

## Obstacles in Implementing Green Building Projects in Malaysia

Mohd Reza bin Esa, Mohd Arif Marhani, Rostam Yaman, Ahmad Arzlee Hassan Noor Hanisah Noor Rashid, Hamimah Adnan

Faculty of Architecture, Planning and Surveying,  
Universiti Teknologi MARA (UiTM) Shah Alam, Selangor, MALAYSIA

---

**Abstract:** Widespread concern about energy conservation, global warming and depletion of the planet's non-renewable resources has given birth to the green building movement, with its idea of sustainable architecture that seems to be mushrooming across the world. Simply put, green buildings represent design and construction that are sensitive to the environment now and in the future. Green building is not a common practice in Malaysia because of the unique challenges these programs face. This research was conducted to identify the main obstacles to the advancements of green buildings developments in the country and how to include more involvement from the parties in the construction industry to adopt this approach. The opinions and views of related parties in building industry were obtained from structured interviews and case studies which have been identified to give a clearer picture of the current situation of the green building developments in Malaysia. Suggestions on how to gain more exposure for green buildings were also acquired. Based on the findings, it was concluded that the main hurdles are lack of awareness, education and information on the benefits of the construction of green buildings. It is important for us Malaysians to get a paradigm shift and start looking at greener options which are more environmentally friendly and reduces energy consumption. Creating awareness also is the first and biggest step to ensure that green buildings are here to stay.

**Key words:** Obstacles, Green buildings, Paradigm shift, Awareness.

---

### INTRODUCTION

One of the main concerns of many developers going green is the increased cost in development. Although cost is an issue, developers of today should change their mindsets, and should not look for the cheapest answer but instead aim for the best long-term solution. Green buildings are sometimes valued higher than conventional buildings and may even fetch higher rentals. Green buildings not only give commercial benefits, but also come with social and environmental advantages, which do not have a tangible value (Yap, 2007).

Green buildings require a holistic top-to-toe approach taking into account each component and every step of the construction process. Designed to minimise their impact on the wider environment and surrounding community, a green building is energy and water efficient, sited to take advantage of existing trees and transportation options, and uses materials that are recycled, recyclable and non-toxic (Ng, 2008).

The key to moving forward to going green is challenging and all parties, including the government, owners, designers and contractors would need to embrace the concept to make it work. The main concern is that even with the recent support from the government to build more green buildings and global wide awareness on environmental issues, not many developers and designers are willing to go the extra mile, and instead subscribed to the conventional method of construction.

Green building is an outcome of a design which focuses on increasing the efficiency of resource use-energy, water, and materials while reducing building impacts on human health and the environment during the building's lifecycle, through better siting, design, construction, operation, maintenance and removal (Frej & Browning, 2005).

Green buildings are designed to reduce the overall impact of the built environment on human health and the natural environment by:-

- efficiently using energy, water, and other resources;
- protecting occupant health and improving employee productivity; and
- reducing waste, pollution and environmental degradation

(Source: U.S. Environmental protection agency, 2009)

It also can be related to a similar concept of natural building, which is usually on a smaller scale and tends to focus on the use of natural materials that are available locally. Other commonly used terms include sustainable design and green architecture (Hopkins, 2002).

Malaysia has only started to embrace the green building concept with a few energy-efficient buildings such as the *Securities Commission Building*, *Pusat Tenaga Malaysia* zero energy office (*ZEO*) in *Bandar Baru Bangi*,

and the *Ministry of Energy, Water and Communications*' Low Energy Office (*LEO*). At present, the country's first green certified building in under progress, which is the G Tower, in Kuala Lumpur.

Malaysia is a strong advocate of green building construction. The former Prime Minister of Malaysia, Y.A.B Tun Abdullah Ahmad Badawi, launched the Malaysian Green Building Mission in March 2007 with the objective of raising the level of awareness, promoting, and consolidating efforts in achieving sustainable building and construction in Malaysia.

Integrating "sustainable" or "green" building practices into the construction of state buildings is a solid financial investment (Kats, 2003). The financial benefits of green buildings include lower energy, waste disposal, and water costs, lower environmental and emissions costs, lower operations and maintenance costs, and savings from increased productivity and health. These benefits range from being fairly predictable-energy, waste, and water savings; to relatively uncertain -productivity/health benefits. Energy and water savings can be predicted with reasonable precision, measured, and monitored over time. In contrast, productivity and health gains are much less precisely understood and far harder to predict with accuracy.

**Embracing Green Building in Malaysia:**

A lot of definitions have been made to ascertain what a —green□ or —sustainable□ building really is, but they all revolve around the same functions. For a building to be green it is vital for the environmental impact of all its constituent parts and design decisions to be evaluated. —Green□ or —sustainable□ buildings use key resources like energy, water, materials, and land more efficiently than buildings that are just built to code. With more natural light and better air quality, green buildings typically contribute to improved employee and student health, comfort, and productivity.

According to Kats (2003) —green□ or —sustainable□ buildings are sensitive to:-

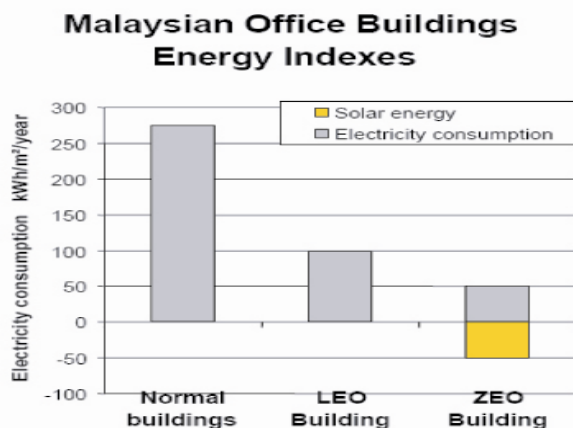
- Environment;
- Resource & energy consumption;
- Impact on people (quality and healthiness of work environment);
- Financial impact (cost-effectiveness from a full financial cost-return perspective); and
- The world at large (a broader set of issues, such as ground water recharge and global warming, that a government is typically concerned about).

These objectives for sustainable building design include not only tangible savings associated with energy, water and waste efficiencies, but also —softer□ benefits, such as human health and productivity, impact on the environment and incorporation of recycled content materials.

Others define green buildings as a green approach to the built environment involves a holistic approach to the design of buildings; that all the resources that go into a building, be they materials, fuels or the contribution of the users need to be considered if a sustainable architecture is to be produced□ (Vale & Vale, 1994).

Van der Ryn & Cowan (1996) stated that we should infuse the design of products, buildings and landscapes with a rich and detailed understanding of ecology.

Malaysia is still very much lacking behind in green building developments as compared to other Asia Pacific countries such as Australia, Japan and Singapore. There are already a few "green buildings" in the Malaysia, which have been built based on the concept of energy efficiency, despite it being a relatively new concept in the country.



**Fig. 1:** Comparison of BEI in Malaysian Energy Efficient Buildings. (Source: Chen, 2009)

Although the following buildings are not classified or rated as green buildings because they do not meet certain requirements, it has shown that Malaysia is ready to embrace the idea of green building and has already started to employ certain features especially energy and water efficient systems in the buildings. These include *Securities Commission*, Bukit Damansara, Kuala Lumpur, *Pusat Tenaga Malaysia* zero energy office (ZEO) in *Bandar Baru Bangi*; the *Energy, Water and Communications Ministry's* low energy office (LEO Building); and the Energy Commission's "Diamond" headquarters building in *Putrajaya*. The average Building Energy Index (BEI) of office buildings in Malaysia is 200-250 kWh/m<sup>2</sup>/year. Of these only a handful of buildings has BEI of less than 150 kWh/m<sup>2</sup>/year. The benchmarks for BEI to-date are:-

- 1) Securities Commission HQ (1999), BEI < 120
- 2) LEO building (2004), BEI = 100
- 3) PTM's ZEO building (2007), BEI = 50 (0)
- 4) Energy Commission HQ (design), BEI = 80

***Low Energy Office (LEO), Ministry of Energy, Water and Communications, Malaysia:***

The completion of the new LEO Building of the Ministry of Energy, Water and Communications in Putrajaya as the first Government building in Malaysia to incorporate a wide range of EE features and technologies exemplifies the Government's commitment and serious efforts in achieving sustainable development through energy efficiency and conservation as one of the sound approaches. For this purpose, several critical decisions were made with respect to the building design, construction and operation pertaining to the architecture, mechanical and electrical systems, lighting, air-conditioning, office equipment and landscaping, together with the implementation of an energy management system.

The main target has been to minimize energy consumption and therefore running cost, but without sacrificing aesthetics and occupants' comfort. The Government of Malaysia intended to make the new MEWC building as a showcase building that demonstrates energy efficiency and low environmental impact, and obtained design support on energy efficiency from the Danish International Development Assistance (Danida) programme. The Low Energy Office (LEO) Building, as it is now known, has demonstrated integration of the best energy efficiency measures, optimised towards achieving the best overall cost-effective solutions. Energy Efficiency (EE) Features in LEO Building includes daylighting, EE lighting, EE office equipment, EE ventilation, Controls & Sensors, Orientation, Insulation and Energy management.

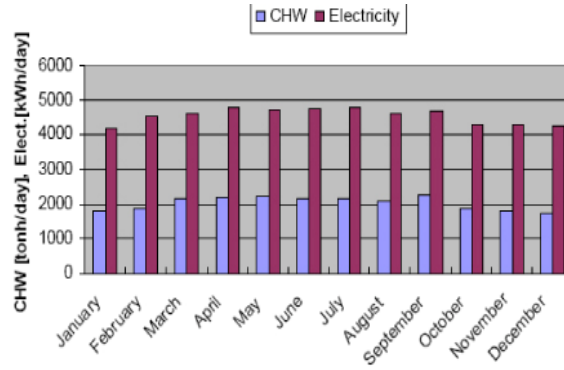
***Zero Energy Office (ZEO), Malaysia:***

The ZEO building was designed to be very energy efficient, thus consuming very little fossil fuels with energy index (designed) of 35 - 40 kWh/m<sup>2</sup>/year; compared to typical conventional office building in Kuala Lumpur of 250 to 300 kWh/m<sup>2</sup>/year. The term Zero Energy Office does not mean that the building does not require energy to operate. In principle, the amount of energy used by the building is counter balanced by the amount of energy generated by its own renewable energy power generation system, which contributes to its name, ZEO - Zero Energy Office.

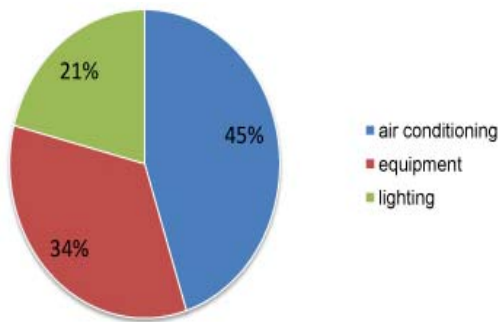
Heeding the call to best manage energy resources, PTM's ZEO rises to the occasion by capitalising on energy efficient measures implemented through various facets of the overall design. Construction work on the building started in March 2006, which was followed by the successful installation and commission of the four solar building integrated photovoltaic (BIPV) systems in June 2007, leading to the completion of PTM's ZEO in October last year. Fashioned after the Low Energy Office (LEO) building initiated by the Ministry of Energy, Water and Communications (MEWC) in Putrajaya, the PTM's ZEO building has placed Malaysia on the regional map as the first completely self-sustainable building in Southeast Asia. ZEO operates on the dynamics of both passive and active techniques and onsite renewable energy generation, as exemplified in the solar BIPV system (Yoong, 2008).

**Table 1:** Energy Data in 2005. (*Source: Pusat Tenaga Malaysia*)

	CHW tonh/day	CHW kWh/day	GS02 kWh/day	GS04 kWh/day	Electricity kWh/day	Total Energy kWh/month
January	1,800	1,320	1,342	2,816	4,158	169,824
February	1,852	1,358	1,421	3,102	4,523	164,682
March	2,141	1,570	1,441	3,168	4,609	191,566
April	2,169	1,591	1,462	3,305	4,767	190,721
May	2,229	1,634	1,475	3,218	4,693	196,147
June	2,133	1,564	1,445	3,314	4,759	189,684
July	2,167	1,589	1,455	3,337	4,792	197,810
August	2,059	1,510	1,463	3,152	4,614	189,840
September	2,251	1,651	1,461	3,183	4,644	188,830
October	1,858	1,362	1,409	2,880	4,289	175,204
November	1,774	1,301	1,360	2,934	4,294	167,857
December	1,731	1,269	1,388	2,859	4,247	171,001
Mean [kWh/day]	2,014	1,477	1,427	3,106	4,532	6,009
Total per year [kWh]	734,974	538,981	520,790	1,133,544	1,654,334	2,193,164
Total BEI [kWh/m <sup>2</sup> ]						114.0



**Fig. 3:** Energy Consumption of the LEO Building in 2005. (Source: Ministry of Energy, Water & Communications Malaysia).



**Fig. 4:** Breakdown of Energy Consumption in the LEO Building. (Source: Ministry of Energy, Water & Communications Malaysia).

Today, PTM's ZEO continues to function as a showcase building to facilitate and explore the concept of sustainability in buildings, while assisting to create opportunities for the involvement of other relevant industries. The building is exemplifying the use of energy efficiency, with solar BIPV setting a new standard for sustainable building in the ASEAN region.

**Methodology:**

The research on the obstacles to the adoption of green buildings in Malaysia is a relatively recent subject area and must be conducted according to the limited resources due to lack of relevant research in Malaysia, and even then, the concentration of these green buildings is mainly in the Klang Valley area. The main objective of the research methodology is to get an extra information and feedback, as an additional input of the earlier published data (secondary data). Two (2) fold of research methodologies had been chosen in order to obtain the necessary data, identified as follows:-

- i) Interviews
- ii) Case Studies

**Interviews:**

As this research paper necessitates subjective opinions and evaluations, a questionnaire method will not be very accurate in obtaining the data. Thus, it was proposed to undertake interviews and discussion method in order to obtain the necessary data, which will be conducted with relevant parties.

The interviews were conducted with the players in the building industry such as architects, engineers, and developers to seek their opinions and feedbacks on the level of green building progress in Malaysia and to get a general perceived attitude towards green building developments.

They were also asked to provide views on the major obstacles that lead to the low number of green building projects in Malaysia. From conclusive interview feedbacks, the involvement and commitment of building industry parties was determined.

**Case Studies:**

Two buildings which embodies the characteristics of a Green Building have been identified, which are:

- PJ Trade Centre in Damansara Perdana, Petaling Jaya; and
- GTower at Jalan Tun Razak, Kuala Lumpur.

**Findings:**

**Interview Analysis:**

Interview questions with which relates to the topic was prepared (refer to Appendix A). There are two parts to the questions, part one is on their involvement in green building projects; and part two is to get the interviewees' opinions on the challenges of green building developments in Malaysia. The researcher managed to gather eight (8) sets of findings from both designers and clients.

The participants involved have been picked both randomly and selected based on case studies. From the selected case studies, one respondent from client and architect each had been obtained, which make up 25% each. The remaining 4 interviewees were randomly picked and make up the other 50%.

Eight sets of structured interviews had been carried out by the researcher, inclusive of 2 case studies that have been selected. The research findings from the interviews were used to obtain opinions from the parties involved in Non-Residential Development in Klang Valley. The interviewees involved included clients (developers) and architects.

**Table 2:** Percentage of Interview Respondents.

Interview Subjects	Party Involved	Number of Respondents	Percentage (%)
Selected Case Studies	Client	2	25
	Designers	2	25
Randomly Picked	Client	0	0
	Designers	4	50
Total Interviews		8	100

The parameter of these findings was carried out to find out about:-

- a) Their involvement in green buildings, products, and materials;
- b) The challenges to green building developments in Malaysia; and
- c) Their recommendations to make green development grow in the country.

**Case Studies:**

**PJ Trade Centre:**

PJ Trade Centre is a new commercial project that is ongoing at Damansara Perdana with the concept of "The Malaysian Paradigm". PJ Trade Centre has four towers of 20 stories each and now is being close to 100% completion.

Passive design approaches were used extensively in the PJ Trade Centre, taking into the idea of the traditional tropical houses; which is in actual fact the —greenest building ever. The green elements include:-

- a) *Building Orientation*
- b) *Full Height Glazing*
- c) *Naturally Ventilated Lobbies*
- d) *Deep Overhangs and Corridors*
- e) *Cross-Ventilation*
- f) *Screens to Deflect Excessive Sunlight*
- g) *Locally Sourced Materials*
- h) *Rainwater Harvesting*
- i) *Water-Cooled Air Conditioning System*
- j) *Effective landscape plaza and sky garden*

**Gtower:**

The country's first certified green "mixed development" building called GTower, situated in the main commercial centre of Kuala Lumpur near the famous Petronas Twin Towers, is now currently in progress and almost nearing completion. Comprising retail, hotel service apartments and offices, this 30 storey building is developed to provide a synergized office environment. Being built by Goldis Bhd., GTower has a gross built up area of over 1,000,000 sq ft.

GTower has incorporated the following Green Building Technologies (GBTs) to achieve a better sustainable, low energy built environment by improving:-

- Energy efficiency;
- Water efficiency;
- Indoor environmental quality and environmental management;

- Green planting throughout the building to improve air quality;
  - Energy efficient chilled water air-con centralized air conditioning;
  - Low e-glass for lower heat transmission; and
  - Environmentally friendly materials used throughout the building
- Among its elements to improve energy efficiencies are:
- a) *Building Orientation*
  - b) *Energy Efficient Air Conditioning System and Chiller Plant System*
  - c) *Double Glazed Low Energy Glass*
  - d) *Efficient Lighting System*
  - e) *Motion Sensors and Photo-Sensors*
  - f) *Efficient Lift and Escalator System*
  - g) *Atrium to allow for natural illumination*
  - h) *Water efficiency fittings*
  - i) *Rainwater Harvesting*
  - j) *CO<sub>2</sub> and CO Monitoring System*
  - k) *Environmentally friendly building materials and finishes*
  - l) *Refrigerant Leak Detection System*
  - m) *Site and Project Management*
  - n) *Power efficiency*
  - o) *Innovative Installations*

### **Conclusion:**

The findings show that the main obstacle in the adoption of green buildings in the country is to create a paradigm shift in environmental issues for all Malaysians, especially those in the construction industry. Lack of awareness, even from the architects, consultants, and clients have been repeatedly mentioned in this research as the key issue to the slow progress and reluctance in getting involved in green buildings.

The researcher also deduced that without a shift in mentality and habits, the advancements of green buildings in Malaysia will be a very difficult vision to achieve. Low investments and participation from the Government and private companies in the green building movement also creates a challenge to building practitioners to design and build more efficiently.

The grouses from the architects mainly, is that there no competent local energy specialist to provide useful data and advice on green building systems and concepts. The Malaysian government together with *Pertubuhan Akitek Malaysia* can bring in foreign experts and at the same time, provide training so we can have our own experts. Awareness on the environmentally-friendly buildings and products must also be heightened, not just to the relevant parties in the building industries, but also to the general public so that more demand for green buildings can be achieved. *Pertubuhan Akitek Malaysia* (PAM) and *Jabatan Kerja Raya* (JKR) can play a role in making it compulsory for all architects to understand green buildings basics by conducting compulsory training and classes. Finally, the government can also start enforcing all developers to incorporate some green building features in all of their future developments before giving building approvals. This way, clients and architects have no choice but to adhere to the requirements.

### **REFERENCES**

- Burr, A.C., 2008. CoStar Study Finds Energy Star, LEED Bldgs. Outperform Peers: Demand in Marketplace for Sustainability Creates Higher Occupancy Rates, Stronger Rents and Sale Prices in 'Green' Buildings. *CoStar Building Study*.
- Chen, T.L., 2009. "Preview of the Green Index Malaysia". *Green Design Forum*. Kuala Lumpur, Malaysia.
- Frej, A. and W.D. Browning, 2005. "*Green Office Buildings: A Practical Guide to Development*". Urban Land Institute.
- Heerwagen, J., 2002. Sustainable Design Can Be an Asset to the Bottom Line. *Environmental Design & Construction*.
- Hopkins, R., 2002. "A Natural Way of Building". *Convergence Magazine*.
- Kats, G.H., 2003. "Green Building Costs and Financial Benefits": *A Report to California's Sustainable Building Task Force*.
- Ministry of Energy, W.a., 2008. "Energy Performance of LEO Building". *Ministry of Energy, Water and Communications*.
- Ng, C., 2008. "Constructing a green building". *Malaysian Business*.
- U.S. Environmental Protection Agency., 2010. Retrieved from Basic Information-Green Building: <http://www.epa.gov/greenbuilding>.
- Vale, R., and B. Vale, 1994. "Towards a Green Architecture". *RIBA Publications London*.

- Van der Ryn, S. and S. Cowan, 1996. *Ecological Design*. Washington DC: Island Press.
- Woolley, T., 1997. *Green Building Handbook: Volume 1*. Taylor & Francis Group.
- Yap, Y.J., 2007. October 29). City & Country: Moving in the green direction. *The Edge Daily*.
- Yoong, Y., 2008. Pusat Tenaga Malaysia's Zero Energy Office.