

Renewable Energy in Malaysia: Experience from Perlis

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Abstract

Malaysia, like many developing countries relied on the use of cheap and readily available petroleum products for its energy use until the successive “oil-shock” in the early 1970s. Due to that matter, Malaysia come out with new policy named “Five Fuel Policy” in which covers the renewable energy and energy efficiency. Feed-in tariff is one of the instruments that had been applied by companies and also individually in order to implement the renewable energy application in Perlis. This paper discusses the current situation of renewable energy in Perlis and the role of the Malaysian government and Non-Government Organization (NGOs) to promote and contribute to the development of renewable energy in Perlis. Descriptive open ended semi-structured interview sessions with selected respondent from government agencies and non-government agencies had been held regarding renewable energy in the state of Perlis. Findings show that Perlis has attractive energy potential such solar energy, biomass energy, wind energy and others and the government agencies also take important roles in promoting the importance of renewable towards local communities

Keyword: renewable, energy, Kyoto protocol, FiT, Perlis.

1. Introduction

Renewable energy is the energy that comes from resource which are continually replenished such as sun, wind, rain, tides, waves and geothermal heat. Mankind has been traditionally used renewable energy for thousands of years whether it is solar, water, wind or Bioenergy. With the advent of time, the technology extends and elaborates. But up until the 19th century, the scale on which renewable resources are implemented relatively small, typically for individual use or for small communities in the agricultures or industrial area. Renewable energy is becoming major resources for the global electricity generation. The propensity to lean towards renewable energy is because it does not run out with use over time as compared with conventional energy. It produces little or no greenhouse gas pollution to the environment. In terms of the modern era, the attention and focus are on the possibilities of utilizing renewable energy as part of the solution to produce and generate electricity for mass usage. It was triggered by the devastating oil crisis 1973 and during the 1979-80 periods. Since the system in those days was very much dependent on fossil fuels, alternatives had to be found to reduce the dependency on them. Renewable energy plays an important role in Malaysia.

In 1993, the contribution of renewable energy to the overall energy requirement of the area was around 12 percent. There is a total of 640kW of photovoltaic power systems installed in Malaysia which is comprised of stand-alone and centralized hybrid systems. Mostly, the energy generated is used for rural electrification, telecommunications, street lighting and navigational aids. Solar water heating is popular too. Its usage in terms of energy equivalent is approximately 2kTOE[1].

2. Renewable energy in Malaysia

There are several renewable energy programs in Malaysia which are SREP (Small Renewable Energy Power) programmed. The SREP was launched in 2001 with the objectives to encourage production of renewable energy by small power generators (10MW) and allow the sale of generating electricity to utilities. The status of SREP stated that the 30MW grid-connected power from Biomass and 2MW grid-connected power. Next, UNDP-GEF Biomass Power Generation and Demonstration (BioGen) Project was established in 2002. The objectives of BioGen Project are to demonstrate biomass and biogas grid-connected power generation projects. The status of BioGen project is 13MW by exporting 10MW and 500kW in FELDA Seriting power plants will be grid-connected and commissioned in July 2009. UNDP-GEF Malaysia Building Integrated Photovoltaic (MBIPV) project also one renewable energy program in Malaysia. The project was established in 2005 with the objectives to reduce unit cost of solar PV technology by 20% and increase capacity by 330% via PV applications in buildings.

2.1 Renewable energy and Kyoto protocol

The Kyoto Protocol to the UNFCCC is an amendment to the international treaty signed in 1992 on climate change, assigning mandatory emission limitations for the reduction of greenhouse gas emissions to the signatory nations. The objective of the protocol is the stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Malaysia is a party to the

UNFCCC and has signed the Kyoto Protocol. Among our responsibilities as a signatory is the role of renewable energy (RE) as an alternative to fossil fuel derived energy, which is a depleting resource, and the preservation of fossil fuels through more effective utilization of energy [2].

3. Renewable energy in Perlis

Perlis lies on the northern part of the west coast of Peninsular Malaysia. Perlis Indera Kayangan has a population of 227,025 as of 2010 and the state was estimated approximately 795 km² squares. These smaller states of Malaysia naturally endowed with renewable energy sources such as solar, wind, biomass and bioenergy. Those energy resources produce little or no pollution or greenhouse gases, and they will never expire. Perlis known as hottest state in Malaysia with the average 12 hours of sunlight received per day. Fig.1 shows the annual average solar radiation (MJ/m²/day) in Malaysia which show that Perlis are among the highest solar radiation in Malaysia.

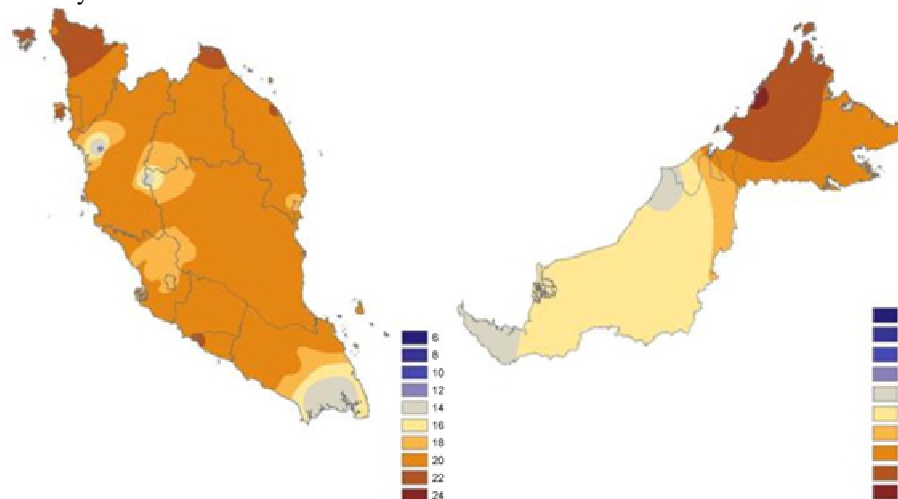


Figure1. Annual average solar radiation (MJ/m²/day)[3]

Recent study on solar energy potential in Ulu Pauh, Perlis by Universiti Malaysia Perlis show that in average of the year, Perlis able to receive about half day of solar radiation regardless the reflectivity . The potential of receiving solar radiation at 6.4626.462°N, 100.351°E is compared to 6.431°N, 100.185°E with support by recorded data using Davis Vantage Pro2 Weather Station.

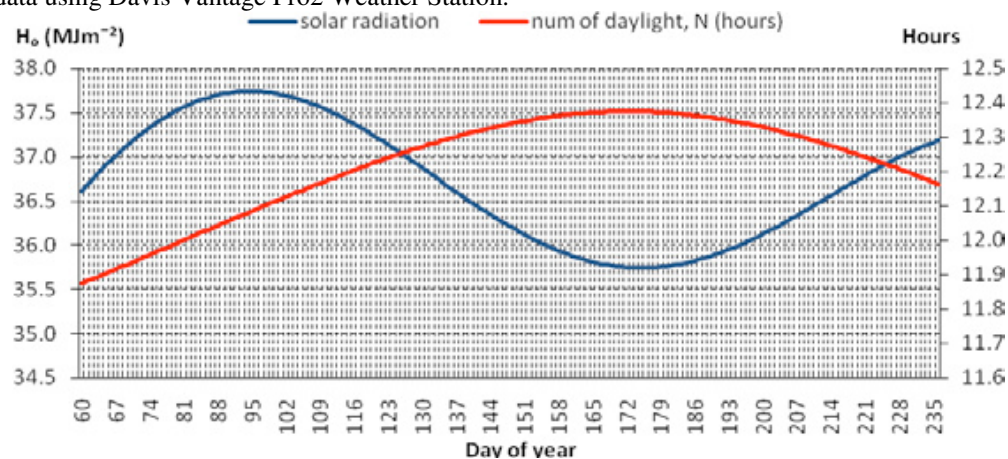


Figure 2. Solar radiation with number of daylight at Ulu Pauh [4]

A study on the wind as renewable energy in Perlis by School of Electrical Systems Engineering, Universiti Malaysia Perlis shows the possibilities and potentialities of wind energy can be developed in Perlis. According to Malaysian Meteorological Department, wind over this country is generally light, but there still some homogenous periodic changes, Malaysia face four seasons, namely the southwest monsoon, northeast monsoon, and two shorter periods of intermonsoon seasons . But in Perlis, it more tend to tropical monsoon because it's

located near to Thailand. The daily average wind speed for the April 2011 has been chosen for the study. The maximum, minimum and mean wind speeds for a month are 3.2274 m/s, 0.1992 m/s and 1.7133 m/s. The maximum average wind power happened from November until March. Hence this is the perfect time to harnessing this renewable energy in Perlis. The installation of Davis Vantage Pro2 weather station has improved the recording data on wind speed. Through the recording data a study of the vertical axis wind turbine shows that, this type of wind turbine most suitable to assess in Perlis as the wind speed in this state is low [5].

4. Renewable energy applications in Perlis

In Perlis, currently the renewable energy applications consist of solar energy and bioenergy. Under the Malaysia national renewable energy and action plan it involves the enactment of Renewable Energy Act which mandate the implementations of the feed-in tariff (FiT) mechanism. While the FiT is instrumental in increasing energy security in the country, the remaining strategic thrusts are vital to ensure a holistic approach towards a sustainable renewable energy socioeconomic development [6]. The concept of the feed-in tariff (FiT) state that feed-in tariffs (FiTs) oblige distribution licenses (DLs) such as Tenaga Nasional Berhad (TNB) to buy from a feed-in approval holders (FIAHs) the electricity produced from renewable sources and sets the FiT rate. The DLs would pay for each unit of the renewable electricity supplied to the electricity grid for a specific duration.

4.1 Renewable Energy Solar Park Kuala Perlis, Perlis

The Renewable Energy Solar Park Kuala Perlis, is one of the largest renewable energy project in which solar energy has been used as the resource to ensure the sustainability of the environment. Cypark Resources Berhad is the company who holds a feed-in approval issued by the Sustainable Energy Development Authority (SEDA) Malaysia, and the holder is eligible to sell electricity from renewable resources. The project in Kuala Perlis focuses on Integrated Waste Management which is transforming the sanitary landfill to the solar energy plant. Cypark produces a groundbreaking model that generates electricity from two renewable resources (solar power and landfill biogas) with the installation of 25MW of solar plants in Kuala Perlis. The electricity that will generate from the solar park will be sold to Tenaga Nasional Berhad (TNB) Perlis. According to the Cypark, they will organize a Corporate Social Responsibility (CSR) to the local community in Perlis in order to give exposure on renewable energy and promoting the solar park.

4.2 Syngas Renewable Energy Conversion Plant in Perlis

Located in Sungai Batu Pahat, Perlis, The Research and development plant of Syngas Sdn. Bhd has been set up since 2010 and it was initially conceived in 2008 at the Saham Utama factory in Selangor. It was a huge achievement for Syngas, endorsing the credibility of their processes and technology. Its core focus is to convert waste products into highly commercial renewable energy products such as petroleum, diesel, kerosene, naphthalene, ethanol and methanol. Later, in 2011, Syngas Sdn Bhd which is moving into green technology in Perlis develops a new plant in Batu Bertangkep. The main activity is producing diesel from plastic waste and it makes Perlis the first state to produce diesel from plastic waste. Besides contributing to a cleaner environment with the reduction of plastic waste at waste disposal sites, the technology also helps better manage the burning of waste. Currently, the Syngas plant in Batu Bertangkep is capable of producing 1.2 liters of diesel oil from per kg of plastic and also able to process two metric tonnes of plastic daily. Syngas has been financially assisted by the Malaysian Government's Northern Corridor Implementation Authority and the Ministry of Science, Technology and Innovation and also received support from the Perlis State Government and PEMANDU Malaysia, a unit under the Prime Minister's Department. Syngas Malaysia strives to be the champion for Green Technology resourcefulness in the production of Synthetic Diesel from waste plastic consistent with its mission statement which to create a brighter future and enhance a healthier living environment.

4.3 Biomass Power Plant in Perlis

Biomass as the fourth largest energy resource in the world is abundant in the country. Malaysia is blessed with tropical and humid climate all year round which is a magnificent opportunity for fully exploiting agriculture and tropical forest's potential. Since late 1990, the concept of waste-to-wealth had been promoted and became widely popular. This concept is based on unwanted wastes which are converted into valuable energy while reducing waste generated and increase the economy-efficiency mainly used for cooking, space heating and power generation [7]. Malaysia is the world's second largest producer of crude palm oil. Almost 70% of the volume of the processing of fresh fruit punch is removed as wastes in the form of empty fruit bunches, palm kernel shells, palm oil mill effluent etc. With more than 423 mills in Malaysia, this palm oil industry generated around 80 million dry tonnes of biomass in 2010. Malaysia has more than 2400 MW of biomass and 410 MW of biogas potential, out of which only 773MW has been harnessed until 2011. Rice husk is another important agricultural

biomass resource in Malaysia with good potential for power generation. An example of its attractive energy potential is a biomass power plant in the state of Perlis which uses rice husk as the main source of fuel and generates 10 MW power to meet the requirements of 30,000 households. The 10 megawatts of power to be generated from each plant through the process of gasification would be sold to T'N B Distribution, Tenaga Nasional Bhd's distribution arm[8]. The US\$15 million project has been undertaken by Bio-Renewable Power Sdn Bhd in collaboration with the Perlis state government, while technology provider is Finland's Foster Wheeler Energia Oy.

5. Perlis Government Agencies and renewable energy

Government agencies in the Perlis play important role in renewable energy development as to initiate, develops and implements energy policy and programs. Those government agencies give full support to the company that wanted to build renewable energy plants and those practitioners of renewable energy in Perlis. Early 2013, the agencies such as Solid Waste Management and Public Cleansing, Education Department, Municipalities, State Economic Planning Unit together with UniMAP (Universiti Malaysia Perlis) and UiTM (Universiti Teknologi Mara) Perlis involves in Corporate Social Responsibilities (CSR) for renewable energy of Cypark Resources Berhad. The objective of CSR program is to educate the students in Perlis about the importance of renewable energy and also to create awareness among the local community regarding the energy. In UniMAP (University Malaysia Perlis), under the research and development unit, they had done many projects on renewable energy together with government's call as the renewable energy are included in the Malaysia Five fuel policy. UniMAP so far focused on solar energy and wind energy in which the solar panel is built near the academic building in order to generate electricity for the building. There's few numbers of windmill installation which also one of the renewable energy resources which has been applied in this university. This is one smart alternative to control the wind in the campus to generate electricity. As for UiTM (University Teknologi Mara) Perlis under the area of renewable energy, they focus more on solar energy. Currently, based on the research grant, they focus on photovoltaic/thermal (PV/T) solar collector in which the photovoltaic is not only producing electricity but also serves as a thermal absorber. The mathematical models and collector design from the research have the potential to be further investigated and developed for domestic and industrial applications.

6. Future of renewable energy in Perlis

Perlis has a strong potential to build large scale renewable energy power due to its location and natural resources. For the local community, an exposure and awareness should be given to them in order for them to understand and receive benefits from the implementation of renewable energy. Agencies such as Ministry of Energy, Green Technology and Water (KeTTHA), Centre for Education and Training in Renewable Energy and Energy Efficiency (CETREE) and others need to be improve and actively provide programs, educational exhibition and awareness talk of renewable energy for the local community in Perlis. In terms of social and economy, the implementation of renewable will give a job opportunities to the community, healthy environment, increase in state energy supply and others. The most important driver would be feed-in tariffs (FiTs) as it will provide a good benefit for the practitioner of renewable energy in Perlis to grow. FiT is the best tool to generate the fastest and lower-cost deployment of renewable energy [8]. Developers should also consider using the solar panel in powering homes. With regard to the awareness and understanding of renewable energy, educational programs should be introduced not only to students but also the local community. Those practitioners of renewable energy in Perlis should introduce their project or plant to the local community by doing program such as edutourism in order to promote renewable energy. Together with the state mission "drive human capital-oriented services with integrity and high performance to create a more progressive society", the implementation of renewable energy in Perlis are mostly encouraged in order for the state contribute towards developed nation. A costs and price distortions should minimize in energy supply as well as established effective and sustainable funding mechanism for renewable energy projects in order for this industry to grow. A strong government policy on renewable energy field is crucial to support market growth and a healthy competition among industry players must be promoted.

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