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Renewable Energy Policy and Initiatives in Malaysia

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Abstract

Energy has always been an essential element for the generation of social and economic growth in a country. It is no longer viewed as a luxury as it used to be but it has become a necessity in our everyday life. Malaysia, a country located between 1° and 7° North of the Equator, has an abundance of renewable energy resources such as solar, wind, hydro and biomass but most of these renewable energy resources are not fully exploited. Presently, Malaysia is still very much dependent on fossil fuels as its primary source of energy. Due to the current upward trend of fuel prices, especially crude oil prices in the world market, the Malaysian Government is forced to look into other alternative energy sources with the emphasis on renewable energy. There are numerous efforts taken by the Malaysian Government in pursuit of the exploitation of renewable energy. This paper will discuss the five main initiatives taken by the Malaysian government on renewable energy, namely Renewable Energy as the 5th Fuel under the 8th and 9th Malaysian Plan, MS1525 or Energy Efficiency in Commercial Buildings, the Kyoto Protocol, the Malaysian Building Integrated Photovoltaic Programme, also known as MBIPV, and Biomass.

Keywords: Renewable Energy, Fuel, Photovoltaic, Biomass, Energy Efficiency.

1. Introduction

The current population of Malaysia is expected to rise from 25.6 million to approximately 28 million by the year 2010, with an annual growth rate of 2.4%. With this population growth rate the energy demand is also expected to increase, since energy consumption is an integral part and is proportional to the economic development and total population of a country. Refer to Table 1 for the increase of oil prices from 1971 to 2005. In order to cope with the increasing demand for energy, it is universally accepted that renewable energy would be a sensible option in the future.

In line with the population increase the Malaysian Government has taken several measures to explore and promote the use of renewable energy as an alternative fuel source. These measures include the Fifth-Fuel Policy under the 8th and 9th Malaysia Plan, Energy Efficiency in Commercial Buildings (MS1525), The Kyoto Protocol, the Malaysian Building Integrated Photovoltaic Programme (MBIPV), and Biomass. These will be briefly discussed subsequently.

Despite the above and the fact that Malaysia is endowed with abundance of natural resources for renewable energy exploitation, the majority of all the major power stations in Malaysia are still using fossil fuels, such as oil, gas and coal to generate electricity. Tenaga Nasional Berhad (TNB) is the largest electricity utility company in the country with the largest generation capacity of 10,481 MW.

Table 1: Average Increase in Oil Prices
(Source: IMF and Bloomberg, 2005)

Table 1
Average Increase in Oil Prices
WTI (US$/Barrel)

	US$/Barrel
1971	3.21
1973	4.25
1974	12.93
1979	32.11
1980	37.89
1990	23.71
2000	28.14
2001	24.11
2002	25.45
2003	28.84
2004	38.46
2005	67.29 *

Source: IMF and Bloomberg
*: As of 26 August 2005

Currently the biggest power station owned by TNB in Malaysia is the Sultan Ismail Power Station in Paka, Terengganu which is powered by oil and gas (Tenaga Nasional Berhad, 2006). Table 2 reveals the current use of fuel sources by TNB in eleven power stations. Malaysia's newest power station currently under construction at Jimah south of Kuala Lumpur is also based on fossil fuel which is a coal-fired power station. (Wagner, 21 March 2006). Refer to Figure 1 & 2 for other coal-fired power stations in Malaysia.

Figure 1: Manjung Power Station - Coal fired power station located on 285 hectares of reclaimed land.
(Source: http://www.safe.eu.com/case_studies/index.cfm?id=50)

Figure 2: Perlis Power Station - Coal fired power station.
(Source: www.donno.it)

Table 2: TNB Power Stations in Malaysia (Source: Answer.Com, 2006)

No.	Name of Power Station	Powered By
1	Malim Nawar Power Station, Malim Nawar, Perak.	Coal
2	Pantai Remis Power Station, Pantai Remis, Perak.	Coal
3	Manjung Power Station, Manjung, Perak.	Coal
4	Sultan Salahuddin Abdul Aziz Shah Power Station, Kapar, Selangor.	Coal
5	Perai Power Station, Butterworth, Penang.	Coal
6	Tuanku Jaafar Power Station, Port Dickson, Negeri Sembilan.	Oil
7	Tanjung Kling Power Station, Melaka.	Oil
8	Sultan Iskandar Power Station, Pasir Gudang, Johor.	Gas
9	Serdang Power Station, Serdang, Selangor.	Gas
10	Sultan Ismail Power Station, Paka, Terengganu.	Oil & Gas
11	Connaught Bridge Power Station, Klang, Selangor.	Steam

Coal, one of the most common fuel sources for power station has also experienced a sharp increase in price recently. The average coal price has moved up from USD49.90 per metric tonne in 2005 to USD53.50 per metric tonne in 2006. Approximately 70% to 80% of TNB's coal requirements are purchased from third parties. This imposes a high fuel cost for TNB with the increasing use of coal. The balance of TNB's coal requirement is sourced from its own coal mine in Kalimantan, Indonesia (Ceic, 2006).

The following sections of this article will focus on two main initiatives taken by the government of Malaysia in pursuit of renewable energy and energy efficiency namely on policy codes and alternatives energy programmes.

2.0 Policy Codes

2.1 Fifth-Fuel Policy under the 8th and 9th Malaysia Plans

The National Energy Policy was introduced in 1979. The Policy has three main objectives. The first objective is aimed at ensuring an adequate, secure and cost-effective energy supply based on the maximum use of indigenous resources. The second objective is the utilization objective that calls for the promotion of efficiency and conservation measures as a way to eliminate wasteful and non-productive patterns of energy consumption. The third and final objective is the environment objective which states that in achieving the supply and utilization objectives, environmental concerns will not be neglected.

To augment the National Energy Policy, a Five-Fuel Policy was introduced in 2001 under the 8th Malaysia Plan from 2001 to 2005. The aim was to guide the country's energy mix towards five fuels namely oil, gas, coal, hydro and renewable energy. (Kementerian Tenaga Air Dan Komunikasi, 2005). Based on this policy, Malaysia would be equipped with a sustainable model of energy development.

However, during the implementation of the policy events have not turned out as expected. At the end of 2005, under the Fifth-Fuel Policy of the 8th Malaysia Plan, which targeted for 500MW of electricity generated from renewable sources to the national grid, only 12MW was delivered from two projects under the Small Renewable Energy Power Programme (SREP). The wide gap between policy and implementation clearly indicates that there are barriers to the effective transition from conventional to a sustainable energy development. (Kementerian Tenaga, Air Dan Komunikasi, 2005).

Due to the unfulfilled target, the government has proposed the Fifth-Fuel Policy to be continued into the 9th Malaysia Plan from 2006 to 2010. The government again made recommendations to promote and to give further impetus towards the development of a more sustainable energy sector in the country. One of the proposed recommendations is the Energy Efficiency in Commercial Buildings or known as MS1525.

2.2 Energy Efficiency in Commercial Buildings (MS1525)

The Code of Practice on Energy Efficiency and use of Renewable Energy for Non-residential Buildings or known as MS1525 was published in the year 2001. It was later revised and updated in 2006. These guidelines for Energy Efficiency in non-residential buildings represent a milestone in the efforts to effect efficient use of energy. Commercial buildings, in particular are major consumers of energy and therefore offer potentials for energy saving efforts (Ministry of Energy Telecommunications and Posts Malaysia, 1989).

However, these guidelines just remain as code of practice and not mandatory for building owners, engineers and architects to comply with building plans submission to the local authorities. The guidelines only provide minimum standards for energy conserving design of new and existing buildings and provide methods for determining compliance with these criteria and minimum standards. Unfortunately, until today only a small number of buildings are designed in compliance with MS1525.

In order to transform these mere guidelines into mandatory regulation, the Ministry of Energy, Water and Communication Malaysia has proposed amendments to the Uniform Building By-Laws or UBBL to incorporate energy efficiency features for commercial buildings. According to the Ministry of Housing and Local Government, which is responsible for UBBL, the proposal is being considered very favourable by the government. (Kementerian Tenaga, Air Dan Komunikasi, 2005). The implementation of the revised UBBL would be another milestone for renewable energy use in Malaysia.

2.3 Kyoto Protocol

In 1997, the Kyoto Protocol was adopted, calling for stronger action in reducing Green House Gases or GHG emission in the post 2000 period. Refer to Figure 3 for the CO2 emissions in the World in 2000. Under the protocol, developed countries have a legally binding commitment to reduce their collective emissions of six greenhouse gases by at least 5% based on the 1990 levels by the period 2008 to 2012. The Protocol also establishes an emission trading regime including clean development mechanism (CDM) to facilitate countries to fulfil their commitments. CDM allows developed nations to achieve part of their reduction obligations by buying emission reductions from projects that reduce greenhouse gas emissions in developing countries.

This mechanism also assists the developing countries in achieving sustainable development. Refer to Figure 4 for the map that indicates the countries that ratified Kyoto Protocol as of June 2003. The success of the CDM rests on its contribution towards the national sustainable development goals, especially from the perspective of a developing country like Malaysia (Pusat Tenaga Malaysia, 2005).

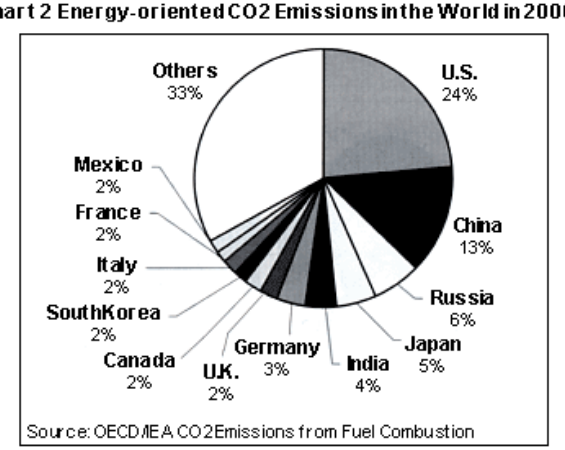

Figure 3: Energy-Orientated CO2 Emissions in the World in 2000. (Source: OECD/IEA CO2 Emissions from Fuel Combustion)

On 12th March 1999, Malaysia signed the Kyoto Protocol and ratified it on 4th September 2002. With the ratification of the Kyoto Protocol by the Malaysian Government, this implies that Malaysians can benefit from investments in the GHG emissions reductions. Extra revenues can be generated for renewable energy projects, energy efficiency projects, waste management projects and many more. All these projects have been given priority by the Malaysian Government for CDM implementation in Malaysia. (Pusat Tenaga Malaysia, 2005).

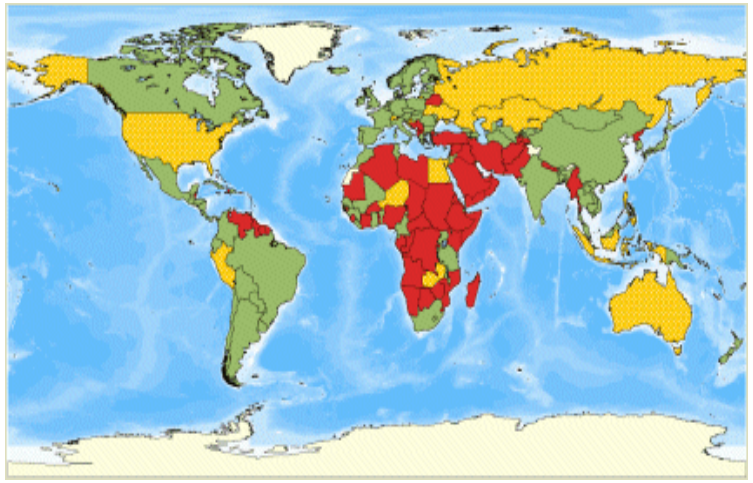

Figure 4: This map depicts the countries that have ratified or signed the Kyoto Protocol as of June, 2003. Ratifying countries are indicated in green. Those countries that have signed, but not ratified the Kyoto Protocol are indicated in dotted yellow. Those countries that have neither signed nor ratified the agreement are depicted in red.
(Source: http://www.pbs.org/saf/1404/features/publicpolicy.htm)

3. Alternatives Energy Initiatives

3.1 Malaysia Building Integrated Photovoltaic Programme (BIPV)

Building Integrated Photovoltaic (BIPV) technology is an innovative power generator. It has a dual function of an integral part of a building as well as an energy generator. BIPV also contributes to the overall energy efficiency in buildings without sacrificing aesthetics and sustainability of building materials. Refer to Figure 5 & 6 for one of the first Building Integrated Photovoltaic System in Malaysia. The project was a collaboration between NLCC Architects Sdn Bhd, Fraunhofer ISE, Germany and SIRIM Bhd.

In 2004 the Global Environment Facility (GEF) together with the United Nations Development Programme (UNDP) had approved a grant of nearly USD 4.7 million to support the development of BIPV in Malaysia. The main objective of the project was to reduce the long term cost of BIPV technology within the Malaysian local manufacturing market. Subsequently, with similar approach, the project also hopes to pass on to its neighboring countries and global market. The final outcome of the project would be sustainable and widespread use of BIPV technology applications that would avoid greenhouse gas emission from electricity providers. The duration of the project was planned for 5 years as a full GEF project. (United Nations Development Programme & Global Environment Facility, 2004)

BIPV technology is still at an infant stage in Malaysia. Therefore, the project will demand for extensive promotion campaigns and capacity building on BIPV to generate awareness and improve local competency. It is anticipated that during the project, BIPV applications and technology will be demonstrated at selected premises where the impacts of the demonstrations would be the most tangible output of the BIPV project. The BIPV applications will be applied on building elements such as roofs, sun-shading devices and canopies. Refer to Figure 7 & 8 for examples of skylight and canopy using BIPV.

In the end, the success of this project hinges very much on the commitment of the Malaysian government and involvement from industry players in the country who share the same vision for environmental conservation and sustainability. The project is managed by 'Pusat Tenaga

Malaysia' (PTM), a government-owned company under the Ministry of Energy, Water and Communication.

Figure 5: Building Integrated Photovoltaic. (Source: Solar House, SIRIM Bhd., Shah Alam)

Figure 6: Building Integrated Photovoltaic for Roof Tiles (Source: Solar House, SIRIM Bhd., Shah Alam).

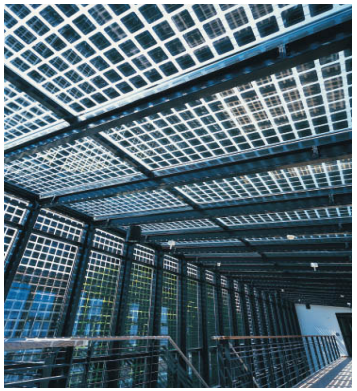

Figure 7: Building Integrated Photovoltaic for Sky Lights (Source: Schuco Solar, Germany).

Figure 8: Building Integrated Photovoltaic for Canopy (Source: Schuco Solar, Germany).

3.2 Biomass

Malaysia has been one of the largest producers and exporters of palm oil for the last forty years. Currently, Malaysia has approximately 3.87 million hectares of land under oil palm plantation (K.S. Kannan, 2005). Commonly, palm oil is cultivated for its oils, palm kernel oil and palm kernel cake as the commodity products. Today, there are many other uses for its co-products like empty fruit bunch or EFB palm fibre and shell which has great potential for energy production. Refer to figure 10 & 11 for picture of palm kernel and EFB.

Figure 9: Oil Palm plantation in Malaysia (Source: www.earthscan.co.uk/).

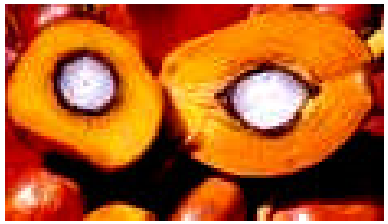

Figure 10: Palm kernel. (Source: www.hort.purdue.edu/)

Under the 5th fuel policy, the government of Malaysia has identified biomass as one of the potential renewable energy. With about 380 palm oil mills distributed all over the country it is estimated that Malaysia would be able to generate electricity power of approximately 2,400MW (K.S. Kannan, 2005; Mazlina Hashim,2005).

Figure 11: Empty Fruit Bunch or EFB of Oil Palm. (Source: ss/jircas.affrc.go.jp/)

Under the Small Renewable Energy Programme (SREP) launched in 2001 there were a total of 14 projects approved which have a total capacity of 105MW (Mazlina Hashim, 19-21 January 2005).

Although there is so much power potential from Biomass energy, there are still many major key barriers and challenges that need to be addressed and overcome such as fuel security, electricity sales price, renewable energy power purchasing agreement, financing assistance, lack of promotion, conventional energy verses renewable energy power plant and subsidy of conventional energy (Mohamed Ali Hassan et al., 2006).

4.0 Conclusion

Renewable energy is starting to emerge from a niche industry into a significant power supplier for many European countries. However the same

scenario seems to be lacking in many Asian countries, Malaysia being one of them. Many of the new power stations being built in Malaysia still rely on carbon-rich fossil fuels, and there are economic, environmental and moral obligations to use those fuels efficiently. When renewable energy can deliver clean and green energy while a conventional power plant consumes our depleting fossil fuels and pollutes the environment, the picture seems obvious. If the world energy consumption continues to increase while significant numbers of inefficient conventional power generation plants are installed, the achievements and progress of the renewable energy sectors could be dampened and eventually declined. National and international energy policies clearly have to take a broad and intelligent view of the entire energy scenario. More coordinated efforts for real implementation of the policies in place seem to be wanting. Additionally, other sources of renewable energy such as solar thermal and wind need to be explored. Although solar thermal, for example, is mainly used for hot water supply, it has great potential in the area of solar-assisted air-conditioning technology which is yet to be explored and exploited.

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