CHAPTER THREE

SUSTAINABILITY IN MALAYSIAN BUILDING PROJECTS

3.1 INTRODUCTION

The previous chapter has explored the sustainability principles of building, the strategies to integrate the principles into the project planning and their impact on influencing the project performances. This chapter is now tries to assess the current sustainability practices in Malaysian building projects including the efforts and barriers of the practice. Particularly, this chapter aims to address research question two of this dissertation - 'to what extend is sustainability concept being practiced in Malaysia?' It is aims not only to justify the gaps and needs for this study but also to inform the relevant sustainability principles of building and the integration strategies to be included in the proposed framework.

This chapter covers four main parts. Arrangement of this chapter begins with exploration of the issues of construction industry and sustainability practices in Malaysia. It is followed with an investigating on the current country's efforts including the government incentives and policies towards promoting sustainability in building project. In the third part, the discussion shifts to the current practices of project planning process in Malaysia, followed by a listing of the current Malaysian buildings achievement on sustainability recognition. The last part seeks to assess the reasons for the continuous presence of, and increasing problems of unsustainable building projects in this country, the significant of developing a framework of integrating sustainability through project planning process and proposing a preliminary framework. It does base on the literature review in Chapter Two and also by examining the gaps and barriers that have hindered the successful integration of sustainability in Malaysian building projects.

3.2 CONSTRUCTION INDUSTRY IN MALAYSIA: THE PATH TOWARDS SUSTAINABILITY

The growth of population and urbanization has been increasingly in Malaysia which led to greater economic growth in construction industry. In 2009, Malaysia's total population was estimated to be about 28.3 million, which over 70% is living in urban areas. The country's highest population densities are found in the peninsular cities of Kuala Lumpur, Penang and Putrajaya. The total Malaysian population is projected to grow at average annual rate of 1.3% over the outlook period, reaching below 40 million by 2035 (Department of Statistic Malaysia, 2011).

Malaysia's GDP per capita in 2009 was estimated to be about USD 12 600 which is the third highest among the ASEAN economies. The country's annual GDP growth is predicted to be 4% for the next 25 years (APEC, 2013). Among other sectors, construction industry plays an important role in Malaysian economy since it is extensively linked with many other parts of the economy, in particular with related industries such as those for basic metal products and electrical machinery (Shari, 2011; Zainul Abidin, 2010b). It has been reported that Malaysia is one of the fastest growing construction industry in the world (ABCSE, 2007). Though, over the last 20 years, it was reported that the industry has been only consistently contributing between 3% - 5% of the national gross domestic product (GDP) of Malaysia (CIDB, 2007a), which is the smallest contributing sector of economy. Market Watch Malaysia (Arif, 2007) reported that the construction industry shares 3.3% of the country's GDP in 2003 and employs over 500,000 workers in some 54,500 local companies (80% of these firms are small and medium sized companies). Construction Industry Master Plan (2006-2015) stressed that although it accounts for only 2.5% of the GDP in 2007, the industry still play an important role in the development process of this country especially towards the development of economic sector and supporting the social development of the country through the provision of basic infrastructure (Zainul Abidin, 2010a and CIDB, 2007a). The performance is continuously increasing, as of in year 2005; the construction industry provides job opportunities for approximately 900,000 people. CIDB (2007a) predicted the industry to contribute 5% of GDP by 2015.

The fast growth of construction industry however has created pressure on the environment and social cohesion especially in urban area. National Hydraulic Research Institute of Malaysia (NAHRIM) has predicted that there will be an extreme change on rainfall, river flow and surface air temperature patterns in the country especially over Peninsular Malaysia in future periods of 2025-2034 and 2041-2050, which is monthly rainfall in Peninsular Malaysia is expected to decrease from 32% to 61% and monthly mean temperature of 1.4 degree Celsius with an increase maximum monthly temperature of up to 2 degree Celsius (Shaaban et al, 2008).

3.2.1 The Issues of Construction Industry and Sustainability Practices

The sustainability related issues is one of the top issues of the construction industry in Malaysia (CIDB, 2000). Thus, the government of Malaysia is always striving to upgrade the sustainability aspects in the industry as it is one of the productive and contributive sectors to the economy. The current sustainability issues have an influence on the development of built environment. Among the environmental and socio-economic issues in the country are discussed next.

3.2.1.1 Environmental Issues

The rapid growth of Malaysian construction industry has led to the increasing demand of building materials which resulted of greater greenhouse gases emissions from the energy used in the materials production process, particularly cement and steel. Concrete and steel are the biggest contributor to greenhouse gases emissions. However, it was reported that the local productions of materials in countries of South-East Asia including Malaysia are mostly still not sufficient to meet the demand for construction sector due to demand fluctuations and lack of capital for the build-up supplies (Shafii et al, 2006).

Malaysian's buildings consume about 12.85% of the total energy consumption and 47.5% of the country's electricity consumption (Department of Electricity and Gas Supply Malaysia, 2001). The typical distribution of buildings' energy consumptions are as shown in Table 3.1 (p118) where shopping complexes and offices buildings use more than 90% of the energy for lighting and air conditioning (Ahmed, 2008). It was also reported that majority of Malaysian urban household energy are from the use of car to

and from (24.4%) and after work (31%) respectively. Meanwhile, majority of the household energy which are 44% and 21% of urban home energy consumption without car are from cooling and refrigerator as shown in Table 3.2 (GSB, 2012b). The facts are very worrying as Malaysia is one of the fastest growing building industry in the world (ABCSE, 2007) and having a hyper urbanization (Department of Statistic Malaysia, 2011).

Table 3.1: Distribution of Energy Consumption in Malaysian Buildings (%)

	Residential	Hotels	Shopping Complexes	Offices
Lighting	25.3	18.0	51.9	42.5
Air-conditioning	8.3	38.5	44.9	51.8
Total	33.6	56.5	96.8	94.3

Source: Ahmed (2008, p.7)

Table 3.2: Urban Home Energy Consumption without Car (%)

Lighting	Entertainment	Cooling	Refrigerator	Cooking	Washing Machine	Heating	Others	Total
7.12	4.22	44.23	21.48	4.96	2.47	11.03	4.49	100

Source: GSB (2012b)

Malaysia is well-endowed with conventional energy resources such as oil, gas and coal also renewable energy sources such as hydro, biomass and solar energy (APEC, 2012). Asia Pacific Economic Corporation (APEC) projected the Malaysia's primary energy demand will increase at 3.5% per annum from 56 megatonne of oil equivalent (Mtoe) in 2002 to 147 Mtoe in 2030. In 2010, total final energy consumption in Malaysia was 40,290 kilotonne of oil equivalent (ktoe), an increase of 5.4% from 38 244 ktoe in 2009. By energy type, oil contributed the largest share, with 60.5% of consumption, followed by electricity (22.3%), gas (13.3%) and coal (3.9%) (APEC, 2012). Based on the production level in 2005, it is estimated that the oil reserves is yet to last only 15 years while gas reserves is estimated to last for another 29 years (APEC, 2006) and electricity demand is expected to increase significantly from 96.3 TWh in 2009 to 206 TWh in 2035 (APEC, 2013). Thus, to ensure that these non-renewable resources are sustained, Malaysia needs more alternatives energy sources to fulfill the demand of the country's rapid economy development and to better manage the growing energy demand.

The current increasing rate of the energy consumption in Malaysia has also affected the country's air quality. It was reported that each person in Malaysia generates 5.81 tonnes of CO_2 per year compared to 3.11, 1.45 and 0.89 tonnes generated by each person in Thailand, Indonesia and Philippines respectively (IAEA, 2006). Eighty six percent of the greenhouse gases emission is carbon related (DECC et al., 2008). Malaysia is ranked 25th in global list of human made CO_2 emission (Mohd Yunus, 2007) and the second highest in Asia after Japan (Praveena et, al, 2008). Malaysia is a tropical humid country and generally, the climate is the same throughout the year with uniform temperature, high humidity and heavy rainfall. Total CO_2 emissions from fuel combustion are projected to reach 264 million tones CO_2 in 2035, which is 46% higher than in 2010 and 360% higher than in 1990. It was projected that by 2035, electricity generation sector is the biggest source of CO_2 emissions (33%) and followed by the domestic transport sector (24%), (APEC, 2013). The country has an average annual temperature of 24 degree Celsius to 34 degree Celsius (Malaysian Meteorological Department, 2012). The huge amount of electricity consumption in Malaysian buildings is partly due to keep indoor conditions thermally comfortable. The mechanical cooling technologies that have been used in the buildings consume fossil fuel energy and electricity, which in turn contributes to the issues of greenhouse gases emissions and ultimately global warming and climate change.

Activities related to construction industry are among the contributing factors to the environmental degradation in Malaysia. For instance, careless opening of high land or vegetated areas for construction purposes, which not managed based on environmental concerns such as in Kuala Lumpur, Penang and Johor, which driven by the demand of housing. Depletion of Malaysia rainforest has resulted in loss of biodiversity and marginalization of indigenous populations due to poor resource management decisions (Sani, 1999).

Another issues that accounts much of the environmental degradation in the country is the problems that created by construction wastes (Begum et al, 2006). Sustainable waste management has been the focus but never been achieved (Agamuthu, 2012). This is unsurprising because waste reduction aspect is rarely considered during the project planning and design stage (Begum et al, 2006). Majority of contractors in the Klang Valley do not sort waste at construction sites and dispose their construction wastes at landfills. Those who do are more to large contractors who are aware and willing to pay

more for improvement waste collection and disposal services than others (Begum et al, 2007). This issue has led to the unwanted pollution of rivers, sea, groundwater and contamination of soils (Gatke, 2003).

3.2.1.2 Socio-economic Issues

The current trend of considering minimal initial costs alone in Malaysian construction industry has caused certain social and environmental issues in the country (CIDB, 2007a). CIMP (2006-2015) highlighted that Malaysian clients usually do not award projects to contractors based on their technical capabilities and long term's benefits of the projects are always ignored. Even though the industry employs approximately 9% of the total workforces (as of 2005) in Malaysia, yet it is heavily depending on foreign labors especially from Indonesia and ASEAN region (CIDB, 2007a). As proved by an official statistics as of June 2005, around 250,000 of approximately 800,000 construction personnel are foreigners (CIDB, 2007a). The reliance on unskilled foreign workers in construction phase is related to the issues of cost constraint and low adoption of technology. Foreign workers are usually unskilled when they first arrive in Malaysia which has impacted the productivity and quality of the construction industry.

Unskilled foreign labour is cheaper to employ in short term than skilled local labour, even if productivity per person is low. This labour preference does lower the incentive to migrate to more productive technologies and reduces the attractiveness of the industry to employ more highly skilled or local labour (Chan, 2009; CIDB, 2007a). Local workforce is also reluctant to join the industry because the unskilled foreign labour, low wages and a low emphasis on occupational safety has created an image of 'Dirty, Dangerous, Difficult' industry. For instances, in 2004 the construction industry has the third highest fatality rate after electrical and transportation industries in Malaysia (CIDB, 2007a). Apart of social problems, reliance on foreign labour also creates environmental problems such as from their on-site accommodations which are built without proper sewerage system, domestic waste collection and other basic facilities (Abdul Aziz, 2001).

3.2.1.3 Issues of Sustainability Practices in Malaysian Building Projects

To integrate sustainability into Malaysian construction projects, the industry should address several issues of concern including procurement methods and practices, contracting approaches, construction methods, planning submission and building plan approval procedures, the ability to attract and develop local workforce and securing timely and adequate financing at the various stages of construction project (CIDB, 2007a). Traditionally, the selection of designer and the main contractor has been primarily based on the lowest tender price. This practice has also extended throughout the supply chain with the main contractor competitively outsourcing of elements of the job to subcontractors and materials suppliers. As a consequence, some firms have priced work unrealistically low and then sought their profit margins through contract cost variations arising from such as design changes and other claims (CIDB, 2007a). CIMP (2006-2015) has reported that 50% of the failure in Malaysian construction industry can be attributed to design faults, while 40% are due to construction faults and only 10% are because of material faults. It shows that responsibility on quality in the construction industry will have to include more than contractors alone. The construction players are currently dealing with 144 local authorities and technical agencies involved in planning, submission and building plan approval process. It takes over 18 months to obtain approval for the building plan which results in a delay during submission and approval process (CIDB, 2007a). Cost and budget constraints along with availability of cheap foreign labour have encouraged the construction industry to favors labour-intensive construction methods over the use of more expensive technology such as IBS even though the usage of IBS has been proven to ease pressure of labour requirements and boost quality and productivity. Further, the low wage scheme couples with unpleasant working conditions have discouraged locals from joining the industry (CIDB, 2007a). One of the key challenges expressed by the construction players is securing timely and adequate financing at the various stages of construction project especially common among the small and medium sized players. During pre-bidding and bidding stage for instances, the feasibility studies to support the loan proposals that is too costing, makes it impractical for most construction companies to provide them (CIDB, 2007a).

The concept of sustainability in Malaysia has initially focused on the environmental issues such as limited resources especially energy consumption and how to reduce impacts on the natural environment with emphasis on the technical issues such as

materials, building components, construction technologies and energy related design concepts (Md Darus et al., 2009; and Zainul Abidin, 2009). A study by Zainul Abidin in 2009 has revealed that most Malaysian developers understood 'sustainable construction' more toward environmental perspective (88.6%) and valued social and economic elements as separate entities (Zainul Abidin, 2009). Studies by Shafii et al, (2006) and Zainul Abidin (2009) showed that there are several barriers of sustainable construction project in Malaysia such as lack of awareness on sustainable building project, lack of training and education in sustainable design and construction, the higher cost of sustainable building option, procurement issues, regulatory barriers, lack of professional capabilities especially the designers, disincentive factors over local material production, lack of demonstration examples, lack of enforcement, lack of government intervention, pointing fingers culture and urgency factor. Generally, sustainability is still a relatively new concept in Malaysia (Zainul Abidin, 2009 and Shafii el al, 2006). Even though the awareness is increasing on sustainable building and construction, however it is not across the whole spectrum of the construction sector (Shafii and Othman, 2005).

To sum up, it is clear that the imbalance between environmental and socio-economic development has caused certain social and environmental issues in the country. The exploitation of resources, uncontrolled and improper planned development in the country has resulted in the deterioration of environment. The current trend of considering minimal initial costs and all the issues highlighted earlier in the country's construction industry can be considered as not sustainable. The construction players should be aware that sustainability practices can be achieve without adversely affecting their profits and project performance. The concepts of value management and life cycle costing should be prevalent in procurement discussion and decisions as opposed to cost at the initial stage only (CIDB, 2007a). It is because, viewed over 30 years period has shown that initial building costs account for approximately just 2% of the total, while operations and maintenance costs equal 6% and personnel costs equal 92% (Gottfried, 1996). Some of Malaysian stakeholders are not fully understood with the concept and principles of sustainability which, they believe that it will increase project's cost (Zainul Abidin, 2009 and Shafii and Othman, 2005). The focus of the Malaysian construction industry in providing the best possible (lowest) cost, has downgraded quality concerns to a secondary factor. Lack of training, education and experience in sustainable project and the project delivery process has resulted towards lack of capabilities among

construction players especially designers, who are not capable to consult toward sustainability (Zainul Abidin, 2009; Shafii and Othman 2005).

3.2.2 The Malaysian Efforts Towards Sustainability in Building Project

Even though sustainability in building project is still new, are many efforts relating to sustainability have been implemented in the country. In supporting the sustainable movement, Malaysian Government has been active in sustainability issues internationally including signing of various international agreements such as Montreal Protocol in 1987, which commits the nation to phasing out ozone depleting substances (ODS). Malaysia has successfully dropped its ODS from 0.29 kg per capita to 0.10 in 1997 (Ali, 2007). Malaysia was the host country of the tenth Commonwealth Heads of Government Meeting (CHOGM) on October 1989 at Langkawi. Langkawi Declaration on the Environment was issued during the meeting which covers a wide range of topics related to the environment, blaming past neglect in managing the natural environment and resources. It lists what the Heads of Governments perceived to be the main environmental problems, the greenhouse effect and damage to the ozone layer, marine pollution, land degradation and species extinction. Amongst the commitments made by the members in the Langkawi Declaration are as follows (Commonwealth Heads of Government (1989);

- Support the development of an international sustainable development funding mechanism.
- Support the Intergovernmental Panel on Climate Change and recommend the Commonwealth's own repost on climate change
- Promote energy efficiency
- Promote a forestation and sustainable forest in developing countries and the conservation of virgin forest to protect biodiversity.
- Restrict non-sustainable fisheries, including banning tangle nets and pelagic driftnet fishing, as part of a general trend amongst international organisations
- Prevent dumping of toxic or hazardous materials in the oceans or in developing countries.
- Promote public awareness of environmental risks and issues.

Malaysia also became a Party to the UNFCC in 1994 and Kyoto Protocol in 2005. During the Copenhagen Climate Change Summit in 2009, Malaysia's Prime Minister pledged to voluntarily reduce CO^2 emissions intensity of GDP up to 40% by the year 2020 compared to 2005 levels conditional on financial and technological assistance from developed countries and preserve the forest and land area (APEC, 2013; Ahmad et al, 2011; Razak, 2009a). To achieve the goal, the Malaysian cabinet approved two progressive policies in 2009; National Green Technology Policy and the National Climate Change Policy (APEC, 2013).

CIDB has formed many focus groups in research and development which involved in research of waste minimization, environmental management plan, water management and construction hazard identification (CIDB, 2006a). Other institution in Malaysia such as INSPEN (National Institution of Valuation, Malaysia) and MASTIC (Malaysian Science and Technology Information Centre) under Ministry of Science, Technology and Innovation are among the leading institutions for sustainability research and development (Zainul Abidin, 2009). The subject of sustainability continues to be one of the important agenda of the government since it was identified in the government's five-year plan. Sustainability is one of the five key thrusts in Ninth Malaysia Plan. The latest, the Tenth Malaysia Plan (2011-2015) which was published on 10th June 2010, emphasizes energy supply security and economic efficiency as well as environmental and social considerations by focusing on five strategic pillars: initiatives to secure and manage reliable energy supply, measures to encourage energy efficiency, the adoption of market-based energy pricing, stronger governance and managing change. The plan also lays out actions that need to be taken in developing a sustainable energy sector, with a focus on renewable energy and energy efficiency (Government of Malaysia, 2010). The government has done many efforts include outlining related policies, plans and guidelines toward sustainability. Some of them are as shown in Figure 3.1 (p111);

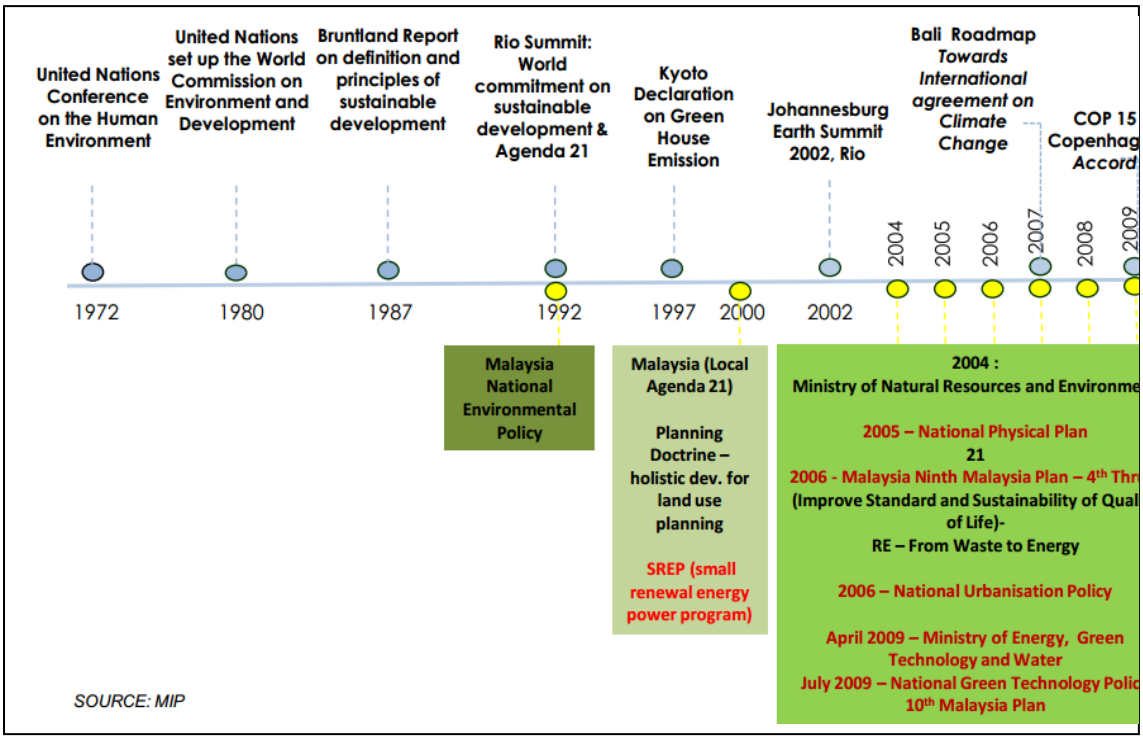


Figure 3.1: Global and National Movement of Sustainable Development
(Source: MIP, 2011)

In Malaysia, the sustainable building project is still in its infancy and the terms of sustainable and green building as well are being using synonymously and interchangeably. Currently, in term of sustainability, Malaysia is looking at making their buildings more energy efficient or more suitable to be addressed as 'green building'. The government of Malaysia has realized the important of saving the environment through sustainable building development especially toward reducing carbon emission and resources use (Md Darus et al, 2009 and Zainul Abidin, 2009). Due to the increasing awareness of sustainable building affect on the environment, workers productivity and human health, both of the public and private sector in this country are beginning to value and market the benefits of sustainable building. Many developers are joining the green contingent as they believe it can attract demand from the growing sustainable conscious population and by earning quality from their efforts (Zainul Abidin, 2010a; 2010b). Tanarimba project at Janda Baik, Pahang is one of the examples of sustainable housing project that blends man-made and natural elements in an exciting concept of ecologically-sensitive community development and providing ecotourism opportunities in Malaysian Highlands (Tanarimba Development, 2010). Besides, several Malaysian developers have taken a lead in preserving environment and offer green building features in their projects such as D'Heron project by Putra Perdana

Development Sdn. Bhd, Eco Villas in Setia Eco Park by SP Setia, Amarin Wickham project by Amarin Wickham Sdn. Bhd. and many more (Jamaldin, 2008).

The concept of sustainability have also been incorporated in the design of several new office buildings such as Telekom Tower (completed in 2001) and Securities Commission building (completed in February 1999) in Kuala Lumpur which were both designed by architect Hijjas Kasturi Sdn. Bhd. Plenty of new Malaysian government and statutory bodies buildings especially in Putrajaya, Federal Administrative Centre of Malaysia were also designed and constructed in a sustainable manners especially on energy efficient and saving resources use. The buildings are such as LEO Building at Precinct 1, Putrajaya (completed in 2002), Putrajaya International Convention Centre (PICC) at Putrajaya (completed in 2003), GEO Building at Bandar Baru Bangi (completed in 2007), Diamond building at Precinct 2, Putrajaya (completed in 2010) and so forth. Among the principles of sustainability that are incorporated in the projects are energy efficiency and renewable energy system, sustainable passive design, water efficiency, reused and recycled materials and resources, indoor environment quality, nature protection and landscape elements and innovation.

Following sections are discussing some of the commitments of sustainability in Malaysian building project, including the policies, guidelines and incentives that have been introduced in the country.

3.2.2.1 Policies and Guidelines on Sustainability in Malaysia

Numerous policies, guidelines and regulations are used by the local authorities and government agencies to enhanced sustainability in Malaysia such as:

- **Energy Policy**

Malaysia's National Energy Policy was first formulated in1979 by the Economic Planning Unit (EPU) under the Prime Minister's Department. The policy consist of three principal energy objectives as follows (APEC, 2013);

1. The Supply Objective – to ensure the provision of an adequate, secure and cost-effective supply of energy.

2. The Utilisation Objective – to promote efficient utilisation of energy and to discourage wasteful and non-productive patterns of energy consumption.
3. The Environmental Objective – to minimize the negative impacts of energy production, transportation, conversion, utilization and consumption on the environment.

The National Depletion Policy was formulated in 1980 to prolong and preserve the economy's oil and gas resources by setting a limit on the annual production of oil and natural gas. In 1981, the Four-Fuel Diversification Policy, with the aim of diversifying the energy mix used in electricity generation was developed. The initial focus of this policy was to reduce the economy's dependence on oil as the principal energy source and it aimed for the optimization of the energy mix of oil, gas, hydro and coal used in generation of electricity. Consequently, oil's domination of the electricity generation mix has been significantly reduced and replaced with gas and coal. In 2001, the Five-Fuel Diversification Policy was introduced to incorporate renewable energy as the fifth fuel after oil, gas, coal and hydro (APEC, 2013).

- **National Renewable Energy Policy**

The National Renewable Energy Policy and Action Plan came into being in 2010, which aims to spur utilization of indigenous renewable energy resources to contribute towards Malaysia's electricity supply security and sustainable development. Two crucial acts were established under this policy; the Renewable Energy Act 2011 and the Sustainable Energy Development Authority Act 2011. The Tenth Malaysia Plan specified a target of 985 MW by 2015 for grid-connected generation from renewable sources, which would contribute 5.5% to Malaysia's total electricity generation mix. This comes from biomass (330MW), biogas (100MW), mini hydro (290MW), solar PV (65MW) and solid waste (200MW) sources. By 2020, Malaysia expects to have an installed capacity of more than 3GW of new renewable energy, of which one-third will be from solar PV and another one-third from biomass sources (APEC, 2013).

- **National Green Technology Policy**

National Green Technology Policy was launched by the Prime Minister of Malaysia in August 2009 in order to achieve the goal of reducing CO^2 emissions intensity of GDP

by 2020 as promised during the Climate Change Summit in Copenhagen in 2009. According to the policy, green technology shall be a driver to accelerate the national economy and promote sustainable development. The policy is built on four pillars (Greentech, 2010b).

1. Energy – to attain energy independence and promote sufficient utilization
2. Environment – to conserve and minimize environment impacts
3. Economy – to enhance economic development through the use of green technology
4. Society – to improve quality of life for all

Four focuses were chosen- energy, buildings, water and waste management and transport. The government initiatives include the restructuring of the Malaysian Green Technology Corporation, the organisation of the annual International Greentech and Eco Products Exhibition and Conference Malaysia (IGEM) and the development of Putrajaya and Cyberjaya as pioneer townships in Green Technology (APEC, 2013).

- **National Climate Change Policy**

The National Climate Change Policy is the roadmap for Malaysia to achieve 40% reduction of carbon emission in 2020. The policy is actively promote sustainable development by integrating climate change responses into national development plans, initiate actions on climate change issues that contribute to environmental conservation and sustainable use of natural resources, integrate climate change considerations into development planning, improve participation of stakeholders and major groups for effective implementation of climate change responses and international involvement on climate change will be based on the principle of common but differentiated responsibilities and respective capabilities (APEC, 2013).

- **National Energy Efficiency Master Plan (NEEMP)**

To better coordinate and implement energy efficiency and conservation targets and programmes, KeTTHA is preparing the NEEMP to be launched in 2013. The proposed master plan has an implementation horizon of ten years to achieve savings from three main sectors – industrials, commercials and buildings (APEC, 2012). By March 2013,

the drafting process of the master plan is progressing well and at the final stage (Jayaraman, 2013). KeTTHA has also drawn up a law to mandate energy efficiency in the economy. The law will likely tabled in 2013 and includes provisions for banning incandescent light bulbs and mandatory import of energy efficient refrigerators (APEC, 2012).

- **Green Neighbourhood Planning Guidelines**

Green Neighbourhood Planning Guideline was introduced by Federal Department of Town and Country Planning (FDTCP) in 2011. It is the planning guideline for the state and local government to formulate policies, strategies and regulations to promote green neighbourhood. It also provides design guidance for industries to develop green neighbourhood. Neighbourhood planned and designed in an integrated manner with the priority given to the protection and consumption of natural resources, application of green technology and recycling. The guideline seeks to preserve the environment, reduce the ecology footprint, and reduce the production of carbon emission, improving public health, safety as well as general welfare of city dwellers (Rosly and Hashim, 2011).

- **Low Carbon Cities and Framework Assessment System**

Low Carbon Cities and Framework Assessment System was developed in March 2011 by the Kementerian Tenaga Teknologi Hijau dan Air (Ministry of Energy, Green Technology and Water) (KeTTHA) with supports from Malaysia Green Technology Corporation (GreenTech) and Malaysian Institute of Planners (MIP). The framework outlines a city that comprises of societies that consume sustainable green technology and relatively low carbon energy as compared with present day practice to avoid adverse climate change. It is an assessment tool to assist local authorities, developers and designers in assessing whether development carried out within the city contributes towards reduction or decrease in GHG (Rosly and Hashim, 2011).

- **The Environmental Impact Assessment (EIA)**

EIA is one form of regulatory control, which is used to manage environment at the project level. The Department of Environment Malaysia requires any project

developments of 50 hectare and above to submit EIA report which is conducted by an independent consultant (Department of Environment Malaysia, 2012). The Malaysian government will issue a stop-work order if the post EIA reveals any components of the project are not complied with the conditions of EIA (Zainul Abidin, 2010a).

- **Environmental Management System for Construction Industry Guidelines (EMSCI).**

Environmental Management System for Construction Industry Guidelines (EMSCI) has been introduced by CIDB Malaysia in order to facilitate construction companies to set up an EMS for their company to stay competitive in the environmentally –conscious world business market and to enhance the environmental performance of local construction industry (CIDB, 2007b).

3.2.2.2 The Government Incentives on Sustainable Building Projects

As to achieve the global and national objectives of sustainability, the Malaysian Government offers numerous incentives to encourage the generation of RE and the adoption of EE initiatives among project stakeholders and users in Malaysia such as the Malaysian Building Integrated PV Project (MBIPV), Suria 1000 and so forth as followings;

- **The Malaysian Building Integrated PV Project (MBIPV)**

MBIPV has been established in 2005 by the UNDP-GEF and supported by the Malaysian Ministry of Energy, Water and Communication (MEWC) and the private sector. The objective of MBIPV project is to promote renewable energy to supplement the current fossil fuel consumption for power generation in Malaysia. This project also aims to reduce the cost of BIPV technology within the Malaysian market. The GEO building is an example of the MBIPV project being implemented which the BIPV systems and technologies have been integrated into the building envelopes used as building elements on the roof and glass (Ahmed, 2008). However, the technology have not yet widely implemented in Malaysian buildings due to its high cost (GSB, 2012b).

- **Suria 1000**

Suria 1000 is a national programme under the MBIPV and funded by the Government of Malaysia with support from UNDP, GEF, Energy Commission and the private sector. The project has been launched by the Prime Minister of Malaysia on June 2007 as part of government effort to promote renewable energy in the Ninth Malaysia Plan (2006-2010). The aim of Suria 1000 is to install 1000kWp of BIPV in the country over 5 years to promote renewable energy and energy efficient. The incentives provided discount price at decreasing percentage of 75%-70% in 2007, 65%-60% in 2009 and 45%-40% in 2010 as this programme was claimed as very successful (Ahmed, 2008). It enables Malaysians to install BIPV systems at their premises at highly discounted prices. MBIPV Project is implemented by PTM under the authority of MEWC. This programme was established to offer opportunity especially to the Malaysian property developers to be involved in total sustainable housing development by the use of BIPV to generate clean electricity from solar energy.

Every year starting from 2007, limited number of grid-connected solar PV systems are offered to the public on auction concept through local mass media and administered by the project team. Successful bidders would then install the PV system which supplied by the participated PV service provider as BIPV at the premises. The minimum BIPV capacity for bidding is 3kWp per application. This programme is co-financed by the public (owners of the system), Energy Commission (for the Government of Malaysia) and the PV industry (via discount for the hardware) (SURIA 1000, 2009).

- **Tax Exemption**

Any person who incurs qualifying expenditure (QE) or the green building cost sum to obtain GBI certification for a building used for his business qualifies for tax exemption. This tax incentive provides exemption on the statutory income which is equivalent to 100% of that expenditure. Any unutilized QE can be carried forward to subsequent years of assessment until the amount is fully exempted. This tax exemption only applies once for each building certified from 24 October 2009 until 31 December 2014 (Razak, 2009b; GSB, 2012b; KeTTHA, 2011).

- **Stamp Duty Exemption**

The stamp duty exemption provides exemption on instruments of transfer of ownership of buildings and residential properties acquired from property developers and awarded GBI certificate. The exemption is on the additional cost of the property incurred to obtain the GBI certificate. The exemption is only given for the first transfer of ownership of the building and for sales and purchase agreements executed from 24 October 2009 until 31 December 2014 (GSB, 2012b and KeTTHA, 2011). The incentives were announced in Budget 2010 speech on 23rd October 2009 and Budget 2011 by the Prime Minister of Malaysia as follow:

> Building owners obtaining GBI certificates from 24th October 2009 until 31 December 2014 be given income tax exemption equivalent to the additional capital expenditure in obtaining such certificates and buyers purchasing buildings with GBI certificates from developers be given stamp duty exemption on instruments of transfer of ownership (Razak, 2009b).

Together with the launch of GBI, the Government introduced tax incentives for GBI certified building in Budget 2010 and Budget 2011 to encourage green building (KeTTHA, 2011). The tax incentive is summarized in Table 3.3 (p119).

Table 3.3: Income Tax/Stamp Duty Incentives for GBI certified building

Incentives for GBI Malaysia certified building	
Building expenditure incurred by a person or company (Income tax (exemption)(No.8) Order 2009)	- 100% tax exemption on additional capital expenditure to obtain GBI certificate. - Set-off against 100% statutory income. - Once in a lifetime claim on GBI buildings. - Incentive claimed once certificate is issued for new buildings and upgrade of existing buildings. - Effective date: Buildings awarded GBI certificate is issued for new buildings and upgrade of existing buildings. - Effective date: Sale and purchase agreements executed from 24th October 2009 until 31 December 2014.
Property buyers (Stamp Duty (exemption) Order 2009)	- Stamp duty exemption based on additional cost to obtain GBI certificate. - Buildings and residential properties with GBI certificate. - Applies only to purchase from developers. - First property owner only. - Effective date: Sale and purchase agreements executed from 24th October 2009 until 31st December 2014.

Note* Not applicable to a company which has been granted investment tax allowance or pioneer status under the Promotion of Investments Act 1986 (Act 327) in respect of qualifying expenditure incurred on activity for generation of renewable energy or for conservation of energy.

Source: KeTTHA (2011) and PWC Malaysia, (2010:5)

- **Incentives for Renewable Energy and Energy Conservation**

Renewable energy promotion in Malaysia is based on the Small Renewable Energy Power (SREP) programme since 2001. Project under this programme are eligible for Pioneer Status (PS) or Investment Tax Allowance (ITA). Currently, the government has expanded the scope of RE to include PV generated power. Generation of RE for own use such as PV is also eligible for ITA under the 2008 budget. Besides, equipment used to generated energy from renewable sources such as PV and EE equipment such as high efficiency motors are also eligible for exemption from paying import duty and sales tax in order to reduce the cost of PV systems for prospective of non-business investors (GSB, 2012b). The incentives are shown in Table 3.4 and Table 3.5 (p120). Nevertheless, these incentives have been expired on 31st December 2010 (PWC Malaysia, 2010).

Table 3.4: Tax Incentives for the Generation of Energy from Renewable Sources

Sector/Activity	Corporate tax incentives	Indirect tax incentives
Companies generating energy from renewable sources	- Pioneer status with tax exemption of 100% of statutory income for ten years; or - Investment tax allowance on qualifying capital expenditure incurred to be set-off against 100% of statutory income for 5 years.	- Import duty sales tax exemption on equipment used to generate energy from renewable sources not produced locally; and - Sales tax exemption on equipment purchased from local manufacturers.
Companies generating renewable energy for own consumption	- Investment tax allowance on qualifying capital expenditure incurred to be set-off against 100% of statutory income for 5 years.	-
Others	- N/A	- Import duty and sales tax exemption on solar PV system equipment for the usage by third parties be given to importers including PV service providers approved by the Energy Commissions and, - Sales tax exemption on the purchase of solar heating system equipment from local manufacturers

Source: PWC Malaysia (2010:3)

Table 3.5: Tax Incentives for Energy Conservation

Sector/Activity	Corporate tax incentives	Indirect tax incentives
Companies providing energy conservation services	• Pioneer status with tax exemption of 100% of statutory income for ten years; or • Investment tax allowance on qualifying capital expenditure incurred to be set-off against 100% of statutory income for 5 years.	• Import duty and sales tax exemption on energy conservation equipment that are not produces locally; and • Sale tax exemption on the purchase of locally produced equipment.
Companies which incur capital expenditure for energy conservation for own consumption	• Investment tax allowance on qualifying capital expenditure incurred to be set-off against 100% of statutory income for five years.	
Others	• N/A	• Import duty and sales tax exemption on EE equipment (e.g. high efficiency motors and insulation materials) to importers including authorized agents approved by the Energy Commission; and • Sales tax exemption on the purchase of locally manufactured EE consumer goods (e.g.: refrigerator, air conditioner, lighting, fan and television).

Source: PWC Malaysia, (2010,:4)

3.2.2.3 Other Commitments

Malaysia struggles to adopt a green lifestyle in order to preserve the environment, to drive economic growth and improve the quality of life. The country has decided to conserve depletion of natural resources and reduce pollution. In January 2010 a Green Technology Financing Scheme (GTFS) of MYR1.5 billion is provided for soft loans to producers and users of green technology (APEC, 2013; GreenTech, 2010a; Bernama, 2010). By the end of December 2010, 68 projects have been certified for the GTFS fund (GreenTech, 2010a). The Malaysia Green Labelling Program (MGLP) has also been introduced. This includes the National Eco Labelling Program to certify eco-friendly domestically manufactured products and the Energy Star Rating certification for energy efficient home appliances (APEC, 2013).

To promote green technology in the building sector, the GBI Malaysia has been developed. The GBI is Malaysia‘s first comprehensive rating system for evaluating the environmental design and performance of Malaysian buildings based on the six main criteria -energy efficiency (design, commissioning, verification and maintenance), indoor environmental quality (air quality, thermal comfort, lighting, visual and acoustic comfort and verification), sustainable site planning and management (site planning, construction management, transportation, design), material and resources (reused and recycled materials, sustainable resources, waste management, green products), water efficiency (water harvesting and recycling, increase efficiency), innovation (in design and environmental design initiatives and GBI facilitator) (APEC, 2013; GSB, 2012b). Sustainable buildings are seen as one of the efforts toward sustainability especially in the matter of reducing the consumption of energy and reducing green house gases emissions. Some of them was realised in the Malaysian GBI indicators which trying to encourage people traveling to and from work by public transports, carpool or walking through its sustainable site planning and management. Energy efficiency and resource consumption efficiency are also encouraged in the guidelines toward sustainablity especially on environmental aspect (GSB, 2012b).

GEO Building or formerly known as ZEO building is officially Malaysia’s first GBI Certified Building which was certified in 2009. Until October 2012, there are three buildings in Malaysia have been verified and certified by GBI Malaysia as certified green buildings which are LEO, GEO building and Diamond building (refer to Table

3.6). The rest of the GBI certified buildings which are around 60 buildings were only certified as provisional certified buildings as the buildings were rated only based on the building design assessment. A Completion & Verification Assessment will be carried out upon completion of the buildings (GSB, 2012a).

Table 3.6: GBI Malaysia Certified Buildings until October 2012

GBI Certified Buildings	GBI rating	Certified Date	Category
GEO building	Certified	24th July 2009	Non Residential New Construction
Diamond building	Platinum	21 May 2011	Non Residential New Construction
LEO building	Silver	1st December 2011	Non Residential Existing Building

Source: GSB (2012a)

LEO building was built by the government of Malaysia to become the new Ministry of Energy, Water and Communications of Malaysia headquarters (MEWC). It was designed as a showcase building to demonstrate energy efficient and cost effective features so that other public and private sector buildings can replicate such measures. The MEWC organized many seminars to share the experience of the LEO Building and energy efficiency management. The seminars were targeted at Government agencies and departments, local authorities, building owners and maintenance, and professional bodies in the energy industry. By creating awareness with such programs the Ministry hopes to increase the effectiveness of energy usage among members of the public. Other continuous activities implemented under this project include monitoring the energy usage index on a monthly basis, receiving visitors, and delivering talks and preparing brochures on the LEO Building (KeTTHA, 2011). In 2007, the construction of the GEO building by PTM was completed and being a demonstration project for commercially feasible examples of sustainable initiatives for modern buildings in Malaysia and the region in order to promote the development of renewable energy in Malaysia (Ahmed, 2008).

The energy consumption in building is normally given in term of Building Energy Index (BEI). The average BEI of Malaysian new office buildings are normally around 200-300 kWh/m2year) (MECM, 2011; Putra Perdana Berhad, 2011 and Kristensen, 2008). KeTTHA or previously known as Malaysian Ministry of Energy, Water and Communication (MEWC) before the year 2004 has introduced the Guidelines for Energy Efficiency in Non-Domestic Buildings in 1989 which recommended BEI of not more than 135 kWh/m^2/yr (Ahmed, 2008). The guidelines were improved and renamed

as the Malaysian Standard MS1525:2001 in 2001 followed by its first revision in 2007. MS1525:2007 is a code of practice (CP) which is intended to be incorporated into Uniform Building by Laws (UBBL) so that the CP becomes part of a by-Law (APEC, 2012; GSB, 2012b). It provides guidance and the baseline minimum standard for the GBI rating tools for energy efficient designs that demonstrate good professional judgment and exceeds minimum standards criteria. It also encourage the application of renewable energy in new and existing buildings to minimize non-renewable energy sources, pollution and energy consumption whilst maintaining comfort, health and safety of the occupants in the areas of architectural and passive design, building envelope, lighting, electric power and distribution, air conditioning and mechanical ventilation (ACMV) system and energy management control system

A GBI Township Tool has been introduced in Malaysia by the Green Building Index Accreditation Panel (GBIAP) and launched in May 2011. It was prepared in order to assist construction players and built environment professions to understand the impact of each design choice and solution towards being more environment-friendly in delivering a sustainable township. It is a verifiable mechanism to benchmark green property development. There are six core categories outlined for the delivery of Sustainable Townships in Malaysia namely- Climate, Energy and Water, Ecology and Environment, Community Planning and design, Transportation & Connectivity, Building and Resources and Business and Innovation. The Township Tool is aims for zero net carbon emissions by maximising passive design principles, minimising the impact of heat island effect, minimising energy consumption, adopting onsite energy generation, utilising renewable energy technologies such as co-generation and micro-generation. The Tool also encourages the reduction of main water consumption, rainwater harvesting and grey water recycling in township. The tool encourages townships to be sensitive to the needs of the local ecology & biodiversity and aims to preserve and enhance the ecological value of the natural environment. Besides, the township should assist in stabilising land by reducing the impact of flooding and erosion.

Sustainable Township should be created using an integrated approach to master planning and best practice urban design principles emphasising people priority and green spaces. Such goals help create a strong sense of place for communities resulting in more liveable and diverse neighbourhoods. The township also tailored to respond to

local needs in creating business and employment whilst incorporating innovative solutions.

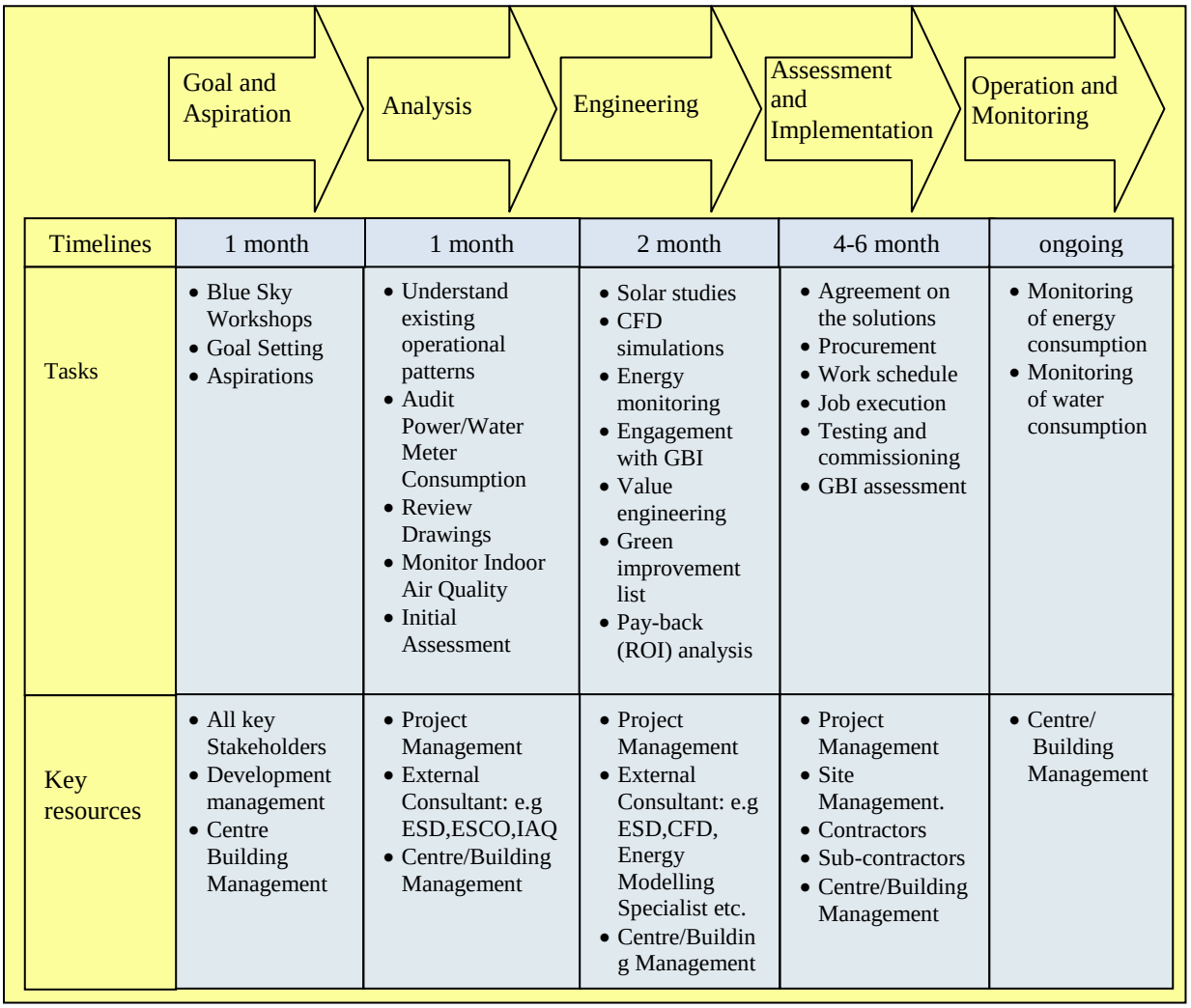
To sum up, the efforts and commitments by the Malaysian government and others have shown positive signs as Malaysian people are becoming more conscious in their responsibilities towards sustainable project. Sustainability in Malaysian building project was also supported by the numerous current spatial planning of this country that consider sustainable and energy aspects such as Malaysian National Physical Planning (NPP2005), National Urbanisation Policy, Development Plans including Structure Plans, Local Plans and Special Area Plans and the development control activities (GSB, 2012b). Improving sustainability is also important in the Tenth Malaysia Plan including to the economy plan to harness its energy savings potential and to reduce Malaysia's carbon emissions and dependence on fossil fuel. Revision of the UBBL to incorporate MS1525 Code of Practice is highlighted in the plan for integration of RE and EE systems in buildings. Wider adoption of the GBI to benchmark energy consumption in new and existing buildings is also emphasized (APEC, 2012).

3.2.3 Planning Process of Sustainable Building Project in Malaysia

Planning process has a significant impact on the ability of a construction project to success (Hamilton et al, 1996; Syal et al, 1992). Since this research focuses on the project planning process, it is imperative to understand the details of the process in Malaysia. There was not much discussion about construction project planning process in Malaysia. In conventional Malaysian building project, early planning is typically not conducted very well due to its complexity and extra costs that almost always associate with it (Mansur et al, 2003). Malaysian clients and consumers of the construction industry place on emphasis on costs, often at the expense of quality. Two practices that cause this focus on low cost are budget constraints imposed by clients and the use of many levels of subcontracting (CIDB, 2007a).

However, in Malaysian's sustainable building projects such as GEO and LEO building, capitalising on energy efficient measures are implemented through various facets of the overall design. Passive architecture design has been incorporated in order to enhance the future operations for energy efficiency and lowering operational costs. An Integrated design which emphasizes more upfront investment has been employed by a

range of stakeholders' groups' involvements. The whole development process of Malaysian sustainable building project that is being practiced is shown in Figure 3.2 (Jallendran, 2011).



Timelines	1 month	1 month	2 month	4-6 month	ongoing
Tasks	• Blue Sky Workshops • Goal Setting • Aspirations	• Understand existing operational patterns • Audit Power/Water Meter Consumption • Review Drawings • Monitor Indoor Air Quality • Initial Assessment	• Solar studies • CFD simulations • Energy monitoring • Engagement with GBI • Value engineering • Green improvement list • Pay-back (ROI) analysis	• Agreement on the solutions • Procurement • Work schedule • Job execution • Testing and commissioning • GBI assessment	• Monitoring of energy consumption • Monitoring of water consumption
Key resources	• All key Stakeholders • Development management • Centre Building Management	• Project Management • External Consultant: e.g ESD,ESCO,IAQ • Centre/Building Management	• Project Management • External Consultant: e.g ESD,CFD, Energy Modelling Specialist etc. • Centre/Buildin g Management	• Project Management • Site Management. • Contractors • Sub-contractors • Centre/Building Management	• Centre/ Building Management

Figure 3.2: Malaysian Sustainable Project Flow Chart
Source: Adapted from Jallendran (2011:18)

A typical project planning process in Malaysia is involved with legislature and development plan. There are over fifty laws and guidelines that should be considered by the construction players (Abdullah et al, 2011) when planning for a property development project such as National Land Code (NCL) 1965, Town and Country Planning Act (Act 172), the Government Act 1976 (Act 171), Uniform Building by Law 1984 (UBBL), the Environmental Quality Act 1984 and so forth. For example, as referred to in Part IV of the Act 172, in section 19 as follows:

> No person, other than the local authorities, shall, commence, undertake, or carry out any development unless planning permission in respect of the development has been granted to him under Section 22 (treatment of application or extended under subsection 24 (3) (lapse of planning permission) (Act 172: 4(19).

A layout and building plan that will be submitted should comply with various development plans such as the national physical plan, a structure plan, a local plan and a specific area plan that have been formulated under Part III of the Act 172 (Act 172(3)) which a developer has to obtain all planning approvals before any physical work can commence on site. Preliminary discussion will normally take place between the planning consultants and the planning department at the respective local authorities during the layout plan, building plan or planning permission submission process. A registered town planner is a principal submitting party (PSP) engaged by the developer or land owner to prepare the layout plan and will act as PSP for all planning approvals at the planning permission stage. The civil and structural engineer (C&S) is required to produce the platform design for the earthwork plan application and structural building design for the architect to submit at the building plan approval as per shown in Figure 3.3. A good working relationship between the consultant, the developer and various respective departments at the local authorities will directly contribute to a successful planning approval (Abdullah et al, 2011).

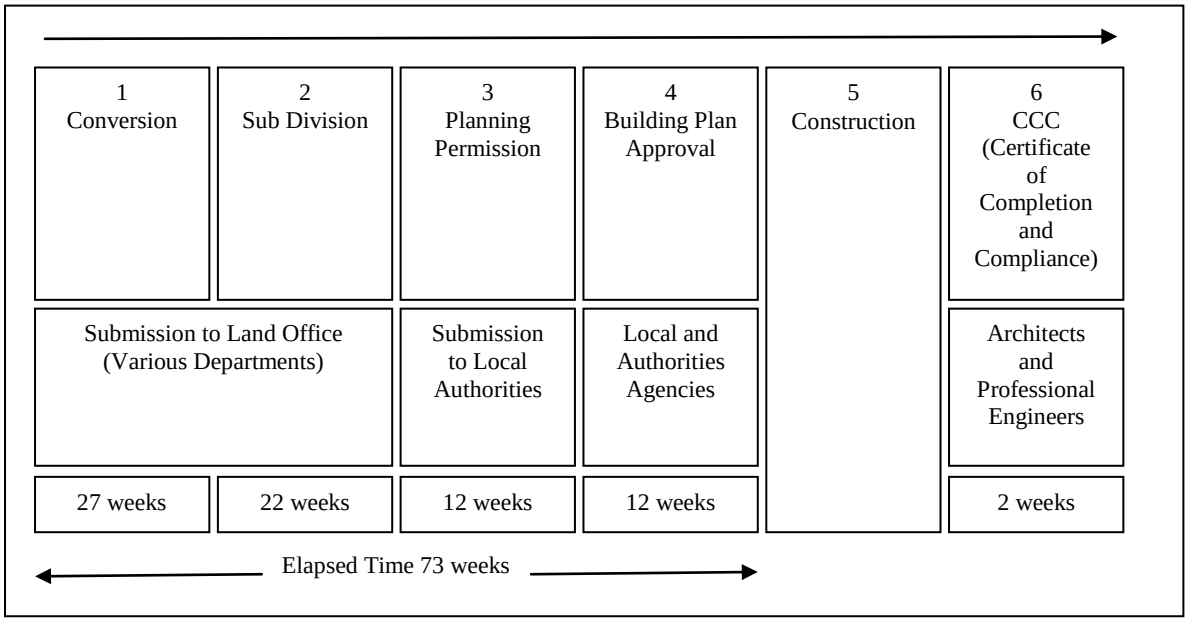


Figure 3.3: Planning Submission and Building Plan Approval Process
(*Source: adapted from CIDB, 2007a:50)*

The owners who intend their buildings to have GBI certified; an application should be submitted directly or through a GBI facilitator, of a comprehensive design and other

necessary documents for GBI assessment. Upon acceptance registration from GBI, the design team and the client should proceed to collect information for each six criteria completing the submittal requirements described under each detailed subsections. The information submitted should be based on preconstruction information such as tender documentation stage when all parameters of the design have been finalized. A provisional design assessment certificate is given at this stage. Further completion and verification assessment for a full GBI certification will be given after the criteria have been properly implemented and verified within 12 months of getting certificate of completion and compliance (CCC) or earlier if not less than 50% occupancy (GSB, 2012b).

There is no specific literature is available regarding the involvement of different Malaysian project stakeholders in the planning process of sustainable building projects in the country. A study conducted by Perry and Singh (2001, p23), revealed that Malaysia is still not ready to depend on voluntary environmental approach without the intervention of government regulations. The lack of enforcement and monitoring of law and legislation is identified as one of the reasons for the current level of poor sustainability integration implementation in Malaysian building projects (Zainul Abidin, 2010a). In fact, the tightening of standards and extension of regulatory controls in the country has been a more important response to new concerns and gaps in original environmental controls than investment in alternative environmental management strategies, either in the form of economic instruments or voluntary initiatives (Perry and Singh, 2001). In Malaysia, many stakeholders are still ignorant about the importance of sustainability practices. For instances, developers are interested on this matter when there is a demand for it. Most local buyers are not aware of sustainability and wanted cheap and affordable buildings (Zainul Abidin, 2010a). It is suggested that Malaysia needs special efforts such as combination of regulatory measures and incentives to ensure enforcement of integrating sustainability in building projects.

To summarize, there is no clear aspect of sustainability integration strategies was innovated in the current Malaysia project planning process. The GBI rating system is obviously to focus more on environmental aspect of sustainability, while planning process matters are not often considered. Besides, emphasis on lowest price procurement system rather than the best value also have impacts negatively on the industry performance. The planning process which does not encourage sustainability

matter clearly will hinder any future sustainable building project from reaching the expected achievement.

3.2.4 Awards Winning Projects on Sustainability

This global focus on sustainability in construction industries has also been evident in Malaysia, with a number of buildings have received sustainability related awards at the ASEAN level as shown in Table 3.7 below.

Table 3.7: ASEAN Energy Awards for Energy Efficient Buildings

ASEAN Energy Efficient Building Competition			
Year	**Category**	**Building**	**Achievement**
2001	New and Existing Building	Securities Commission Malaysia	Winner
	Retrofitted	Sultanah Zanariah Library, UTM	1st Runner up
2002	Special Submission Category (cutting edge technology)	Sutera Harbour Resort, Malaysia	Winner
2003	Retrofitted	Malaysia Electronics Materials Building	2nd Runner up
2004	New and Existing Building	Main Terminal, KLIA	1st Runner up
2005	New and Existing Building	Telekom Malaysia Tower	1st Runner up
	Special Submission Category (cutting edge technology)	Solar Hydrogen House, UKM	Winner
2006	New and Existing Building	Low Energy Office	Winner
2007	New and Existing Building	Putrajaya International Convention Centre	1st Runner up
	Tropical	The Street Mall, Cyberjaya	2nd Runner up
2008	New and Existing Building	Putrajaya Corporation Complex	2nd Runner up
2012	New and Existing Building	Diamond Building, Putrajaya	Winner
	Tropical	ESB Integrated Logistics Complex – Panasonic DC, Malaysia	1st Runner up
	Special Submission	Green Data Centre of the Ministry of Energy, Green Technology and Water, Malaysia	Winner
	Special Submission	Universiti Teknologi Malaysia, Sustainable Energy Management Programme	Winner
ASEAN Renewable Energy Competition			
Year	**Category**		**Achievement**
2009	On-Grid	Zero Energy Office	Winner
2012	On-Grid	4 MW Perting Mini Hydro, Amcorp Properties Berhad, Malaysia	Winner
	On-Grid	Landfill gas extraction and power generation system at Bukit Tagar Sanitary Landfill, Malaysia	2nd Runner up
	Off-Grid	Solar PV/diesel hybrid system for remote schools in Johor, Malaysia	2nd Runner up

Source: greenprospectsasia.com, (2012) and Chantanakome, (2006)

The buildings have made their continuous improvement especially in energy efficiency aspects. Started from the Malaysian conventional buildings with BEI of 200-

300kWh/m^2/year, the sustainable buildings have made their improvement; the LEO with BEI of up to 100 kWh/m^2/year and Diamond Building with the BEI of 65kWh/m^2/year without PV and 55kWh/m^2/year with PV. Proudly says that the Diamond building is not only having platinum GBI certificate of Malaysia but the building also is the first Malaysian building that rated under the Singapore Green Mark Platinum. Besides, the most successful Malaysian energy efficient building GEO, is able to achieve the BEI of 30kWh/m^2/year with PV which is about a third of the BEI of LEO building.

Even though, some of the Malaysian buildings have been awarded in ASEAN Energy Award (AEA) and certified by GBI Malaysia as a sustainable or a green building, however, the criteria used by AEA and GBI in measuring the sustainability aspects of the buildings are still questionable. The GBI Malaysia rating system is obviously to focus more on environmental aspect of sustainability rather than the holistic approach. AEA measures sustainability in buildings mostly on the 'energy efficient and renewable energy' aspects. The sustainability measures are also skewed on the final product without considering the integration of the measures throughout the whole life of the project. For instances, GEO building was mostly awarded as a 'renewable energy building' in AEA in 2009 for being a low and renewable energy consumption of building (Newell and Manaf, 2008). It was against the concept of sustainable development itself which is 'sustainability' must be in consideration of environment, economic and social aspect at once (Zainul Abidin, 2010b; DETR, 2000 and World Bank, 1992).

3.3 SIGNIFICANT OF DEVELOPING A FRAMEWORK OF INTEGRATING SUSTAINABILITY INTO THE PROJECT PLANNING PROCESS

Sustainability indicators (SDIs) have become increasingly important as a tool to assess progress towards sustainability since the induction of Agenda 21 in 1992 (Peterson, 1997). The need for developing SDIs in Malaysia to assist decision making was highlighted in the Eight Malaysian Plan and has been implemented at the state and local levels (Shari, 2011).The initiative was pioneered by Selangor state government in 1998, commissioned the project 'Formulation of Sustainable Development Strategy and Agenda 21 of Selangor (Hezri and Hasan, 2004). However, the SDIs initiatives has

suffered some constraints as Peireira and Hasan (2004:11) highlighted that there is lack of an integrated sustainability policy at the national level, poor coordination and integration among government agencies which has led to additional burden over and above daily work demands among government agencies. Lack of communication and knowledge constraint as well as limited administrative capacity has also restricted towards achieving sustainability (Hezri, 2004).

The government has introduced the 'Guideline for Energy Efficiency in Buildings' in 1989 (Ministry of Energy Telecommunications and Posts Malaysia, 1989) followed by MS1525 in 2002 (Department of Standards Malaysia, 2007). However, the guidelines suffered due to lack of enforcement and did not have desired impact on the building projects (Shari, 2011). Meanwhile, the implementation of environmental policies and EIA has suffered some problems such as weak enforcement and an absence of strong commitment by local politicians (Memon, 2000), slow approval process (Harding, 2003) and incompetent consultants (Vun et al, 2004). It can be concluded that that there is no clear aspect of sustainability integration strategy provided in the present building project planning process, policies and guidelines. Internationally, the project management process is highlighted in the LEED and Green Mark however, most of the points are allocated to commissioning and certification activities and no points are allocated to planning (Wu and Low, 2010). The Prince2 (Projects in Controlled Environments) which is a process-based method for effective project management in the United Kingdom is also claimed as having no sustainability aspect in its entire process (Grevelman and Kluiwstra, 2010). In Malaysia, the same case is happening which is no any clear sustainability integration procedure through planning process was revealed, which will hinder any future sustainability framework of building project from reaching their full potential.

Malaysian construction players are always offered a range of different thoughts that point to misconceptions and uncertainty about sustainable development (Dola, 2003; Zainul Abidin, 2009) and therefore, failures in the communication chain toward sustainable project delivery. The traditional linear planning process and minimal input from the operation and maintenance groups, construction manager and trade contractor or outside stakeholders during the planning and design process of a project also is one of the factors why sustainability was hard to be incorporated in the projects. For instances the use of industrialized building systems (IBS), one of sustainable

construction methods (CIDB, 2003) is still not widespread in this country due to two main reasons which are i) lack of integration at the design stage, which IBS component manufacturers are currently involved only after the design stage and ii) poor knowledge of IBS. The lack of integration among relevant players at the design stage has resulted in the need for plan redesign and additional cost to be incurred if IBS is adopted. Besides, lack of collaboration among Malaysian construction players such as pointing fingers culture (Zainul Abidin, 2009) and the weakness of government involvement especially in term of enforcement matter (Shafii et al, 2006) and devising new policy (Zainul Abidin, 2009) also have hindered the accelerating of sustainable building projects in this country.

According to Shafii et al (2006), majority of clients in Southeast Asia including Malaysia have not been interested in any sustainable features except for energy efficient aspects which is believed to lead to an immediate paybacks. Malaysia developers also will consider sustainable project when they convinced that there is a market for it and the cost is transferred to the buyers or end user (Zainul Abidin, 2009). Shafii et al, (2006) argued that Malaysian stakeholders expect more exemplar projects in order to convince them to adopt sustainable building options. Many efforts relating to sustainability have been implemented in the country. Thus, it is become a wonder why the sustainability integration in Malaysian construction and building project is still remain without proven and the unsustainable issues in this industry are still persist? This denotes that the gap of this study is about ‘there is no clear framework concerning sustainability integration into the project planning process was innovated in the current Malaysian building industry’ as highlighted earlier in Chapter One. Thus, knowledge enhancement and a proper framework of sustainability integration strategies is a priority to breaking the gaps towards sustainability integration in the building projects and in turn bridge the gaps of this research.

3.4 PRELIMINARY FRAMEWORK OF INTEGRATING SUSTAINABILITY INTO THE PROJECT PLANNING PROCESS

It is crucial for the project stakeholders to continuously improve their sustainability capabilities, communicating and collaborating as a team. Sustainability integration requires stakeholders who are sympathetic to this idea and, as a team, evolve the planning and design with a sustainable outlook (Edward, 1998). Without a proper

planning, the sustainable building projects will carry a lot of risks. Thus, careful sustainability integration into the planning process is crucial which the project team members should employ an integrated design process with a strict focus on the sustainability orientation and supported by a sets of clear sustainability regulations and code compliances. Based on the synthesis of all findings from the literature review, this research suggests 'A Preliminary Framework for Integrating Sustainability into the Project Planning' as presented in Table 3.8 below. The preliminary framework is divided into two main parts – a) sustainability principles of building and b) strategies to integrate the sustainability principles into the project planning process. It consists of 29 sustainability principles of building and 21 strategies to integrate the sustainability principles into the project planning process.

Table 3.8: Preliminary Framework of Integrating Sustainability into the Project Planning Process

(A) **SUSTAINABILITY PRINCIPLES OF BUILDING**
ENVIRONMENTAL SUSTAINABILITY
1. Optimise materials and resources used
2. Sustainable materials and resources
3. Energy efficient
4. Efficient water consumption
5. Noise control
6. Urban design, visual impact and aesthetic
7. Site Planning and management
8. Transport management
9. Concern on quality of land, river and sea
10. Air and emissions quality
11. Conserving heritage
12. Efficient environmental management
13. Sustainable method
ECONOMIC SUSTAINABILITY
14. Economic benefit to the stakeholders
15. Improve local market presence
16. Whole life cost efficiency
17. Indirect economic impact
SOCIAL SUSTAINABILITY
18. Employment Benefits
19. Labor/Management Relations
20. Occupational Health and Safety
21. Training, Education and Awareness
22. Fairness
23. Human right performance
24. Society Performance

'Table 3.8, Continued'.

25.	Product responsibility
26.	Stakeholders participation
27.	Macro social performance
DESIGN AND INNOVATION	
28.	Sustainable Design
29.	Sustainable Innovation
(B) STRATEGIES TO INTEGRATE THE SUSTAINABILITY PRINCIPLES INTO THE PROJECT PLANNING PROCESS	
SUSTAINABLE PROJECT ORIENTATION	
1.	Specific sustainability goals and project priorities
2.	Sustainable concern during the establishment of project scope, project charter, drawing, contract & detailed project plan
INTEGRATED PROJECT TEAM	
3.	The project team members are involved and maintained throughout the planning process
4.	Local community representative is involved in support of the project
5.	An integrated design/ sustainability coordinator is appointed as one of the project's team members
6.	The team should have the core knowledge of sustainable building project
7.	Team members are educated on sustainability issues and process including vendors
8.	Team members' selection with sustainable development quality and capability
9.	Team members are fully informed on sustainability goals and priorities of the project.
INTEGRATED DESIGN PROCESS	
10.	Involve diverse set of stakeholders on the team
11.	Committed and collaborative team throughout the process
12.	Bringing the team together as early as possible during planning process
13.	Sustainability and integrated design requirements and the process are included into the project documentations, strategic and comprehensive plan.
14.	Do whole building design and systems analysis
15.	Commissioning process is added during this process and described in a specific section
16.	Planning should reflect all the project stakeholders
17.	Design should reflect the end user community
18.	Effective communication and incorporation of charette process
REGULATIONS AND CODE COMPLIANCES	
19.	Government policies to encourage sustainable development
20.	Compliance with code and regulatory tool of sustainability
21.	Incentive to encourage sustainable development

The development of the 'preliminary framework' is guided by the following requirements:

1. Implementation the holistic concept of sustainability in building project (Chapter Two).
2. Reflecting the global efforts towards sustainability including the current available sustainability framework and BPASs (Chapter Two).

3. Addressing the whole cycles of building and project and considering the impact of implementation towards project performance (Chapter Two).
4. Acknowledging the local context – The proposed factors within the framework should reflect the local conditions, constraints and project contribution to the local community including to enhance their social and economic achievement as well as environmental health. It is also important to ensure that development makes use of, where appropriate, indigenous knowledge and technology and maintains or enhances local cultural and heritage value (Chapter Two, Chapter Three).
5. Involving participation of local building project stakeholders through communication, dialogue, sharing knowledge and experiences for market acceptance and supports (Chapter Two, Chapter Three).

3.5 SUMMARY

This chapter has revealed the sustainability practices in Malaysia in general including the Malaysian efforts, issues and barriers surrounding the context. There are many efforts have been done especially by the Government of Malaysia and the professionals towards achieving sustainability in building projects. Though, these efforts have not successfully been reached due to some constraints such as the lack of sustainability knowledge, lack of experience and integration, inefficient communication, cost oriented thinking and so on. A common practice in determining the costs and benefits between a traditional development and a sustainable project is a comparison of the costs of comparable features. Thus, it is not surprising why sustainable building projects are usually seen as the more expensive option than a conventional building. To surmount the barriers, there is a need to introduce effective ways to integrate sustainability into the project by significant adjustments to the conventional project planning process. A shift in mindset towards the longer term benefits of sustainability need to be initiated and the concepts of sustainable development need to become more prevalent in the project planning process. It is crucial to consider costs over the entire life cycle of construction project, as opposed to costs at the initial stage only. Early incorporation of sustainability principles since the project planning process may minimize change orders during later stages and enable the production of a more efficient, durable structure, which will lower long term operating and replacement costs. It can be achieved by a good level of communication and an inclusive of design charrette process across the

project team throughout the process. On the contrary, the linear and split processes of traditional project planning process can cause rework later in the project and add additional costs for features that are unnecessary for the whole building system. As highlighted by Robichaud and Anantatmula (2011) and Doyle et al. (2009), it is less expensive to address sustainability issues in the planning stage of the project than to work them in during the implementation stage. The whole idea generated from the review of literatures in Chapter Two and Chapter Three is illustrated in Figure 3.4 below.

Planning process ensures that sustainability principles are integrated into the whole cycle of building projects. This is the bridge that enables to fills the gaps of this study. Thus, there is a need to propose a framework to integrate sustainability into the project planning process towards achieving successful sustainable building performance. A preliminary framework has been developed as shown in Table 3.8 (p132). The framework however required of inputs and refining processes which involve local project stakeholders to consider the local context of where the framework is applied. It is also to ensure the market acceptance and support from the industry. Thus, the next chapter will discuss the methodology of the research to ensure views from Malaysian building stakeholders are considered throughout the framework development process.

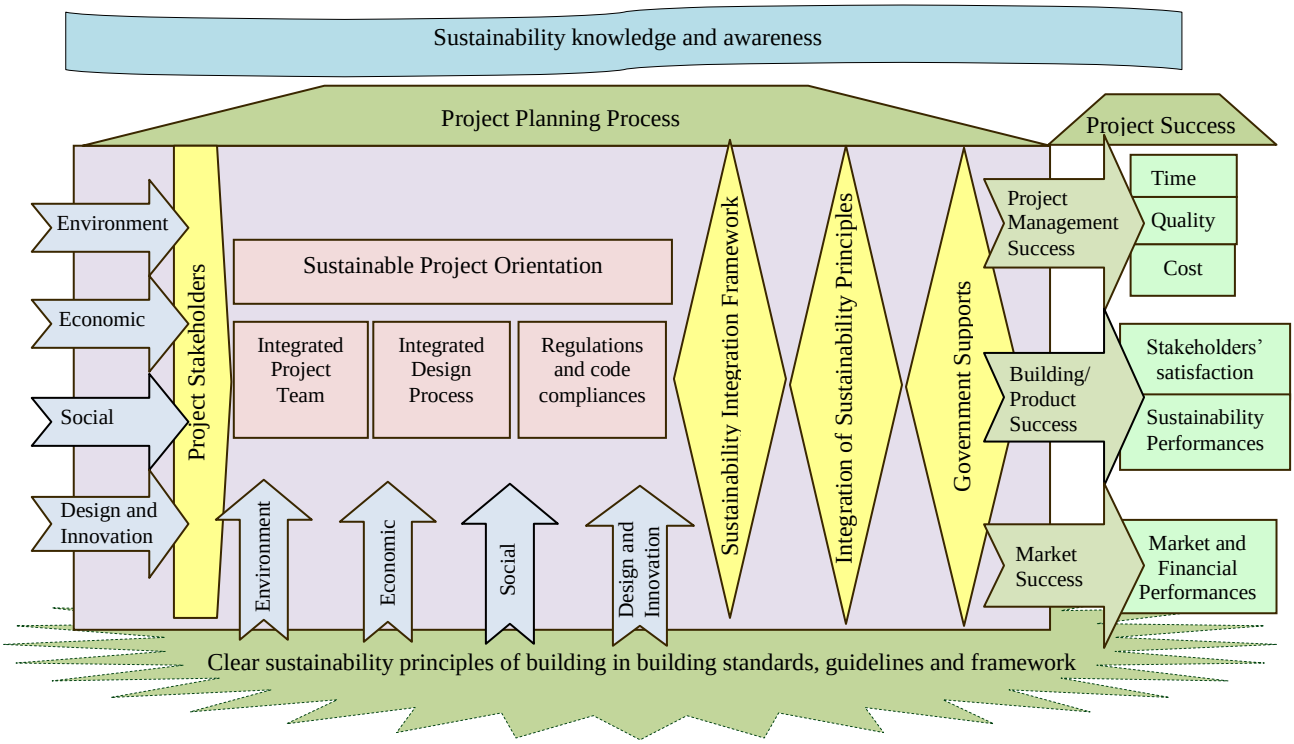


Figure 3.4: Integrating sustainability into the project planning process towards achieving successful project performance