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Recent advances of feed-in tariff in Malaysia

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ABSTRACT

In order to promote the growth of renewable energy sector in Malaysia, feed-in tariff (FiT) mechanism has been introduced by Malaysian government in 2011, in accordance with Renewable Energy Act 2011 and Sustainable Energy Development Authority Act 2011. The tariff was enacted to overcome the shortcomings identified in the small renewable energy power (SREP) Program from 2001 to 2010. This paper highlighted some measures adopted to rectify the shortcomings identified during SREP, and the role of Sustainable Energy Development Authority (SEDA) in achieving the above mentioned task. The paper also includes the latest progress on renewable energy projects, especially those related to solar photovoltaic system. It is predicted that solar energy will become the main source of renewable energy in Malaysia by the year 2050.

Contents

1. Introduction

Since the advent of human civilization natural sources, sunlight and woods are the chief sources for energy for man. On the other hand, domesticated animals were the common means of transportation. However, with the emergence of Industrial Revolution around 1760, the need for more powerful, reliable and abundant energy propelled the need for finding alternatives of storing and transporting the excess energy acquired. Since 1859, when petroleum surfaced, coal was gradually replaced as the main source of energy, especially after the invention of internal combustion engine to power vehicles [1]. With the success of petroleum production technologies, almost all aspects of human daily lives, such as power generation, petrochemicals production and

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transportation was dominated by petroleum-based products, including plastics, soaps and fertilizers to mention just a few. Due to these petroleum related activities, the consumption of petroleum is increasing at an alarming rate. As a result, the hitherto assumed inexhaustible petroleum resources is now depleting at an astronomical rate. Furthermore, the production of energy from petroleum is associated with the release of carbon dioxide gas into the atmosphere, which is the principal cause of global warming. International Energy Agency (IEA) has identified this as the biggest environmental challenge caused by human beings due technological advancement., hence various steps have been taken to decrease the dependency on crude oil as the primary energy source [2]. One of the steps includes 2 °C scenario (2DS), which aims to limit the rise of global temperature in 2 °C, instead of 6 °C if no preventive measures have been taken, by 2035 [3], This can be done by promoting renewable energies in replacement of the crude oil. By harnessing energy from natural and non-depleting sources (including sun, wind, hydro, geothermal heat under the ground, and others), the emission of CO_2 released from utilization of crude oil can be reduced.

Currently, IEA is made up of 28 countries, but apparently most nations across the globe understand the importance of renewable energies, and are making concerted effort to promote its development in their respective countries and Malaysia as a sovereign nation is not left behind in this crusade. Malaysia, like most of the countries, has been relying on crude oil and natural gas as the main energy supply, especially in the electricity sector. It was recorded that the primary energy demand of Malaysia increased from 21,471 thousand tons of oil equivalent (ktoe) in 1990 to 79,289 at 2011, and 79% of the demand in 2011 consist of natural gas, crude oil and petroleum products, as shown in Fig. 1 [4]. In the past, Malaysian government has been heavily subsidizing the power sector in terms of the price of natural gas used. However, following the country's rapid development, more subsidies have to be put into the power generation. Hence, Malaysian government is shifting the power generation into the utilization of renewable energies to reduce the economic burden.

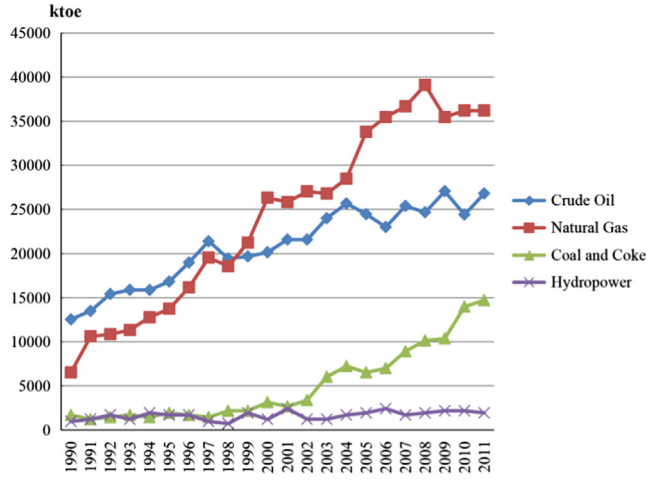

Fig. 1. Malaysia energy demand by types of fuels [4].

Table 1
Renewable Energy connected to grid as of May 2011 (*Source*: Ministry of Energy, Green Technology and Water (KeTTHA)).

Category	Capacity (MW)
Biomass	40
Biogas	4.95
Small hydro	12.5
MSW	5
Solar PV	2.5
Total	64.95

Several studies have been conducted on the energy development in Malaysia. For example, Chua and Oh [5] reviewed on the important agencies and programs in Malaysian energy development since its dependence, while Ahmad et al. [6] discussed energy demands and potentials of several renewable energies (RE) in Malaysia. Similar review was also done by Hashim and Ho [7]. On the other hand, Mekhilef et al. [8] and Muhammad-Sukki et al. [9] gave specific attention to the development of solar energy in Malaysia. An extensive review was also done by Chua et al. [10] on feed-in tariff (FiT) mechanism, which was implemented since November 2011. This paper will discuss the latest development of the FiT mechanism in Malaysia, especially how it rectified the shortcomings identified during SREP program, as well as its role in stimulating the growth in the renewable energy (RE) sector in Malaysia, with the special focus on solar energy sector.

2. Background of RE sector in Malaysia

Malaysian government has been promoting RE since its independence, by introducing several policies and acts as follow:

a. National Petroleum Policy (1975).
b. National Energy Policy (1979).
c. National Depletion Policy (1980).
d. Fourth Fuel Diversification Policy (1981).
e. Electricity Supply Act (1990).
f. Gas Supply Act (1993).
g. Fifth Fuel Policy (2000).
h. Energy Commission Act (2001).
i. National Biofuel Policy (2006).
j. National Green Technology Policy 2009.
k. Renewable Energy Act 2011.
l. Sustainable Energy Development Authority Act 2011.

The policies and acts from (a) to (k) have been reviewed by several researchers [5,7,9–12]. It is noted that the Malaysian government started to recognize the potential of renewable energies by replacing fossil fuels to provide electricity in the country. Thus, it is listed as the fifth fuel in Malaysian energy supply mix in 2000. Countless efforts have been initiated to produce renewable energies in Malaysia. Thus, Small Renewable Energy Power (SREP) Program was launched on the 11th May 2001. The objective of SREP was to encourage the participation of private sectors in the RE sectors, and the possible sources recognized under this program including solar, biomass, biogas, wind, and mini-hydro energy. The RE developers can sell the generated electricity to utility suppliers, such as Tenaga Nasional Berhad (TNB) in West Malaysia, or Sabah Electricity Sendirian Berhad (SESB) in Sabah. The electricity is then sold to end-users through the National Grid. It is noted that this program was not applicable in Sarawak due to its own legislation in electricity supply. In order to participate in SREP, developers are required to negotiate directly with the utilities regarding the Renewable Energy Power Purchase Agreement (REPPA), including the selling price of the electricity, based on a "willing seller, willing buyer" model. Once the plant is commissioned, the developers would be able to obtain license for the plant operation of 16–21 years, depending on the types of RE source used.

Despite of the high expectation (500 MW) when SREP was launched, from 2001 to 2005, only 12 MW of RE from two projects