What Building Management System Can Offer to Reduce Power Wastage both Social and Economical: Brief Discussion by Taking Malaysian Power Infrastructure as a Sample

Zahid Rasool*, Waqar Tariq**, Ir. Dr. Mohammad Lutfi Othman*** & Dr. Jasronita bt. Jasni****

*Researcher, Faculty of Engineering, Electrical and Electronics University Putra Malaysia, UPM Serdang Selangor Darul Ehsan, MALAYSIA. E-Mail: zahidrassol.iu{at}yahoo{dot}com
**Researcher, Faculty of Engineering, Electrical and Electronics, University Putra Malaysia, UPM Serdang Selangor Darul Ehsan, MALAYSIA. E-Mail: waqar.tariq{at}hotmail{dot}com
***Senior Lecturer, Faculty of Engineering, Electrical and Electronics, University Putra Malaysia, UPM Serdang Selangor Darul Ehsan, MALAYSIA. E-Mail: Lutfi{at}eng{dot}upm{dot}edu{dot}my
****Senior Lecturer, Faculty of Engineering, Electrical and Electronics, University Putra Malaysia, UPM Serdang Selangor Darul Ehsan, MALAYSIA. E-Mail: jas{at}upm{dot}edu{dot}my

***Abstract*—**As energy saving and zero energy building concept is flourishing, incorporation and installation of new systems are necessary to manage a building installed facilities. This particular paper reviews the literature concerning the energy savings achieved by installation of energy management systems and Implementation of energy management system and the reduction of the need for mechanical heating and cooling equipment permit the reduction of buildings' energy up to 50% and often entail no greater construction cost than conventional design. The paper also discusses the benefits and advantages of BMS or EBMS, the restrictions and hurdles of its implementation in Malaysian current power systems. Respective paper also highlighted the main reasons behind the respective challenges and respective solution, taking Malaysian society and current power generation and distribution /consumption system as a case sample also a bit review on some energy wasting factors like phantom load or standby energy wastage is included in this paper.

***Keywords*—**Air Handling Unit; Building Management System; Energy Management System; Gross Domestic Product; Heating Ventilating and Air Conditioning; Private Automatic Branch Exchange; Standard Temperature & Pressure; Water Treatment Plant.

***Abbreviations*—**Air Handling Unit (AHU); Building Management System (BMS); Close Circuit Television (CCTV); Electrical and Electronic Equipment (EEE); Energy Management System (EMS); Gross Domestic Product (GDP); Heating Ventilating and Air Conditioning (HVAC); Kilowatt Hour (KWH); Private Automatic Branch Exchange (PABX); Standard Temperature & Pressure (STP); Uninterruptible Power Supply (UPS); Water Treatment Plant (WTP).

I. INTRODUCTION

THE era in which we are living is the era of Renewable energy or the era which always sound of energy management, energy saving. Energy management is the concern of everyone, the buildings are now tends to be constructed in a manner to provide maximum comfort and ease to the Public with minimum energy utilization. This is only possible with the help of monitoring, Optimizing and controlling theme and implementation of such devices that are to be installed in a building during construction or after as per requirement. This monitoring and controlling can be of any type, from simple switching to smart decision making according to the respective usage of energy therefore main idea of such design system is to automate respective operations of the plant/industry or any building of any use in most resourceful manner [Swarnalatha, 1; Eng Loo Ler, 2; Xiaotong Du et al., 3]. Energy Management system is not only beneficial for society in technological aspects but also an indeed cost effective phenomenon in various dimensions

most importantly maintenance factor of any kind of building it also ease user functionality, comfort and safety. Malaysian society in this era is focusing on high-rise building construction, with more users of energy in one Compaq space. The purpose of this paper is to give a brief but precise analytical review on needs, infrastructure and most importantly limitations and challenges of Energy management system in Malaysia [Hawkess & Forester, 4].

II. BACKGROUND

2.1. The Malaysian Needs of Energy

Malaysia is one of the world's emerging nations in economic sector and world's 42nd ranked country by population and with increase of 1.8% per annum. Comparing with Asian countries Malaysia is in the lead of number of expiates maintaining the Integrity of the Specifications. Buildings are one of the fastest growing energy consuming sectors. It is estimated that the amount of the energy consumed in Malaysia buildings reaches 40–45% of total energy consumption [Saidur, 5].

2.2. Energy Sector in Malaysia an Overview

In a recent study, high economic growth in Malaysia is observed, which ultimately causes a rapid increase in energy Consumption. Several researches reached the conclusion of the positive connection between electricity Consumption and the economic growth. From 1980 to 2009, the total electricity consumption and domestic product (GDP) increased by 9.2% and 6.2% respectively from 1980 to 2009 [Bekhet & Othman, 7; 8]. Fig.1 shows that the Malaysia has the highest electricity Consumption among the ASEAN countries. Fig. 2 shows the distribution of total energy consumption In Malaysia Department. It turns out that the Commercial sector, the second-largest user, for about 32% of total energy consumption in Malaysia's accounting [Xiaotong Du et al., 3].

2.3. Energy /Building Management in Malaysia

Like other developing countries to contribute in energy saving Malaysia is also transforming towards Building/Energy Management system the mission to transform Malaysia into a grand economy can be achieved by maintaining all standards internationally followed respectively all sectors specially energy sector. In Malaysia, as a result of the government's initiative and Future outlook in advancing the use of innovative Technologies turns to be in the favour of both consumers and providers and step ahead towards smart building management system. Despite of all tiring efforts of government as well as private sector still a lot need to do in flourishing building management system and to implement it as same as international standard for better efficiency and outcome in both perspectives i.e. economy and energy saving [Aun, 9; Ramesh Babu et al., 10].

III. CHALLENGES TO BUILDING MANAGEMENT SYSTEM IN MALAYSIA

3.1. Social Challenge

As Malaysian society is in a phase of transformation, because of this every new product or technological invocation is taking time space to penetrate. That is why till now Malaysians are quit reluctant to give space to building management regarding they are well aware of its benefits, but there are some basic reasons.

3.1.1. Lack of Technical Complexity

Many users are not aware of the modern day ultra-technological specs and are afraid of its use due to lack of technical education or either technology is not so user friendly so this come across a very basic reason that come across in implementation of Energy /Building management system.

3.1.2. Fear of Cost Effectiveness

Large groups of user are concerned about the cost of the new technology, or cost effect on the current system which is already implemented it's a natural factor that the user end is not concerned about the efficiency or energy usage but do care about the cost that is becoming a big hurdle in progress of BMS/EMS.

IV. IDEOLOGICAL ISSUES

As all the basic infrastructure of energy sector is in directly or indirectly control of government or supporting bodies so a large number of user/investor might be hesitant or reluctant to give room to a new technology due to their political or ideological differences.

V. GOVERNMENTAL CONCERN

The most important block of a society is government, and in Malaysian society government plays a key role in developmental projects however government is also showing some concerns of implementing Building Management System as a national policy some basic reasons are as follows.

5.1. Time and Cost of Installation

Government is really concerned that if they tends make Building/Energy management as a national policy how much time and cost will it take to replace, reinstall or enhance the current Installed system.

5.2. Public Demand

Government also wants to make sure that what is public need but more that what is public demand so the public perception also makes effect on the progress in any new technology implementation in this case BMS/EMS.

5.3. Investor Concern

Concern that whether the investment is safe or not in the respective society, however the risk factor is not as bigger as of the under developing countries. All above factors are the challenges which energy/building management system is facing for its implication in Malaysian society [Lewis, 21].

VI. Statistical Overview of Malaysian Electricity Consumption

According to many independent and governmental surveys and reports confirms that the need of electricity of Malaysian society is in a continuous increase year by year the below chart explain electricity consumption KWh per capita of Malaysia according to world bank report published in 2010.

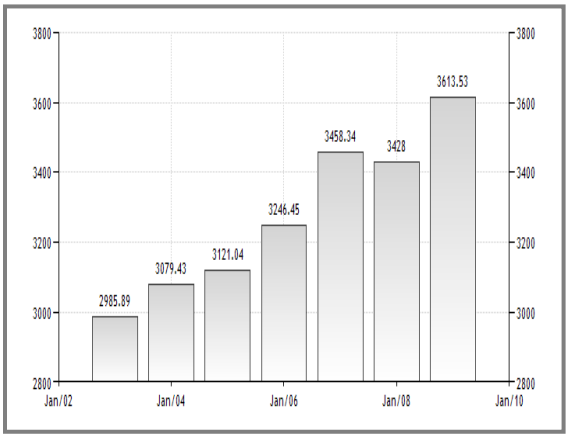

Figure 1: The Electric Power Consumption (kWh per Capita) in Malaysia [Saidur, 5]

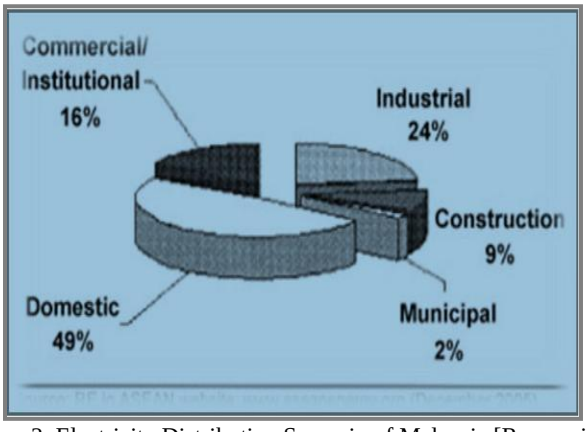

Figure 2: Electricity Distribution Scenario of Malaysia [Rosnazri Ali et al., 6]

As this massive consumption of electricity the wastage is also the same in Malaysia it is being assumed that approximately 30% to 45% of the total electricity consumption is wasted in current implemented scenario of distribution and usage. There is a weird scenario occurring in Malaysia that the ratio of electric wastage between industry/institution and house hold is getting closer and closer.

VII. Phantom Load Factor

Phantom Load or ghost load is one of the most rapidly growing in this current era. The production of electrical and electronic is constantly increasing because of rapid economic growth and the increasing demand of consumer has increased both the production and the consumption of Electrical and Electronic Equipment (EEE) [Sinha, 11]. E-Waste widely cover from all electrical and electronic equipment such as mobile phone, digital music recorder/p layer, computer, refrigerator, television, washing machine a and many other house hold consumer item [12].

Phantom load or vampire draw the power wastage done by electronic appliances such as laptop, TV's, DVD player, mobile phone etc during standby mode or low efficiency after a certain time period of use. The main cause of phantom load is continuous use electrical and electronic appliances and not shutting it down after use it and all appliances remain on standby mode that uses 30% of total and continuous electricity. Which is one of the main causes of wastage of power and that's way the ratio between industrial and household is gradually becoming closer [Khetriwal et al., 13; Wen et al., 14; Rachna Arora, 15; Kalana, 16].

VIII. How BMS/EMS is Real Solution?

In this era, where energy management is the core concern, the buildings are being constructed in a manner to provide maximum comfort and ease to the people with minimum energy utilization. This whole thing is only possible with the help of controlling devices that are to be installed in a building during construction. This controlling can be of any type, from simple switching on and off of the lights, to water motor control or HVAC System and many more. Therefore main idea of designing Building Management system is to automate these operations of the plant in most resourceful manner [Swarnalatha, 17; Byron A. Ellis, 18].

8.1. The Scope of BMS/EMS

Building Management System is based on the controlling of temperature, humidity and carbon dioxide inside the building, basic functions of BMS can be seen in figure 2 the priority is given to maintain a specific temperature in a building by controlling the heating and cooling, which is done by operations of fan, ventilation and damper. Beside this minimization of carbon dioxide followed by increase in oxygen has also been kept as an important feature.

This building management system is mainly designed to manage and supervise the following activities:

- Electrical Distribution Panels
- Lighting Control Conditioning System
- Fire Alarm & Fire Fighting
- Public Address
- CCTV System Monitoring
- Intrusion Detection, Water Consumption.

Some of the major advantages of this system include good control of internal comfort conditions, possibility of individual room control, effective monitoring and targeting of energy consumption, improved plant reliability and life, save time and money during the maintenance, control Of building, central or remote control and monitoring of building, remote Monitoring of the plants (such as AHU, Fire pumps, plumbing pumps, Electrical supply, STP, WTP etc.) [Hamid Reza Naji, 19].

8.2. Classified Advantages of BMS/EMS

The advantages can be classified in to three main domains i.e. Building tenant/occupants, Building owner and Maintenance companies.

8.2.1. Building Tenant/Occupants

- Good control of internal comfort conditions
- Possibility of individual room control
- Increased staff productivity
- Effective monitoring and targeting of energy consumption
- Improved plant reliability and life
- Effective response to HVAC-related complaints
- Save time and money during the maintenance
- Control of Building

8.2.2. Building Owner

- Higher rental value
- Flexibility to change of building use
- Individual tenant billing for services, facilities manager
- Central or remote control and monitoring of buildings
- Increased level of comfort and time saving
- Remote Monitoring of the plants (such as AHU's, Fire pumps, plumbing pumps, etc.

8.2.3. Maintenance Companies

- Ease of information availability problem
- Computerized maintenance scheduling
- Effective use of maintenance staff
- Early detection of problems
- More satisfied occupants

All the above advantages, partial of them or the respective once as per need can be achieved by implementing a smart building management system or its particular modules [20].

IX. CONCLUSION

The Issue of energy efficiency has come to manage the energy policy world widely. This is set to continue into the future as a result of political and financial requirements concern about the environment and climate. Buildings have a significant impact on energy efficiency potentials of the country. Only commercial and residential buildings use almost 40% of primary energy and approximately 77% of the electricity. Respective paper tends to give some observation and suggestions for energy efficiency, management and challenges involve in implementation of BMS/EMS in Malaysia paper also tend to give some respective solutions.

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Zahid Rasool was born on 8th September 1988 at Karachi, Pakistan. He studied in Major of Electronics for Bachelors degree (Engineering) at Iqra University from 2007 to 2012. He started working under internship in different well known organizations like, Pakistan International Airlines and Pakistan Army, served as application engineer. He started Masters Degree program in 2012 from University Putra Malaysia.

Waqar Tariq was born on 27th December 1987 at Karachi, Pakistan. He studied in Major of Electronics for Bachelors degree (Engineering) at Iqra University from 2007 to 2012. He started working under internship in different well known organizations like Pakistan Army, Pakistan International Airlines and Avialite Sdn Bhd, Malaysia serving in field service engineering, manufacturing and production department, sales and marketing department and research and development department. He started Masters Degree program in 2012 from University Putra Malaysia.

Ir. Dr. Mohammad Lutfi Othman received the BSc degree with Magna Cum Laude distinction in electrical engineering from the University of Arizona, Tucson, AZ, USA, in 1990 and the MSc degree also in electrical engineering from the University Putra Malaysia, Serdang, Malaysia, in 2004. He is currently pursuing his PhD degree in UPM on protective relay operation analysis using data mining approach. Currently, he is a full time Lecturer at the Department of Electrical and Electronics Engineering, Faculty of Engineering, University Putra Malaysia. He is also an Electrical Engineering Consultant in electrical services installation works and an Electrical Director/Partner in a local engineering consultancy firm as an effort of intermingling between academia and industrial experience. This serves as an opportunity for his students to attain some industrial exposure in his teaching. Ir. Mohammad Lutfi Othman is a Professional Engineer (P Eng) registered under the Board of Engineers Malaysia (BEM) and a Corporate Member of the Institution of Engineers Malaysia (IEM). He is also a member of the of Electrical and Electronics Engineers (IEEE) which is based in the USA.

Dr. Jasronita bt. Jasni received B. Eng. (H) Electrical Engineering, in 1998, from Universiti Teknologi Malaysia, then got M.E. Electrical Engineering, in 2001, from Universiti Teknologi Malaysia and done PhD Electrical Power Engineering, in 2010, from Universiti Putra Malaysia.Serving as senior lecturer at University Putra Malaysia since 2010.