Building and Construction Authority

# Business Case
## for Green Buildings in Singapore

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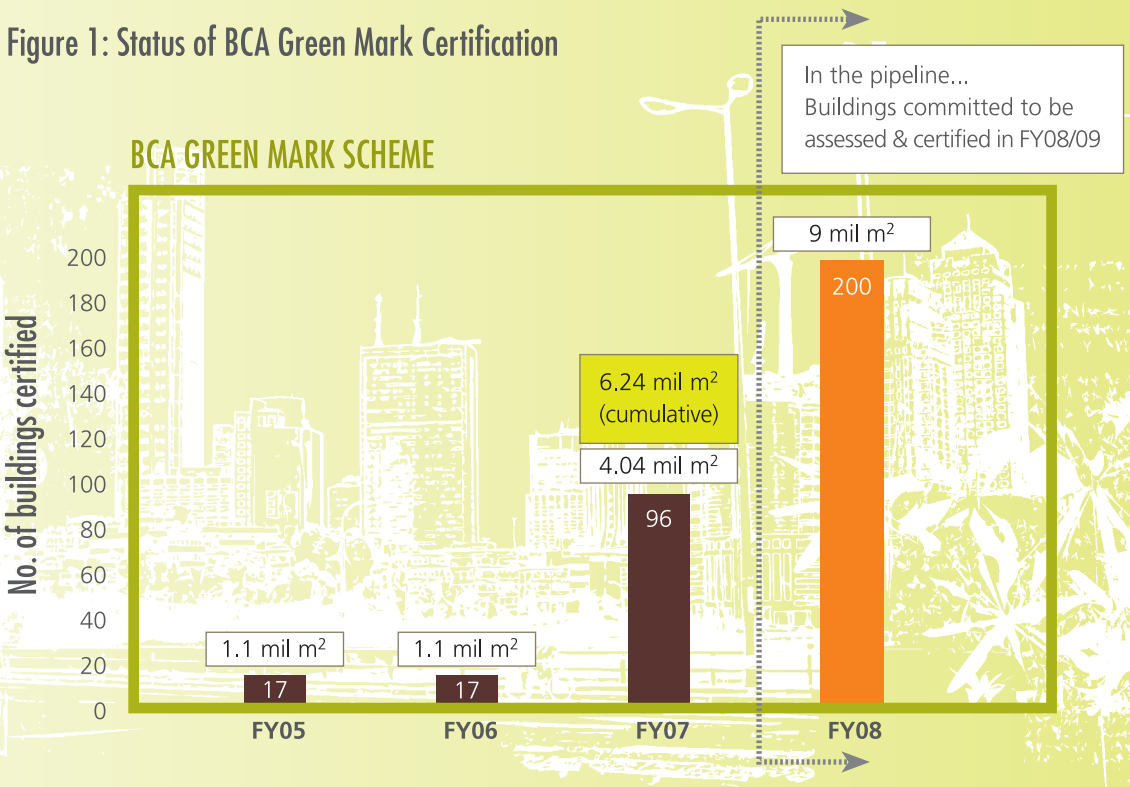
Buildings have always been an important facet of everyday lives as we spend much of our time indoors. The benefits of green buildings include cost savings from efficient use of key resources such as energy and water, leading to lower operation and maintenance costs; and enhanced occupant productivity and health. With these in mind, it is not difficult to see why the development of green buildings has gained much momentum in the recent years internationally.

In Singapore, the BCA Green Mark Scheme that recognises green buildings has made much progress since its launch in January 2005. BCA expects that by the end of FY07, close to 100 buildings covering GFA of about 4 million square metres would have been Green Mark certified as shown in Figure 1. This can only be achieved with the strong support from many 'green' champions of our building and construction industry.

Figure 1: Status of BCA Green Mark Certification




Nevertheless, there are still challenges to overcome in our efforts to promote wider adoption of green buildings in Singapore, despite growing recognition and acceptance of sustainable building practices, green products, and technological advancement in green building design and construction. This could be mainly attributed to the general perception of a high cost premium in constructing a green building over a basic code-compliant building and the lack of quantifiable information regarding the financial implications and the business case for green buildings.

To address this concern, BCA has conducted a preliminary study on the 'Business Case of Green Buildings in Singapore', based on an aggregate analysis of 15 BCA Green Mark certified buildings at various rating levels and for different types of development. Notwithstanding the limitation of a relatively small sample size in the preliminary study, the results presented here is indicative of the ballpark green cost premiums and payback periods of green buildings in Singapore.

Findings of the preliminary study, as presented in Table 1, show that the cost premium of Green Mark Certified buildings, ranging between 0.3% and 1%, is marginal over code-compliant buildings. A Green Mark Gold Plus building (1% to 3%) only costs nominally more than a Green Mark Gold building (1% to 2%). The cost premium for a Green Mark Platinum building ranges from 2% to 8%. The cost premium generally varies with the building type, with a green industrial or institutional building usually at the lower end of the range. Commercial and residential buildings generally incur a higher green cost premium due to higher performance designs. There is no great disparity in the payback periods of Green Mark Certified and Green Mark Platinum buildings as the greater cost premium of green buildings at higher rating levels could be recovered with larger amounts of energy and water savings. The trend of the local green cost premium is also generally consistent with findings for green buildings in the United States. With courtesy of City Developments Limited (CDL) and Xilinx Asia Private Limited, key green features of some Green Mark Platinum buildings are presented in the backpage.

The findings in this preliminary study provides indicative cost premium and payback period for green buildings at various rating levels in Singapore. It must however be noted that **there are many less tangible benefits provided by green buildings such as better indoor environmental quality leading to enhanced occupant productivity and health.** With increasing energy and water costs and the rapid advancement in green building technologies, there would be an even stronger business case for the wider adoption of green buildings in Singapore. It can be expected that with greater adoption of green buildings to form a critical mass of demand for green building technology, it could further drive down the cost premium of green buildings in Singapore.

## Table 1: Range of Green Cost Premiums & Payback Periods vs. Level of Green Certification

| BCA Green Mark Award Type | Green Cost Premium (%) | Payback Period (years) |
|---|---|---|
| Platinum | 2% to 8% | 2yrs to 8yrs |
| Gold Plus | 1% to 3% | 2yrs to 6yrs |
| Gold | 1% to 2% | 2yrs to 6yrs |
| Certified | 0.3% to 1% | 2yrs to 5yrs |

*(Footnote: The green cost premium is defined as the extra construction cost incurred in constructing a green building over a code - compliant building. The payback period is computed by taking the green cost premium over the sum of annual energy and water cost savings accrued. Outliers and abnomalities were removed to prevent bias and skewness of the results. The cost data was normalised to a base year. This Business Case would be strengthened through further research and data collation in the future, with the collective efforts of the industry).*

# City Square Mall

City Square Mall is a 9-storey Commercial Development comprising a Retail Podium from the 1st to 5th storey, an Institutional Tower from the 6th to 9th storey and 4 levels of basement. The basement consists of 2 levels of car park, 2 levels of retail and other ancillary facilities including an Urban Park / Sunken Plaza @ Kitchener Road & Serangoon Road.

## Key Green Features

- *Eco restrooms with "very good" to "excellent" fittings under PUB's Water Efficiency Labelling Scheme*
- *Twin chute (organic and inorganic waste) pneumatic waste disposal system*
- *Real time display of indoor environmental performance for public awareness*
- *Priority parking for hybrid cars*
- *Basement car park fitted with motion sensors to control lighting level*

*Expected Energy savings per year: S$2 mil*


# Xilinx Asia Pacific Headquarters

Xilinx Asia Pacific Headquarters consists of a 6-storey Office Cum Business Park Development located within Changi Business Park.

## 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 use of low VOC paint and zero-formaldehyde-emission carpet to 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, restrooms, car park and staircases*
- *Use of centralised lighting management system which is linked to the Building Management System via an IT backbone*
- *Use of solar cum heat pump hot water system*
- *Use of recycled condensate water for landscape irrigation*

*Energy savings per year: S$500,000*

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