ISSUES ON EFFECTIVE ENERGY MANAGEMENT SYSTEM FOR VERTICAL DEVELOPMENT OF URBAN MOSQUE IN MALAYSIA

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ABSTRACT

Contemporary urban mosques in Malaysia shows the tendency for vertical progression in their physical layout. The general climate of Malaysia and also the operation schedule of the mosque have impact on the demand for the energy uses by the mosque. The energy management not only involves the electricity problem but also the water resources for five time daily used. The objectives of this study include determination of energy efficiency, water efficiency, the indoor air quality and also the sustainable site planning management for mosque that will lead to effective way of saving energy used by the mosque. This study presents the analysis of collected data from literature survey as well as evaluating two case studies in Malaysia. The aim is to assess and look forward to the energy used by the urban mosque having vertical progression with the new high-end technology and the well-managed design mosque as a step towards a comprehensive study their effective way of management of energy system.

Keywords: Energy efficiency, vertical mosque, sustainability, urban mosque.

INTRODUCTION

Malaysia is a tropical country with hot and humid climate. Usually, the daylight hours start around 7am to 6pm. Climate of Malaysia is characterized by uniform temperature, abundant rainfall and high humidity. Contextual design will take serious consideration to the specific climatic conditions of the site. All aspects of the bio-climatic element such as the climate change, orientation of the building, and many more aspects should be considered to apply to the design as one of the effective ways to save the energy used by the urban mosque.

Malaysia is one of the Muslim majority countries in Asia and with the rapid growth of the Muslim community, mosques also grows together to fulfill the needs of the worshipers. One of the major concerns regarding mosque architecture and management is to have effective energy efficient plans for ensuring comfortable environment for Muslims while having low impact on surroundings.

Inappropriate way of energy management system will lead to unsuitable thermal environment for the worshipers inside the mosque. This study aims to discuss effective ways to control the energy used by the mosque. One of the effective ways to control is incorporating advance technology. Though the initial cost might be high but for the long-term use, it will give more benefits to save energy as well as reduce expenses.

Renewable energy is generally defined as energy that comes from resources which are naturally replenished on a human timescale, such as sunlight, wind, rain, tides, waves, and geothermal heat (Ellabban, Abu-Rub, & Blaabjerg, 2014) .

In most of the cases energy being wasted by over usage of the heating or cooling. Another example of resource wastage is the excessive usage of water for wudu'. By introducing renewable energy system and effective energy management scheme this problem could be handled in the urban mosques of Malaysia.

SUSTAINABLE SITE PLANNING MANAGEMENT

Site analysis is one of the most important things to do before constructing any particular building in that area. Site synthesis is followed by site analysis. Analysis and synthesis finally aid in deciding the mosque orientation and also the opening of the building and other related aspects.

According to the Green Building Index (GBI), a green building is achieved when six key criteria are met. there are the energy-efficiency, indoor environmental quality, sustainable site planning and management, materials and resources as well as water efficiency and innovation. By a good sustainable site management, the green building concept will be easily adopted to the mosque (Zhin, 2014).

There are few benefits from sustainable site planning management from financial aspect. Sustainable design should identify the needs and the value of the nature to preserve the balance between people and nature and also the surrounding contexts. From here, the mosque should be more "greeny" so that people may feel comfortable to use the building without using extra energy to ensure the comfort zone to the user of the mosque (Zaufishan, 2013). For instance, the mosque in Cyberjaya, with the proper site planning management, the mosque itself can give the comfort to the user without using much energy. We can take the example of the mosque and surau from the pre-1990's having good site management, which were built without any mechanical air-conditioning or artificial lighting except ensuring proper orientation and also a good management of the site (Shaik Roslinah Bux & Othman, 2014).

ENERGY USAGE CONTROL INCORPORATING HIGH-TECHNOLOGY SYSTEM

Nowadays, there are lots of new high-end technology system that will help in controlling the energy being used. With the systematic adaption of the new technology to the uses of the mosque supported by the good services and products, it will not only give benefits long-term from lower energy costs but also will give the positive public image of the mosque.

With the new high-technology systems, it will allow the automation of the mosque based on variety of interfaces. One of the technologies is by using the sensor (detectors). It will be function by detecting the body temperature or movement of people that will lead to the automatically brighten the lights as when the area is used for the worshipers to perform their prayer (solat). Based on the unique schedule of operation used of the mosque, by having the detectors technology, it will help to save energy used at the mosque by using the schedule to control the lights and climate control at the pick times (Al-Shaalan, Wakeel, & Alohaly, 2014).

The renewable technology must be comprehensive as it integrated to the new development mosque as one of the effective ways to save the energy used for urban mosque.

Mostly, the new mosque in Malaysia trying their best to save the energy used by controlling the usage of energy by adopting eco-friendly technology system as one of the best systems to reflect the renewable technology. For this topic I try to focus on the effective way to reducing the usage of energy for the comfort indoor environmental quality and efficiency way to water save energy loads through the climate-responsive design and conservation practices by using the renewable technology system (Hab, 2015).

The AACE Chairman Anthony Gomez told the reporter "saving water is motivation for people to adopt this system rather than the conventional methods, where there's a lot of water wastage". There are many ways of the renewable energy, one of it is by optimize the building (mosque) performance by employing energy modeling programs and also try to build the automation systems for maximize the functionality or the renewable energy at the minimum cost. The wudu' as the ceremonial washes before Islamic prayer, supposedly it only took about only half a liter of water. But with the fast-flowing water from the tap and also the bad habit of the user or community, such as letting the water run while rolling up their sleeves or removing their socks, it will result higher consumption, instead of using only half of a liter it will become much more than that amount.The water consumption for ablution wudu' can be save up until 95% of the ordinary usage if the renewable technology system is being applied (Jaberi, 2015).

There are few technologies for the renewable water energy. The famous one is by re-used the ablution water to be re-used as landscape irrigation around the mosque and also for the toilet usage (flush). other than that, the water from the RWDP also can be re-use for the sanitary usage and also for the cleaning of mosque.

The technology that being applied to reduce the energy usage of the water consumption in a mosque is by using the self-stopping tap. The tap with the sensor-operated water conservation devices to moderate water flow will limit the amount of water use by the user for ablution wudu'. So, I think, all these high-technology reflect the ideas to commit to the sustainability building process. While supporting and follow the message of the Prophet Muhammad SAW who said "do not waste water, even if you perform your wudu' on the banks of an abundantly-flowing river"- said Al-Musharrekh (Jaberi, 2015).

As an example, Abu Dhabi- AEU, most of the mosque was doing some experiment with the water consumption during the heavily-attended Ramadan prayers. One of the Professor of Mechanical and Materials Engineering in Masdar Institute was doing some research to control the water consumption and do some demonstration of ability to save the precious water. from here, we can adapt the idea of control the water consumption to be apply to our mosque in Malaysia.

CASE STUDIES

1. CASE STUDY 1: TUANKU MIZAN ZAINAL ABIDIN MOSQUE, PUTRAJAYA

Tuanku Mizan Zainal Abidin mosque also known as the Iron Mosque is one of the early sustainable mosques in Malaysia. The mosque also known as one of the best natural air conditioning in Malaysia. By doing some research and review from the other articles, I can conclude the building was designed to achieve the simplicity, airiness and also te transparency feel "from outside to inside and inside to the outside" (Anis, 2010).

To become the sustainable building, the mosque should be provide the comfortable environment to the inside spaces. The most was situated at the tropical, Malaysian climate so the unique cooling system was created by using the high-end technology system; GKD's Escale stainless steel mesh which is allow the fully the natural air-conditioning to the inside spaces. not only that, by using this high-end technology, it also creat a good the daylight and give the effect of transparency to the mosque. In my opinion, by considering the long-term positive impacts the idea to use the high-end technology system applied to the mosque is a very good action to reduce and to save the energy used by the mosque. day and night, u will feel comfortable with the thermal temperature even though the Malaysia is one of the hot humid country (GKD-USA, 2015).

Figure 1: The high-end technology materials being apply to the mosque for long-term save energy for the mosque.

(Sources: http://designandbuildwithmetal.com)

Figure 2: The interior space of prayer hall that just use the natural daylight for a day.

(Sources: http://designandbuildwithmetal.com)

2. CASE STUDY 2: CYBERJAYA MOSQUE, CYBERJAYA

Cyberjaya mosque, Cyberjaya is one of the good examples of the green mosque in Malaysia. for me, this mosque is a truly become a model for the building of future mosque in Malaysia. The main design intent of the mosque is to save the energy use by reduce the usage of the electrical energy by designing and planned to have an average daytime temperature of 26degree Celsius. when it can achieved the thermal comfort zone, the idea to save the energy will be success for the long-term planning (Architects, 2015; FuturArc, 2015).

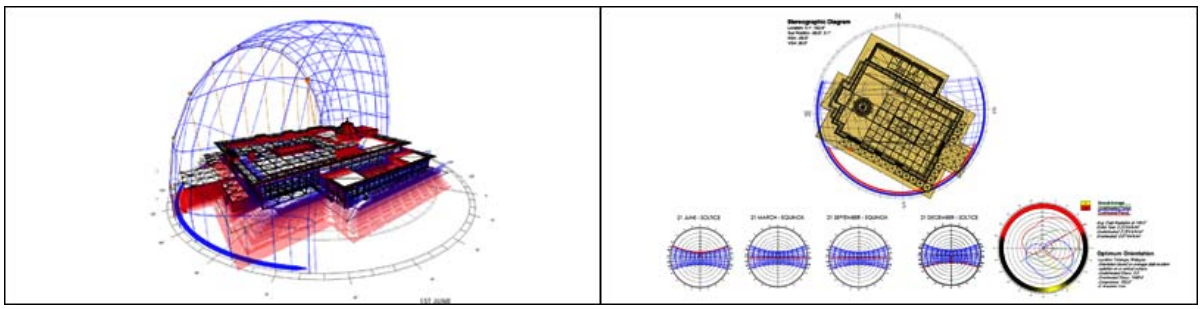

Figure 3: The site analysis for the climate changing at the Cyberjaya mosque site

(Source: http://www.atsa.com.my)

Figure 4: The natural ventilation and visual of natural day-lighting for Cyberjaya mosque

(Source: http://www.atsa.com.my)

CONCLUSION

As a conclusion, to save the energy used for the urban mosque should be the main focus for the future development of the mosque. This will not only save the energy but also will be related to the running costs. In any situation, always refer to the basic element of the mosque which is give a good respond to the nature and also the contexts to create the urban context with the surrounding. to reduce the energy use it can be happening by maximizing the use of materials that are recyclable and will eventually help in protecting the surrounding environment aspects. So, for mw here is the opportunity for us as the new designer to consider and re-think again the approach of designing the mosque in today's environmental concerns and the awareness of the community for next build of the mosque.

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