 points)</p>	Up to 10 points
Sub-Category Score for Part 1(C) :	10 points
PART 1 – ENERGY EFFICIENCY CATEGORY SCORE :	74 points

Part 2 : Water Efficiency	Green Mark Points
<p>LH 2-1 Water Efficient Fittings</p> <p>Encourage the use of water efficient fittings that are certified under the Water Efficiency Labelling Scheme (WELS).</p> <ul style="list-style-type: none"> (a) Basin taps and mixers (b) Flushing cisterns (c) Showerheads, taps and mixers (d) Sink/Bib taps and mixers (e) All other water fittings 	<p>Extent of coverage : At least 90% of the fitting type used</p> <p>WELS rating V Good – 1.0 point Excellent– 1.5 point</p> <p>(Up to 3 points)</p>
<p>LH 2-2 Water Efficient Landscaping</p> <p>Provision of suitable systems and controls for landscape irrigation to minimise potable water consumption.</p> <ul style="list-style-type: none"> (a) Use of rainwater harvesting system for landscape irrigation (3 points) (b) Use of water efficient irrigation system for at least 50% of the landscape areas with controls such as <ul style="list-style-type: none"> (i) Rain sensors for irrigation (1 point) (ii) Drip irrigation/Micro irrigation techniques (1 point) 	<p>Up to 5 points</p>
<p>PART 2 – WATER EFFICIENCY CATEGORY SCORE :</p>	<p>8 points</p>

Part 3 : Environmental Protection	Green Mark Points
<p>LH 3-1 Sustainable Construction</p> <p>Encourage the adoption of building designs, construction practices and materials that are environmentally friendly and sustainable.</p> <p>(a) More efficient concrete usage for building components (Up to 3 points)</p> <p>(b) Use of Sustainable and Recycled Materials</p> <p>(i) Eco-friendly cements with approved industrial by-products to replace 10% of Ordinary Portland Cement (OPC) by mass for concrete production of structural building elements (1 point) and/or at least 20% of OPC by mass for that of non-structural building elements (1 point)</p> <p>(ii) Recycled Concrete Aggregates (RCA) and Washed Copper Slag (WCS) from approved sources are used to replace coarse and fine aggregates for concrete production of building elements.</p> <ul style="list-style-type: none"> ▪ At least 10% aggregate replacement by mass for structural building elements (or as approved by relevant authorities) (2 points); and/ or ▪ At least 50% replacement by mass for non-structural building elements (2 points) <p>(c) Use of Sustainable Products</p> <p>(i) Environmental friendly products that are certified under the Singapore Green Labelling Scheme (SGLS) (Cap at 2 points)</p> <p>(ii) Products with at least 30% recycled content by weight or volume (Cap at 2 points)</p> <p>(iii) Products that made of rapidly renewable materials for example, bamboo, cork etc (1 point)</p>	<p>Up to 14 points</p> <p>1 point for meeting the prescribed CUI limit. Additional 1 point for every 0.05 incremental improvements in CUI</p> <p>1 point for high impact item 0.5 point for low impact item</p>
<p>LH 3-2 Construction Waste Management</p> <p>Encourage management practices that minimise the amount of construction waste going to disposal and landfill.</p> <p>More than 50% waste recovered and reused on site / sent to recyclable uses</p>	<p>1 point</p>

Part 3 : Environmental Protection – Cont'd	Green Mark Points
<p>LH 3-3 Environmental Management Practice</p> <p>Encourage the adoption of environmental friendly practices by implementing effective environmental management programmes.</p> <p>(a) Site monitoring programmes in place to minimise energy use and water use (1 point)</p> <p>(b) Use of compost recycled from horticulture waste (1 point)</p> <p>(c) Provision of recycling facilities or bins for collection of storage of different waste such as paper, glass, plastic or organic waste etc (1 point)</p>	<p>Up to 3 points</p>
<p>LH 3-4 Stormwater Management</p> <p>Treatment of stormwater runoff before discharge to the public drain.</p>	<p>2 points</p>
<p>PART 3 – ENVIRONMENTAL PROTECTION CATEGORY SCORE :</p>	<p>20 points</p>

Part 4 : Indoor Environmental Quality	Green Mark Points
<p>LH 4-1 Indoor Air Quality (IAQ) Management in Habitable Spaces</p> <p>Minimise airborne contaminants mainly from inside sources to promote a healthy indoor environment.</p> <p>(a) Use of low volatile organic compounds (VOC) paints, adhesives, sealants and other finishes that are certified under the Singapore Green Labelling Scheme (SGLS) (Up to 4 points)</p> <p>(b) Provision of adequate natural ventilation and daylighting in wet areas such as kitchens, bathrooms and toilets (Up to 3 points)</p> <p>(c) Outdoor air delivery to habitable spaces through the use of fresh air handling unit in air conditioning systems (2 points)</p> <p>(d) High efficient particulate (HEPA) filters or other enhanced air filtration media in air conditioning systems (1 point)</p>	<p>Up to 10 points</p> <p>Extent of coverage : At least 90% of the applicable areas</p> <p>1 point for high impact item 0.5 point for low impact item</p>
<p>PART 4 - INDOOR ENVIRONMENTAL QUALITY CATEGORY SCORE :</p>	<p>10 points</p>

Part 5 : Other Green Features	Green Mark Points
<p>LH 5-1 Green Features and Innovations</p> <p>Encourage the use of other green features and practices which are innovative and have positive environmental impact.</p>	<p>Up to 8 points</p> <p>3 points for high impact item</p> <p>2 points for medium impact item</p> <p>1 point for low impact item</p>
<p>PART 5 – OTHER GREEN FEATURES CATEGORY SCORE :</p>	<p>8 points</p>

Green Mark Score (Max 120 points)

$$\text{Green Mark Score} = \sum \text{Category Score} [(\text{Part 1 – Energy Efficiency}) + (\text{Part 2 – Water Efficiency}) + (\text{Part 3 – Environmental Protection}) + (\text{Part 4 – Indoor Environmental Quality}) + (\text{Part 5 – Other Green Features})]$$

where

$$\text{Category Score for Part 1} = \sum \text{Sub-Category Score} [(\text{Part 1A – Passive Design for the Tropics}) + (\text{Part 1B – Active System Efficiency}) + (\text{Part 1C – Renewable Energy})]$$