Executive Summary – Development of Green Buildings in Singapore

1.0 Green Buildings Assessment System Adopted

The Building and Construction Authority (BCA) Green Mark scheme was launched in 2005 and is an internationally recognised green building rating system customized for the tropical climate. Green Mark criteria is based on set parameters and establishes indicators to steer the design, construction and operation of buildings towards increased energy effectiveness and enhanced environmental performance. It is designed to promote sustainability in the built environment and heighten environmental awareness among all stakeholders in the industry when they start project conceptualisation and design, as well as during construction.

BCA Green Mark comprises a number of distinct rating tools that, together, holistically rate the built environment for its environmental performance. These include:

- New Buildings including Non-Residential, Residential and Landed Housing
- Existing Buildings including Non-Residential, Residential and Schools
- User Centric including Office Interior, Retail, Supermarket, Restaurant and Data Centres
- Beyond Buildings including Districts, Parks, and Infrastructure

The Green Mark scheme formed the foundation for Singapore's first Green Building Masterplan developed in 2006 to encourage, enable and engage industry stakeholders to adopt new green buildings. The second Green Building Masterplan was launched in 2009 to tie in with the Inter-Ministerial Committee on Sustainable Development (IMCSD)'s report on Sustainable Singapore. The focus then evolved to greening the large existing building stock in order to achieve the key target in the IMCSD report of having "at least 80% of the buildings in Singapore to be green by 2030". With the two Masterplans in place, the green building momentum spearheaded by BCA took off in Singapore and achieved much international recognition. The third Green Building Masterplan was launched in Sep 2014, with an ambitious vision of becoming "A global leader in green buildings with special expertise in the tropics and sub-tropics, enabling sustainable development and quality living".

2.0 Statutory Requirements On The Following Elements Of Green Buildings

As Singapore aspires to be a leading global city in environmental sustainability, there is scope to further improve on energy efficiency requirements in buildings, to address the impact of climate change. While the focus on energy efficiency remains important, a more holistic approach was taken to encourage environmental friendliness in buildings to ensure that environmental quality and comfort are not compromised. Among other initiatives, BCA has enhanced the Building Control Act and put in place the Building Control (Environmental Sustainability) Regulations, to require a minimum environmental sustainability standard that is equivalent to the Green Mark Certified Level for new buildings and existing ones that undergo major retrofitting. This regulation took effect from 15 Apr 2008. Projects that are submitted for URA planning permission on or after 15 Apr 2008 will be subject to this requirement.

The Building Control (Environmental Sustainability) Regulations 2008 will apply to :

- All new building works with gross floor area of 2000 m^2 or more;
- Additions or extensions to existing buildings which involve increasing gross floor area of the existing buildings by 2000 m^2 or more;

- Building works which involve major retrofitting to existing buildings with gross floor area of 2000 m^2 or more.

The table below illustrates the recent developments of the Green Mark Assessment Criteria for new buildings (residential and non-residential) which is substantially different from its earlier versions – evolving to a more performance based centric assessment criteria.

Green Mark for New Buildings	**Objectives**
Green Mark for Non-Residential Buildings GM NRB: 2016 is the fifth edition of the Green Mark scheme for new non-residential buildings such as commercial (office, retail, hotel), industrial and institutional buildings.	• Streamlined criteria that addresses sustainability in a more balanced and holistic manner • Greater Emphasis – climatically contextual design, energy effectiveness, greater focus on health and wellbeing of building occupants, smart buildings, and a systematic approach to addressing embodied energy and resource use. • Recognises the design process and encourages due processes to respond to site context which facilitates sustainability to be considered at the early project stages where there is the greatest opportunity for low cost, high reward options to be implemented. • Green Mark itself becomes a design guide and accessible to professionals, students and the population at large • A collaborative framework– with extensive external industry members involved in its setting of metrics, assessment methods and performance levels.
Green Mark for Residential Buildings GM RB: 2016 is the fifth edition of the Green Mark scheme for new residential buildings	

To achieve a sustainable built environment, it is important to ensure that existing buildings continue to operate efficiently throughout their life cycle. On 01 December 2012, Part IIIB—Environmental Sustainability Measures for Existing Buildings was introduced to the Building Control Act (Act), requiring building owners to:

- Comply with the minimum environmental sustainability standard (Green Mark Standard) for existing buildings;
- Submit periodic energy efficiency audits of building cooling systems; and
- Submit information in respect of energy consumption and other related information as required by the Commissioner of Building Control. These measures will help building owners to benchmark their current building operations, achieve the minimum efficiency standards required and reap the benefits of the energy efficient systems.

Mandatory Higher Green Mark Standard For Government Land Sales Sites In Selected Strategic Areas

- To maximise the potential for cost-effective energy savings in our built environment, it was announced in BCA's 2nd Green Building Masterplan in 2009 that projects developed on land sold under the Government Land Sales (GLS) Programme sites in the selected strategic areas will be subject to higher Green Mark Standards.

Selected Strategic Areas *Exact Location to refer to the Building Control (Environmental Sustainability) Regulations 2008*	**Requirements for building wholly or partly within area that is on land sold on or after 5th May 2010 under the Government Land Sales Programme**
Marina Bay	Green Mark Platinum Rating
Downtown Core – including areas within the CBD located next to Marina Bay	Green Mark Gold^{Plus} Rating
Jurong Lake District	Green Mark Gold^{Plus} Rating
Kallang Riverside	Green Mark Gold^{Plus} Rating
Paya Lebar Central	Green Mark Gold^{Plus} Rating

Selected Strategic Areas *Exact Location to refer to the Building Control (Environmental Sustainability) Regulations 2008*	**Requirements for building wholly or partly within area that is on land sold on or after 20th July 2012 under the Government Land Sales Programme**
Jurong Lake District	Green Mark Gold^{Plus} Rating

Selected Strategic Areas *Exact Location to refer to the Building Control (Environmental Sustainability) Regulations 2008*	**Requirements for building wholly or partly within area that is on land sold on or after 1st September 2014 under the Government Land Sales Programme**
Woodlands Regional Centre	Green Mark Gold^{Plus} Rating
Punggol Eco-Town	Green Mark Gold^{Plus} Rating

3.0 Government Incentives For Providing New Green Buildings And Existing Green Buildings

Since the introduction of the Green Mark scheme in 2005, the government had been introducing a myriad of incentives to the industry. In December 2016, a sum of $20 million was set aside on 'Green Mark Incentive Scheme (GMIS)' to help accelerate the adoption of environmentally-friendly green building technologies and building design practices – this amount was fully committed within 3 years. Other new incentives are then introduced to spur more research and development into green practices, attract building owners to upgrade their existing premises and also to incentivized developers to attain higher Green Mark certifications (Platinum and Goldplus). More details on these schemes can be found below.

- Green Mark Gross Floor Area (GM GFA) Incentive Scheme
    - https://www.bca.gov.sg/GreenMark/gmisebp.html
- $50 Million Green Mark Incentive Scheme For Existing Buildings And Premises (GMIS-EBP)
    - https://www.bca.gov.sg/GreenMark/gmisebp.html
- Pilot Building Retrofit Energy Efficiency Financing (BREEF) Scheme
    - https://www.bca.gov.sg/GreenMark/breef.html
- $5 Million Green Mark Incentive Scheme - Design Prototype (GMIS-DP)
    - https://www.bca.gov.sg/GreenMark/gmisdp.html

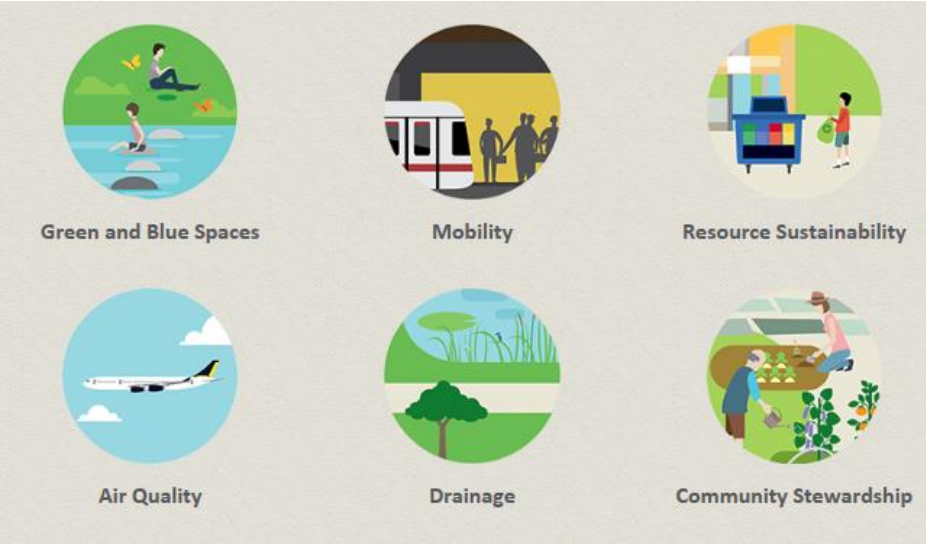
4.0 Quantity Surveyors' Involvement In Green Buildings

The Quantity Surveyor involvement in Green Buildings revolves around cost and contracts. With the emergence of Green Buildings, there is much more emphasis on life cycle costs. The business case for green buildings needs to be firmly established and one of the ways to overcome the initial higher construction costs is via life cycle costing and payback analysis. Other than costs, the QS will need to understand the technicalities of green products and the impact on warranty requirements to safeguard clients' interests. This knowledge will also be valuable to the project team in assessing the suitability of materials and/or technology for the project.

5.0 Updated Developments Of Green Buildings

The Sustainable Singapore Blueprint 2015 is one of the key strategic plan that outlines our national vision and plans for a more liveable and sustainable Singapore, to support the diverse needs and growing aspirations of Singaporeans. This blueprint is a plan for action and provides all of us a unique opportunity to work together to create a better home, a better environment, and a better future that we can all be proud of.

The Blueprint has targets for each of the main category below. Under the Resource Sustainability category, one of the target is to have 80% of buildings in Singapore are to be green mark certified by 2030. It was estimated that in May 2017, we have already attained more than 33% of building stock in Singapore to be green mark certified.



Source: Extract from Sustainable Singapore Blueprint 2015

6.0 Useful Links Relating To Green Buildings

- Sustainable Singapore Blueprint 2015
  - http://www.mewr.gov.sg/ssb/
- BCA Green Mark Information
  - Source: https://www.bca.gov.sg/GreenMark/green_mark_buildings.html
- Singapore Business Case for Green Buildings
  - https://www.bca.gov.sg/GreenMark/others/bizcasefeb08.pdf
- BCA Green Mark Assessment Criteria And Online Application
  - https://www.bca.gov.sg/GreenMark/green_mark_criteria.html
- Green Mark Projects
  - https://www.bca.gov.sg/green_mark/
- Certified Green Mark Manager/ Green Mark Professional
  - https://www.bca.gov.sg/GreenMark/gm_manager.html
- Singapore Green Building Council
  - http://www.sgbc.sg/
- Singapore Green Building Product & Services Certification
  - Http://www.sgbc.sg/sgbc-certifications/
- SGBC Certification Directory
  - https://sgbc.online/certification-directory/products/
- Singapore Environment Council
  - http://www.sec.org.sg/
- SGLS Green Product Certification
  - http://www.sec.org.sg/web/green-label.php