

## **GBI-NREB towards the sustainable value of money and sense for Existing Purpose-Built Building in Malaysia**

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### **Abstract**

The Copenhagen Climate Change Summit 2009 (COP15) has seen Malaysia aim for a voluntary reduction of its emissions intensity of GDP by the year 2020. Therefore, the building sectors are also motivated to play a part through the Green Building Index (GBI) scheme; the sustainable tool that has potential in resolving this global environmental issue. It is expected that GBI offers a promising outcome to stakeholders against the issues on the fees and construction cost to gain this certificate. This paper is part of a main research area focusing on the value of money and sense towards attaining the GBI-NREB certification which takes into account existing purpose-built buildings in Malaysia. This paper measures the quantifiable value of the GBI-NREB scheme that can be materialized through the computation of the upfront cost on the GBI scheme and government incentives against the promising operational cost saving. The research method is based upon a literature review and comparative studies on relevant cases in Malaysia. The anticipated outcomes from this paper are that, a profound effect on the investment in attaining GBI-NREB certification which eventually aims for property sustainable value and operational cost saving.

### **Keywords**

GBI, purpose-built building, upfront cost, government incentives, operational cost-saving

### **1. Introduction**

Malaysia today is facing two of the world's most pressing issues, namely climate change and energy security which in due course causes an increase in the world's carbon emissions (Malaysia Prime Minister, 2009; Warren, 2009; Dunphy et al., 2007). The data has been accumulated from the United Nations Millennium Development Goal indicators (2006) and listed Malaysia's carbon emissions in 2006 at 187 million tonnes, which is approximately 7.2 tonnes per person a year in Malaysia. In current risk exposure indicators (likelihood and magnitude) to energy and climate change trends for its major urban city, Kuala Lumpur is exposed to medium state risks based on its energy insecurity, energy import dependency, physical exposure and city vulnerability towards the climate change (Malaysia Green Building Confederation, 2010). In addition, Malaysia Green Technology Corporation (2010) believed this puts Malaysia in third place in the South-East Asian region behind Indonesia (333 million tonnes) and Thailand (273 million tonnes), with Vietnam (106 million tonnes) in fourth place. According to the study, it has been estimated that over seventy percent of the average city's greenhouse gases (GHGs) emissions come from existing and old buildings, while about eighty percent of Malaysia building stocks contribute significantly to green- house gas emissions (MGBC, 2010). For this reason, the Copenhagen Climate Change Summit 2009 (COP15) has seen Malaysia adopt an indicator of a voluntary reduction of up to 40% in terms of emissions intensity by the year 2020 compared to 2005 levels.

In facing up to the GHGs emissions challenges, the Government and the Malaysian Construction Professionals are now very committed to contribute to a sustainable approach providing the ultimate reasons of 'Going Green' concept become a government policy. This is evident when the Ministry of Energy, Green Technology, and Water (2010) increase the speed towards this Green vision by announcing the national green policy namely Green Technology. Inspired by the government 'Green' vision, the building sectors are also motivated to play a part through the Green Building Index (GBI) scheme (MGBC, 2010). Malaysia green building rating system; the Green Building Index is promising an environmental-friendly buildings that take into account the carbon footprint in Malaysia's urban cities (Tan, 2009).

## **2. The National Green Building Rating Tools: Introduction of Green Building Index Malaysia**

The Green Building Index (GBI) is a green rating tool to guide architects, designers, government bodies, building owners, and developers in constructing environmentally responsible buildings. It was initiated and will be managed by Pertubuhan Akitik Malaysia (PAM) newly formed Sustainability Committee. In addition, Green Building Index Sdn Bhd was incorporated in February 2009, a wholly-owned subsidiary of PAM and the Association of Consulting Engineers Malaysia (ACEM), to administer GBI accreditation and training of GBI Facilitators and Certifiers. GBI accreditation for buildings is separated into three tiers. At the highest level is the GBI Accreditation Panel, the independent regulatory body for GBI accreditation. At the intermediate level are the GBI Certifiers, consisting of experienced professionals that conduct the assessment and accreditation of project submissions. On the front-line level are the GBI Facilitators, professionals who together with clients and the design team enhance their projects to meet or exceed GBI rating system requirements. The GBI rating tool provides an opportunity for developers and building owners to design and construct green with - sustainable buildings that can provide energy savings, water savings, a healthier indoor environment, better connectivity to public transport and the adoption of recycling and greenery for their projects and reduce our impact on the environment. GBI<sup>1</sup> is developed specifically for the Malaysian-tropical climate, the environmental and developmental context, cultural and social needs.

### **2.1 GBI certification guarantee a government incentives**

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<sup>1</sup> GBI information as retrieved from GBI page on [www.greenbuildingindex.org/index.html](http://www.greenbuildingindex.org/index.html)

GBI has become an important initiative that promises a significant outcome to the certified green building movement in Malaysia (MGBC and Chen, 2010; Tan, 2009). However, the community is still hesitant about embracing the 'green' concept due to misgivings about the quality standard of this 'green' model whether it would benefit building and its economies. The benefits of green building need to be clearly modeled in feasibility study (Bertrand, 2010; Warren, 2010; MGBC, 2010). Therefore, to encourage its implementation, the GBI supported by the Malaysia government; has subsidized the Malaysian new framework and will guarantee the reimbursement to the investor with government incentives as shown in **Table 1**.

It is expected that the newly developed green building will also operate with less energy consumption, less water, and generates less waste which in turn provides operational cost saving as much of 9 percent yet increase building values by  $\pm 7.5$  percent higher than a conventional building (Tan, 2009; Thor, 2008). In contrast, IEN Consultants (2010) studied the potential of Low Energy Office (LEO) building subsequent performance and this indicates that, adapting to a sustainable building approach would only cost about 5 percent additional outlay but provide 50 percent operational cost savings. The comparative data of green building potentials is tabulated in **Table 2**. Moreover the pay back period for such a green adapted building is estimated to be around 5 years based on operational savings alone.

**Table 1: Incentives for Renewable Energy, Energy Efficient, and Green Buildings in Malaysia (Green Building Index Certificate for buildings from 24 October 2009 until 31 December 2014)**

GOVERNMENT INCENTIVES FOR BUILDINGS OBTAINING GREEN BUILDING INDEX CERTIFICATE	
Eligibility for GBI Incentives	Types of Incentives for obtaining GBI Certificate
Buildings that have been awarded the GBI certificate of any grade are eligible to be considered for GBI incentives. The criteria are; Energy Efficiency (38%), Indoor Environmental Quality, Sustainable site Planning and Management, Material and Resources (9%), Water Efficiency, and Innovation (9%).	<p><b>Tax Exemption:</b> The qualifying expenditure (QE) to obtain GBI certification for a building used for his Business qualifies for tax exemption which is equivalent to 100% of the amount of QE and is allowed to be set-off against 100% of the statutory income for each year of assessment.</p> <p>Qualifying expenditure means an additional expenditure incurred in relation to construction of a building, alteration, renovation, extension or improvement of an existing building.</p> <p>Any unutilized QE can be carried forward to subsequent years of assessment until the amount is fully exempted. This tax exemption is given only once for buildings awarded GBI certificate from 24 October 2009 until 31 December 2014.</p> <p><b>Stamp Duty Exemption:</b> Buyers of buildings and residential properties awarded GBI certificates acquired from property developers are eligible for stamp duty exemption on instruments of transfer of ownership of such buildings. The amount of exemption is on the additional cost incurred to obtain the GBI certificate.</p>

Source: KETTHA Handbook- pg. 13, 2010

## 2.2 Green Building: the concern and issues

Although Malaysia has undergone rapid economic and social prospect over the last fifty years, business and the property industry have been slow to react to environmental change even though there has been awareness of the growing environmental consequences due to earlier development actions (Warren, 2009; Khamidi, 2007). In the built environment, about eighty percent of the Malaysian building stocks contribute significantly to green house gas emissions (MGBC, 2010). Conversely, Jones Lang LaSalle (2005) noted that many owners have opted for minor refurbishments to existing building to lower their

own capital expenditure and avoid access problem due to its excessive supply of new building stock. This scenario occurs due to the fact that the market outlook on the environmental sustainability aspect in Malaysia is still new and vulnerable for green building. More to the point, the financial dilemma facing all Malaysian developers are, as always, the total development cost, fragmented fees, risk, and return (MGBC and Chen, 2010; Von, 2010; Bertrand, 2010). These issues (as the following shows) are mostly related to green buildings as they present new challenges for developers. That are; performance is often driven by the objectives and context of the development, limited size of the market, and difficulties in identifying any change in value aspects (tangible benefit) that can be directly attributed to sustainable and green building (Bertrand, 2010; Warren, 2009).

- i. According to a study by Bertrand (2010), he points out that **in addition to rapidly evolving accreditation criteria** (GBI, 2011), to harvest the benefits of green buildings while reducing the risks and cost, GBI scheme requires an integrated approach. Too often a **pure criterion by criterion approach leads to a collection of costly independent green features**. Moreover, according to the Khamidi (2010) a survey on the level of importance of criteria in the Green Building Index Malaysia, **80% of respondents agreed that innovation is significant** but costly. Thus, the highly variable additional costs of **sustainable development and the range of potential operating cost savings as certified by the GBI also make it difficult to identify specific value elements within individual buildings** (Bertrand, 2010; Miller et al., 2008).
- ii. Lorenz et al., (2007) identified the **causes and the lack of a clear financial benefit to sustainable development** on the absence of a hard market to encourage **developers who are keen** to provide buildings and embrace sustainable development. These developers are less likely to add green features **if it does not add value in terms of money on an asset**. Warren (2009) also spotted that the **market does not value the extra costs and risk associated with building a sustainable property. It is expected that when risks and cost can be controlled more effectively**, this can benefit directly the bottom line. Also, the **experience in more established and mature markets** demonstrates that marketing the benefits of green is **vital to harvest the full potential of green buildings** (Bertrand, 2010).
- iii. Tan (2009) and Von (2010) argued that having a **certified green building provides a low construction operational cost, increases the property's selling points**, improves **operational cost saving** up to thirty percent on the energy consumption, and guarantees the **government incentives**. However, Real Estate and Housing Developer's Association (REHDA) (2009) believes that **such incentives would allow a monopoly to exist**; while Chen (2010) agreed that **majority of the local developers are likely opt for 'green washing' to chase the green points** so that their projects are perceived as following the **current trend and thus qualify for the Tenth Malaysia Plan (10 MP) incentive scheme**. As a result, the sustainability objectives of green building has been a particular challenge for the development industry, resulting a lack of a business case for responding to sustainable development objectives (Ellison and Sayce, 2007), Therefore, steps are needed to promote wider acceptance in considering sustainability goal.

Many scholars believed that the global construction is responsible for contributing thirty five to forty five percent of CO<sub>2</sub> emissions throughout the world (Khamidi, 2007). Studies conducted by the United Nations Environment Programme in early 2007 indicated that by 2020, major parts of CO<sub>2</sub> emissions will come from the developing countries. In order to mitigate the financial concern and vulnerable position in the marketplace for green buildings, this paper attempts to identify the economic value based on the potential and risk associated with green building, as the key indicators for moving towards building a sustainable development. Therefore, the summary of variable issues and potential of green building is tabulated in **Table 2** as shown below.

**Table 2: Summary of potential and risk on economical value of building ‘Green’ property**

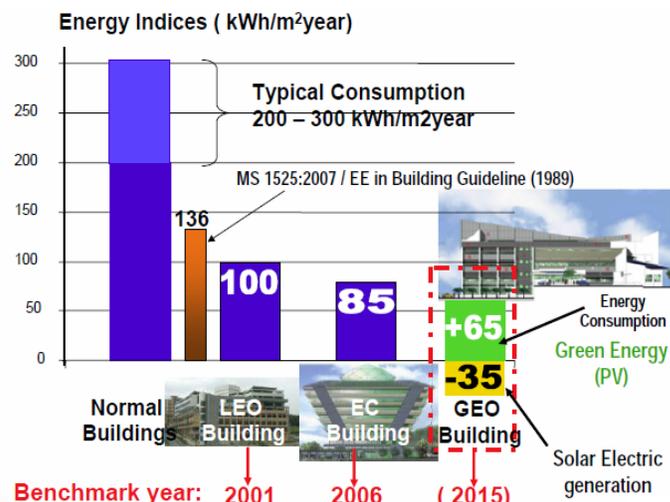
Variables	
Potential	Risk
i. Low construction operational cost (% varies)	i. High Development Cost (% varies)
ii. Property Selling point (+ 7.5%)	ii. Costly additional components and material (+5%)
iii. Government incentives on qualified expenditure (+100%)	iii. Costly Innovation (-100%)
iv. Market value (±10.4 %)- ASIA base	iv. Low market appreciation value (% varies)
v. Operational Cost Saving (50%)	v. High recurrent Maintenance (% varies)

### 3. CASE STUDY ON ‘GREEN’ DEVELOPMENT

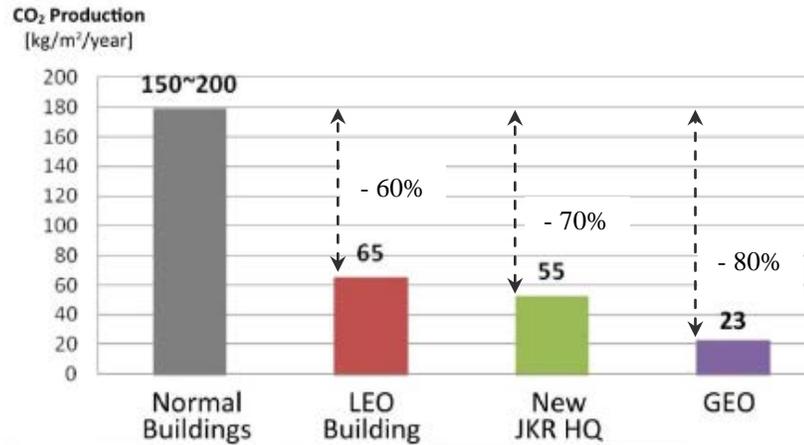
#### 3.1 The Certified (GBI and BEI) BIPV technology of GEO building, Malaysia

The 4000square metres of Pusat Tenaga Malaysia (now MGTC) Green Energy Office (GEO) building serves as a green pilot project that provides a platform for proof of the green concept in driving forward the goals of the Malaysian building industry (developers, consultants, architects, local professionals and academia at large) in the subject of sustainable building design. At a low cost of approximately RM20 million, the conceptual budgets are estimated to incorporate the GEO building with the Building Integrated Photovoltaic (BIPV) system and also achieved the GBI (certified) for Non-Residential Building. GEO building proved the sustainability achievement through its energy efficiency strategy by producing electricity about 1,200 kWh/kWp/year but only consume energy about 65kWh/m2year (without PV contribution) as compared to conventional building that consume energy up to Building Energy Index (BEI) 220 kWph/m2/year (IENC, 2010, MGTC, 2009). It is forecasted that the GEO building could achieve BEI 35kWph/m2year indicator as shown in **Figure 1**; therefore, the GEO building in turn contributes to only 23kgCO2/m2/year (IENC, 2010). The study that has been conducted by the IEN Consultant (2010) and it also shows that, as compared to the conventional office building, the GEO building yields a 50 percent reduction on energy consumption and about 80 percent reduction on CO2 emission intensity per annum (**Figure 2**).

**Figure 1:** Buildings are responsible for one-third of energy related GHG emissions.



**Figure 2:** Green building demonstrates high CO2 emission savings.



Source: IEN Consultants, 2010.

### 3.2 Summary of case study data (based on GEO Building and BIPV technology)

The summary of case study applicable data (as also mentioned earlier in item 3.1) will assist to simulate the expected outcome of the green building in terms of value of money and is tabulated in **Table 2** as shown below. The GEO building consists of Energy Efficiency (EE) quality as certified by the GBI scheme. The MGTC (2009) stated that almost 18% additional construction cost is incurred to adopt EE features while overall additional construction cost for adopting EE and RE features will take up about 33%. The EE performance alone is designed to cater the energy use of the building system such as the air conditioning and space heating, lighting, power, and process. The common index for comparing energy use in buildings is known as the Building Energy Use Index (BEI). This is usually expressed as kWh/m<sup>2</sup>/year which measures the total energy used in a building for one year in kilowatts hours divided by the gross floor area of the building in square meters (Chan, 2009). Moreover, Chan (2009) believed that in order to comply with MS 1525 requirements for non-residential buildings with air conditioned areas larger than 4000 square, the use of Renewable Energy (RE) out of Building Integrated Photovoltaic system (BIPV) is adopted to achieve the thermal efficiency of the building that should not exceed 50 W/m<sup>2</sup> (MGTC, 2010). This strategy is expected to contribute more energy saving on the use of air conditioning system that is normally take up 64 percent of overall energy consumption (MGTC, 2010; Chan, 2008). According to the MGTC (2010) study, the energy saving of GEO building (492, 125 kWh/year) is translated into nearly RM200, 000 based on the Tariff B (Low Voltage Commercial Tariff), whereby for all kWh of energy usage is equivalent to RM0.397 per kWh. Meanwhile, the CO<sub>2</sub> reduction is calculated based on the 0.614 kg of CO<sub>2</sub> emitted to the atmosphere for each 1 kWh of electricity generated by power plant (Peninsular Malaysia).

**Table 3: Summary of the case study on GEO building and BIPV technology.**

Building / RE project	Building Floor Area (sqm)	Overall budget / cost (RM)	Additional Construction Cost for EE / RE	Energy generation (kWh/year)	Energy Use BEI (kWh/m <sup>2</sup> /year)	Energy saving (kWh /year) = RM / year	CO <sub>2</sub> reduction (kg/year)
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GEO Building (EE)	4152	20 million	18% (overall 33%)	NIL	65		
BIPV project (RE)	766	3.million (extracted from 20mil)	15%	1,200	35	492,125 X 0.397 = <b>RM 195,374</b>	(492,125 X 0.614)= <b>302,165</b>

Source: (MGTC and CDM, 2010)

### 3.4 Comparative study on conventional and certified GBI with BIPV of an average of 4000sqm Office Building.

Based on the case study of GEO building, the researcher has attempted to work out a comparison of the conventional building against the green building using the common value in terms of financial analysis (money). Hypothetically, it is expected that the result could change the risk on financial concern for the green building, yet it offers a feasible and viable investment. The working simulation on the financial analysis as estimated in **Table 4** is solely based on the data applicable as shown in **Table 2** and **Table 3**. The conventional building is assumed to have the same area (4000 sqm / 43,055 sqft) but has a reduction of at least 33 percent (RM6.6 million) in construction cost against the sample budget (RM20 million). This is because the additional EE and RE features as applied to GEO building are assumed not integrated in the conventional building. Consequently, this study considers the incentives yield for GBI certified building is the tax exemption on 100 percent statutory income. It is estimated that the qualifying expenditure (QE) on the components and materials of green building is assumed as 5 percent from the additional construction cost (RM6.6 million), which is equivalent to RM 330,000. Hence the building construction cost is estimated based on the value per square feet by dividing the overall budget (for each type of building) with the building area (43, 055 sqft). Although GEO building has adopted the BIPV system for energy efficiency goal, however, this simulation study is not considering the BIPV result as the crucial data of the operational cost saving strategy. This is because the BIPV system for RE generation is not the main provision for energy efficiency as evaluated by GBI scheme (MGBC, 2010). The study also attempted to evaluate the profitable value out of green building based on the average rental of Class A building (RM 6.00/sqft) in an urban city such as Kuala Lumpur that is highly marketable but also exposed to the risk of CO2 emission intensity (MGBC, 2010). The estimated rented area is based on the air-conditioning area whereby it usually covering 80 percent (in this case study is 34,444 sqft) of the gross floor area (GFA) of a building (MGBC, 2010; MGTC, 2010; Chan 2008). Hypothetically, it is expected that the green building is cost-effective to commercial building that generate revenue based on the encouraging performance of the green building features.

**Table 4: Simulation study on financial analysis of Conventional Building versus Certified Green Building of an average of 4000sqm / 43, 055sqft Office Building**

No.	Building description	Conventional Building	Certified Green Building
1.	Overall budget / cost (RM)	<b>RM13.4 mil.</b> (Say: RM20 million – 33 % or RM6.6 million)	<b>RM20 million</b>
2.	Building cost per square feet (RM/sqft)	± <b>RM310 / sqft</b>	± <b>RM465 / sqft</b>
3.	Operational cost saving / year (Solely on EE performance= BEI 65kWh/m2/year)	<b>0</b>	<b>RM195,374</b>
4.	Incentives yield on tax exemption (100 % from additional QE on components and materials)	<b>0</b>	<b>(RM 330,000)</b> (RM 6.6 million – 5% additional cost)

<p><b>5. Rental Market (Purpose Built Office in Klang Valley) at RM 6.00 /sqft (NAPIC, 2010).</b> Say 80% of GFA= 34,444 sqft, so that [( RM6.00/sqft + market value percentage X 34,444sqft X 12 months) + operational cost saving / year] = revenue / year (RM)</p>	<p>(6 X 34,444) = RM206, 664.00/month (+ zero EE saving) <b>equivalent to RM 2, 479, 968 /year</b></p>	<p>(6 + *1 X 34,444) = RM 241,108 /month (+ RM200,000 EE saving) <b>equivalent to RM 3, 093, 296 /year</b> *Green Building market value at ±10.4% or ±RM 1</p>
<p><b>6. Payback period</b> (based on rental, operational cost saving on electricity, and incentives yield)</p>	<p><b>5.4 years</b></p>	<p><b>6.3 years</b></p>

Notes: The feasibility study shown regardless of actual operation expenses, maintenance expenses, and other related utility saving.

#### 4. CONCLUSION

The simulation analysis results from the summary of case study data shown above are that cost saving of EE performance alone (regardless of BIPV contribution) can be achieved from certified green building with BIPV technology at least RM200,000 (RM195,374) a year. As opposed to the conventional building, it is expected that business operation could recover the expenditure on green buildings approximately 6.3 years of operation (rental collection, cost saving on energy efficiency, and tax exemption). Although, the investment on green building seems to have a difference (one year), the simulation study as shown above discounted the cost saving potentials that are derived from the RE performance, water saving, and waste management. That is to say, this study only highlighted the EE potential that only take up about 25 percent of cost saving on energy used. Further study need to be carried out using extensive data on financial records (especially on operational expenses). The green incentives scheme certainly contributes towards green building and seems to make a significant financial difference (RM330, 000) by cutting back the incurred tax on statutory income based on the full qualifying expenditure on installing green features. The main conclusion is that, since the GEO building is a non-profit (generating) building therefore, this simulation needs to be applied to another case study (green building) in the commercial sector where a market rate for the green building could be derived. The conceptual framework of the green initiative needs to justify that building ‘green’ can be a ‘low cost’ or a good investment but it can also be profitable if the business strategy based on the green economy using the green design of the property is structured sensibly.

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