*AENSI Journals*

**Advances in Environmental Biology**

ISSN-1995-0756 EISSN-1998-1066

Journal home page: http://www.aensiweb.com/AEB/

# Implementation of Energy Management in Designing Stage of Building Construction

**[1]Mohamad Zamhari Tahir, [2]Mohd Nasrun Mohd Nawi, [3]Faizal Baharum**

*[1,2]School of Technology Management and Logistics, Universiti Utara Malaysia*
*[3]School of Building, Housing and Planning, Universiti Sains Malaysia*

**ARTICLE INFO**

***Article history:***
*Received 12 October 2014*
*Received in revised form 26 December 2014*
*Accepted 1 January 2015*
*Available online 17 February 2015*

***Key words:***
*energy management, construction, energy efficiency, building design, building maintenance,*

**ABSTRACT**

The design stage in construction project, in fact, is one of the significant stages in a project life cycle. This research aims to emphasize the needs of energy saving element in the design stage of building to face the future changes of building's energy consumption. This research still in its initial phase, therefore the findings and discussion is based on previous studies and looks into the key issues while exploring the potential for further research. This research has been carried out to discover the importance of considering the energy management elements during the design stage of commercial building construction for the conventional building in Malaysia. The main reason is that in tropical climate, commercial buildings have very high energy needs usually during the peak periods of business hour. Hence, the research objective is to minimize the total energy consumption during the building occupancy besides various energy saving strategies that is usually implemented later in operation and maintenance stage. Overall this paper reviews the previous works and potential implementation to the industry in order to enhance this research for further investigation.



**To Cite This Article:** Mohamad Zamhari Tahir, Mohd Nasrun Mohd Nawi, Faizal Baharum., Implementation of Energy Management in Designing Stage of Building Construction. ***Adv. Environ. Biol., 9(5),*** *157-159, 2015*

## INTRODUCTION

The development of new commercial building contributes to the growth of energy use and Green House Gases (GHG) emissions for the building sector especially in the occupancy and operation stage. According to [1] among the biggest contributors to GHG so far is the construction industry. Indeed, buildings have a huge impact on energy use and the environment. The building area represents 36% of energy related to carbon dioxide emissions in most of the industrialized countries. Designing processes of conventional building can have a negative effect on the total energy performance and lack of study related to energy saving strategies implemented during the design stage of construction at the moment [2]. In that case, energy management strategies should be highly considered during the design stage [1], [2], [3]. As a matter of facts, one of the most important factors in the design of the building is to reduce energy consumption and increase energy efficiency [1]. The structures and construction materials for the new building design and energy-efficiency should be appropriately chosen and designed because of the reason for energy-saving management in the commercial building. To further investigate, the design concept and approach have been clarified and numerous previous studies specified the importance of design stage of building construction to overcome any uncertainties in building variations or environmental changes that could influenced the energy consumption for the whole building within the operational and maintenance stage. Design stage basically consists of Schematic Design and Design Development.

**Corresponding Author:** Mohamad Zamhari Tahir, School of Technology Management and Logistics, Universiti Utara Malaysia.
E-mail: emzeti8@yahoo.com

**Advances in Environmental Biology**, 9(5) April 2015, Pages: 157-159

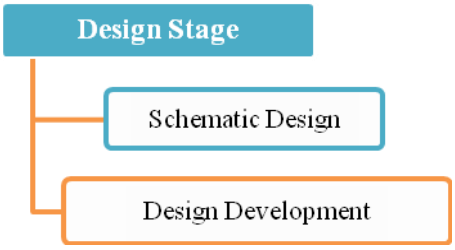


**Fig. 1:** Design stage in building construction

Schematic Design is the first step to develop simple diagrammatic documents such as room sizes, elevation studies of the building exterior as well as interior spaces. Design Development is the further steps to materials selection, lighting fixtures, as well as other equipment and building elements to be reviewed by building committee once the Schematic Design approved.

At the meantime, in Design Stage, designer can tune the thermal characteristic of buildings and moderate external environmental conditions and maintain internal condition using minimum resources and building material by implementing 'passive design' or 'active design'. Commercial buildings could include both active and passive design in the outline. Passive design is the way to maximize the use of natural sources of heating, cooling and ventilation to create comfortable conditions for occupants inside buildings for instance solar radiation, cool night air and air pressure differences. Meanwhile, active design makes use of mechanical or electrical systems, such as boilers and chillers, electric lighting and so on.

*Methodology"*

As for this initial study, several previous works that available and related to the importance of this study to design less wasteful building, future proof and energy-efficient design have been used to review and observe the current situation. Data collection for this research was divided into primary data and secondary data. The primary data will be collected during interviews session on the next phase of this study with those parties involved on construction and building design in Malaysia. In addition, to get more information for this study, a survey research will be used. The interviews will be conducted to get data on the developer and contractors. Meanwhile, secondary data were based on selected available articles. Other add-on secondary data from article journals, books as well as data from government agencies will be used later for further reviews and analysis.

*Findings and Discussion:*

Nowadays, expensive monthly electricity bill had become the concerns for household in Malaysia as well as the commercial sector for the risen of energy use in office buildings especially in information technology for the past two decades. In order to manage energy consumption effectively without sacrifice occupant comfort, the best solution so far is to hire the expert. There are so many companies and energy audit firms that offer energy management solution basically to reduce maintenance, operating as well as equipment costs, while keeping up occupant comfort. Usually, they raised awareness of potential savings at commercial office buildings, recommend cost-effective and best practices guidelines as well as implemented several energy programs. Whereas, based on the previous work done by [4] on large-scale public buildings in Hangzhou, China, the current situation is mainly focus on the energy saving once the building has been occupied or within the operation and maintenance phase. It has not been stretched to the life-cycle materials production, construction, renovation or building destroying and other phases, which leads to the lack of research on new building energy effectiveness design [4]. Therefore, a big potential of energy-saving from the design stage is positively clarified here. Figure 1 shows the propose model of energy-efficient measures in design stage.

Meanwhile, according to [3] active and passive design information is relevant to energy efficiency and its drawing plan and arrangement was utilized to understand the characteristics of the building. A lot of opportunities to improve the design of the building to encourage energy-saving behavior were identified in recent case studies [3][6]. On the other hand, with advance technology and knowledge, design option and material selection are changing all the time which focus to development strategies, construction techniques, standards, measurement and materials selection in relation to energy-efficient commercial building developments [1].

**Advances in Environmental Biology**, 9(5) April 2015, Pages: 157-159

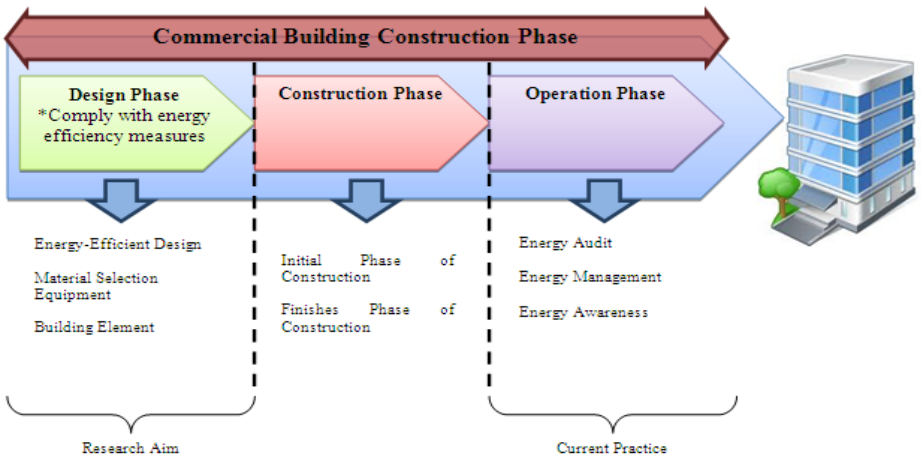


**Fig. 2:** Propose model of energy-efficient measures in design stage for commercial building construction

In addition, the terms 'change' and 'future-proof' are used in some articles based on the previous study. As according to [5], change is an obvious and inevitable characteristic of the built environment and requires tremendous attention during the design stage. There are two sorts of changes that frequently discovered and highly expected during the life of a commercial building, caused either by uncertainties in inter building variations or to environmental changes. Understanding of building life-cycle can allow designers to perceive the main reason for change and to respond properly in the early stages especially during the design stage. While the future-proof concept is a very comprehensive method for the purpose of energy-saving technique based on prediction of future climate effects. This future-proof element from an early planning stage is highly recommended, in fact could reduce the probability of a prematurely obsolete building design. Minimizing the need to apply energy-saving measures in the future entails future-proofing by consolidating durability and adaptability for technology-readiness and occupants' changing behaviors from an early design stage. The need to design for future climate impacts specifically, overheating due to temperature increase is a common objective based on analysis shows in previous studies. However, designing for future builds for instance, overheating, is insignificant and therefore, no standardized method that everyone must comply with a specific guidelines [2].

*Conclusion:*

There is many more to investigate for energy saving strategies as unexplored aspect in the design stage of construction. Current energy management practices in the operation stage could also save significant amount of energy, when in fact not much has been done to get the saving potential on a recurring basis. Therefore this research will promote more efficient utilization of energy and avoid wasteful and less non-productive patterns of energy consumption later there is an urgent need for the Government of Malaysia to work with the agencies in construction industry and local government to promote energy efficiency in both design stage and operation stage. By implementing dual measures of energy saving, the estimated potential energy savings is very high and promising in the operation stage.

## REFERENCES

[1] Zuo, J., B. Read, S. Pullen and Q. Shi, 2012. Carbon-Neutral Commercial Building Development, Journal of Management in Engineering, pp: 95-103.

[2] Georgiadou, M., T. Hacking and P. Guthrie, 2013. Future-Proofed Energy Design For Dwellings: Case Studies From England And Application To The Code For Sustainable Homes," Building Services Engineering Research and Technology, 34(1): 9-22.

[3] Azizi, N.S.M., S. Wilkinson and E. Fassman, 2014. Management Practice To Achieve Energy-Efficient Performance Of Green Buildings In New Zealand," Architectural Engineering and Design Management, 10: 25-39.

[4] Sadafi, N., M.F.M. Zain and M. Jamil, 2012. Adaptable Industrial Building System : Construction Industry Perspective, pp: 140-148.

[5] Yiwei, T. and G. Jian, 2011. Study on the Life-cycle Carbon Emission and Energy-efficiency Management of the Large-scale Public Buildings in Hangzhou, China, in *Computer and Management (CAMAN), 2011 International Conference on*, pp: 1-6.

[6] Tahir, M.Z., M.N.M. Nawi and F. Baharum, 2014. Energy Management Study: A Proposed Case of Government Building, in *International Conference on Mathematics, Engineering and Industrial Applications 2014 (ICoMEIA).*