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SMART ENERGY MANAGEMENT SYSTEM FOR ZERO CARBON BUILDING

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Abstract:
There are evidences that some built environment in developing countries do affect the surrounding because it releases gas which is primarily carbon dioxide (CO_2). Thus, in the developing construction industry, sustainability is the priority to ensure that construction is carried out with environmental preservation. 'Zero Carbon' means that the building can generate as much energy through renewable energy or implementation of sustainability tools in construction to affect carbon reduction to the environment. The objectives of the study are to identify the best practice to reduce carbon emission in design and life-cycle impacts, to evaluate the current sustainable building practice, and to propose the new concept for zero carbon building that has been implemented in other countries and has proven to be successful so that the same concept can be applied in Malaysia. The study shows that the gas emission resulting from the usage of the surrounding development and which release Co_2 accelerate global warming. There should be improvement in the people's awareness, behavioral and political aspects to achieve carbon reduction. Thus, the new concept should be implemented to produce zero carbon building.

Keywords: Keywords: Building performance; Sustainable; Practice

1.0 INTRODUCTION

The issue arises because of the increasingly extreme weather events and accelerating rates of change which have led to climate change caused by the release of greenhouses gases that is mainly CO_2 into the atmosphere. This has caused climate change and its impact in accelarating the global warming accelerating. In 2007 the Intergovernmental Panel on Climate Change (IPCC) confirmed that global climate change led to the extreme weather events was because of human behaviour (Gupta, 2009). The impact of power generation and deforestation which release anthropogenic CO_2 emissions influenced the unhealthy environment. This issue occurs widely when there is illegal deforestation and when there is development in that area. The industrial processes also emit CO_2, for instance the production and consumption of mineral products such as cement, the production of metals such as iron and steel, and the production of chemicals. Unfortunately, this problem cannot be avoided especially in a built environment as it has a big impact to the environment.

The largest source of CO_2 emissions is from the electricity that is used to power homes, businesses and industries. The type of fossil fuel, for instance coal or gas is used to generate electricity that will release different amounts of CO_2. Moreover, the burning coal used to produce electricity releases more CO_2 compared with oil or natural gas. Therefore, the application of new technology which is the Smart Energy Management System should be the best practice to reduce CO_2 and for the sustainable building practice. The Smart Energy Management System is a new concept that can achieve a high level of energy efficiency for overall buildings to reducing carbon.

2.0 LITERATURE REVIEW

The vision is to reduce the dependence of buildings on energy while decreasing the greenhouse gas emission. Therefore, the idea of net-zero energy buildings being exposed is poposed so that energy can be generated efficiently. The achievement of the zero carbon buildings by the NSTC is the use of

existing energy efficient building technologies, new equipment development, increasing efficiency and on-site generation of energy. Hence, to accomplish this idea in the United States the NSTC states four thrusts as priority which are: the whole building metrics, building envelope load reduction, equipment efficiency, and on-site generation of energy.

According to Gupta (2009), global climate change can also be influenced by human behaviour. This journal is concerned with the issue of climate change and the acceleration of global warming impact to the environment. This has led to the use of the term sustainable energy which are the ways to having a longer life and give a low impact to the environment particularly during building development (Gupta, 2009). In order to ensure the success of this idea maximizing the energy efficiency improvements should be given the priority, before adding zero carbon system.

The Malaysia Construction Industry Transformation Programme (CITP) 2016-2020 had launched MyCREST which is the Malaysian Carbon Reduction & Environmental sustainability tool and created the Sustainable Construction Excellence Centre (MAMPAN) as the tools for green solution in Malaysia's construction industry. The designer team can refer to these tools as the guideline to produce sustainable development practice. Thus, based on the overall literature review the ways that should be practice as the new concept in Malaysia was the Smart Energy Management System that can produce the low energy to the building and to reduce the carbon emission.

3.0 METHODOLOGY

A desk study for critical reviews on smart energy management system for zero carbon building identification of the best practice to reduce carbon emission in design and life-cycle impacts, the evaluation of the current sustainable building practice were carried out. The aim is to propose a new concept for zero carbon building that has been implemented in other countries.

4.0 ANALYSIS AND FINDINGS

4.1 Identification of best practice

4.1.1 The ventilation

The ventilation here means that fresh filtered air should be provided which is energy efficient heat recovery ventilation system since studies show that the indoor air quality is worst compared to outdoor. Therefore, when there are the existing of ventilation systems they can supply healthy indoor air quality for the occupants in a building.

4.1.2 Solar PV

The solar PV is the application of photovoltaic system which is the best practice for energy savings that have been measured. This system is exposed to globally because the system isdurable and long lasting. The photovoltaic system cycle is produced when DC current is converted to AC by an inverter.

4.1.3 Building integrated photovoltaic

Building integrated photovoltaic is a PV panel which can be integrated into other building surfaces. This practice is used for large multistorey commercial buildings.

4.1.4 Energy efficient workstations

This practice used full daylighting, workstations can be bright by using just a little energy. LED desk lights are very efficient especially when natural light is not efficient.

4.1.5 Smart Energy Management System

A system that can adjust the room's temperature by using sensors, adjust the internal shades or external louvers to balance between temperature and lighting, can adjust the level of artificial lighting based on how many people are present, and the level of natural lighting that enters the building. To be precise

this system consists of 5 parts which are the measuring device, sensing device, enabling ICT, smart appliance and energy management system (Liu et al., 2016). Smart Energy Management System basic for energy saving is air conditioners or using using smart appliances (Water.IO,2018).

4.2 Evaluation of the current sustainable building practice

The current sustainable building practice is Malaysia Carbon Reduction & Environmental sustainability. The Malaysia Construction Industry Transformation Programme (CITP) 2016-2020 had launched MyCREST which is the Malaysian Carbon Reduction & Environmental sustainability tool and created the Sustainable Construction Excellence Centre (MAMPAN) as the tools for green solution in Malaysia's construction industry (CIDB, 2017). The photovoltaic system is the practice that had been implemented in Malaysia. However, there are disadvantages for this practice where the solar panels' efficiency levels are relatively low between 14%-25% compared to the efficiency levels of other renewable energy systems (Dino, 2012). Moreover, the solar panel is fragile and can be damaged easily It also does not require considerable maintenance and operating costs. Furthermore, the intermittency and unpredictability of solar energy makes solar energy panels less reliable a solution (Dino, 2012). The solar panel also requires a high investment cost for storage batteries.

4.3 Propose the new concept for zero carbon building that has been implemented in another country to Malaysia

The Smart Energy Management System is a new concept that can be applied in Malaysia where the buildings provide the energy if there are occupants in the buildings and automatically switched off when the occupants leave. This Smart Energy Management System can adjust the room's temperature by using sensors, adjust the internal shades or external louvers to balance the temperature and lighting, can adjust the level of artificial lighting based on how many people are present and the level of the natural lighting that enters the buildings. This system had been implemented in other countries such as China, Japan, India, Singapore, the United States and Australia. The laws that enhance to use energy efficiently are being implemented in China, Japan, India, Singapore and Australia that drive all these countries growth of the energy management systems market (M&SI., 2016). By using this new concept to reduce the carbon it can give a lot of benefits for the people and environment, for instance the energy of overall buildings is efficient, reduces the cost for electricity, work becomes easier for people and makes it easier for people to monitor their usage and make effective changes.

5.0 CONCLUSION

In this built environment, gas emission increases is unnoticed until it gives impact to the surrounding. The building for zero carbon where buildings are high level of energy efficiency requires planning. The achievement of zero carbon building is through the designers who should play the role as energy efficiency depends on the design of the building. The designer team must use the energy analysis tools and should understand how sustainable buildings work and make it easier for consumers to monitor their usage and make effective changes. In Malaysia the implementation of the application of solar PV known as photovoltaic which is widely used to gain energy efficiency. However, there are disadvantages of the solar PV practice and to achieve the best practice to reduce carbon emission there must be new technology to be used. Thus, the new concept is Smart Energy Management System that can gain healthy indoor environment for people and is the best practice for zero carbon building that can be applied as sustainable building practice in Malaysia.

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