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Carbon credit of renewable energy projects in Malaysia

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Abstract. The introduction of Clean Development Mechanism (CDM) to Malaysia improves the environment of the country. Besides achieving sustainable development, the carbon credit earned through CDM enhances the financial state of the nation. Both CDM and renewable energy contribute to the society by striving to reduce carbon emission. Most of the CDM projects are related to renewable energy, which recorded 69% out of total CDM projects. This paper presents the energy overview and status of renewable energies in the country. Then, the renewable energy will be related to the CDM.

1. Introduction

The United Nations Framework Convention on Climate Change (UNFCCC) defines climate change as “A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods”. Apparently, the UNFCCC believes that climate change is boosted by human activities such as agriculture, industrialization, transportation, deforestation and open burning. Many countries join the UNFCCC in order to reduce average global temperature together. Rises in global temperature lead to climate change.

The effects of greenhouse gases (GHGs) are more outstanding than expected. As a result, the Kyoto Protocol has been adopted as an international agreement under the UNFCCC since 1997 and entered into force on 2005 to reduce the GHGs emission. The Kyoto Protocol has three mechanisms – Clean Development Mechanism (CDM), Joint Implementation (JI) and Emission Trading (ET). Among these three, the CDM is the most acclaimed mechanism in developing countries as it brings profits to them. Furthermore, it involves technology transfer which enhances the environment through sophisticated technology. The CDM involves both the developed and developing countries. It permits the developed country to achieve their commitments by materialising emission reductions in developing country [1]. It is essential in promoting sustainable development via technology transfer and investment. Besides, GHGs those results in climate change can be reduced through this mechanism [2].

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The Kyoto mechanisms play an important role in realising technology transfer from developed country to developing country [3]. Besides, technology transfer brings economic benefits to the projects that are already economically sound. As a developing country, Malaysia joined the CDM voluntarily as one of the non-Annex I countries. After becoming a member in the UNFCCC on 9 June 1993 and following by the ratification on 13 July 1994, Malaysia became a member in the Protocol officially on 4 September 2002 [4]. Many projects in Malaysia have been successfully registered as CDM projects. This had motivated other corporate sectors in the country such as power manufacturing, waste management, forestry, oil and gas manufacturing, agriculture and transportation sectors to proactively participate in CDM projects applications.

Thereinafter, the Malaysia Government has been highly supportive and instrumental in the CDM participation. A comprehensive administrative committee was set up upon the requirement of the CDM. Besides, the Budget 2008 extends 10 years pioneer status to companies involved in energy conservation, with 3 years tax exemption for income derived from the carbon trading in the country. These are encouraging news to the project developers because the process of application can be done smoothly with the assistance of the group of committee.

2. Demand of Renewable Energy in Malaysia

An estimation done by the International Energy Agency (IEA) demonstrates that, the global energy consumption is foreseen to increase 53% by 2030. [5]. A report by the Ministry of Energy, Green Technology and Water (KeTTHA) in Malaysia shows that, the maximum demand for electricity in Peninsular Malaysia is 15,473 MW in May 2011, which is a 2.7% increment compared to previous year. This projection rate will lead the peak demand to reach 21GW in 2020 and 25 GW in 2030. The electricity consumption growth increased 6.5% in 2011 compared to 2010, which was driven by commercial and domestic sectors with 9.2% and 7.4% rise, respectively. These growth trends illustrate the potential of higher energy demand as the country is striving to grow towards a high-income economy. By 2020, around 10.8 GW of new generation capacity will be required by the country as 7.7 GW of existing capacity will be terminated. By that time, the total installed capacity will rise up 16% if compared to the total installed capacity in 2011 [6].

The electric power consumption in Malaysia is growing substantially from 1970 until now. Over the last 4 decades, the usage of electricity in the country has been largely increased due to the rapid economical growth attributed to industrialization and high density of development [7]. The consumption percentage of coal and coke has been raised from 5.6% to 14.0% out of total commercial energy supply over 7 years from year 2000. This circumstance is like turning the clock back as many proofs had shown that coal burning brings many negative effects to the environment. [8]

The major CO₂ emissions contributor is the energy industry, which accounts for 41 % of entire emissions. It is followed by the transport industry and manufacturing industry, which recorded 23% and 20% of total emissions, respectively [9]. In the Copenhagen forum 2009, Malaysia has pledged to reduce 40% of carbon emissions by 2020 compared to the 2005 levels, subject to assistance from developed countries. This might be a turning point to the local market as environment consideration is not popular among the entrepreneurs, as some of them do not understand the mechanism of global warming and the effects of carbon emissions.

3. Status of Renewable Energies in Malaysia

The Renewable Energy (RE) Act 2011 is an act to provide an establishment and implementation of a special tariff system to encourage renewable energies generation. The SEDA is a statutory body formed under the Sustainable Energy Development Authority Act 2011 to administer and manage the implementation of the Feed-in Tariff (FiT) mechanism which is mandated under the RE Act 2011. The FiT allows electricity generated from indigenous RE (sources from within the country and are not imported from neighbouring countries) to be traded to power utilities such as Tenaga Nasional Berhad (TNB) at a fixed premium price in a certain period. The distribution licensee will pay some amount of incentive to the clean energy power generator depending on the kilowatt hour (kWh) of electricity

generated and exported to the national grid. To date, the FiT mechanism accepts electricity generated from four types of RE such as biogas, biomass, small hydro and solar photovoltaic, based on different FiT rates [10].

Most of the renewable energy in Malaysia is generated from biomass as of end of October 2010. Three options of biomass are mass production of electricity by furnaces, fluidised boilers and pyrolysis, combined heat and power schemes for industry such as solution from bagasse (fibres from sugarcane) or paper and pulp as well as biodiesel. Biomass is easily available since the methane and other gases produced from dead organic matters can be found everywhere. However, the burning of biomass contributes to global warming and particulate pollution. It is also difficult in collection and expensive.

Mini hydro is the second largest RE electricity supplier in Malaysia. It performs well in energy efficiency, cost effectiveness and electricity quality assurance. However, it cannot always achieve the required load demand due to the seasonal water flow variations. Solar power is expected to be fourfold more than the world fossil fuel resources. Tropical country like Malaysia is suitable to adapt solar energy due to accessibility of large amount of sunshine and resource. Nevertheless, the cost of solar power is relatively high, which is three to four times of the cost of fossil fuel. Tidal energy is a type of renewable energy that is unfamiliar in Malaysia. However, it is a potential energy source to the country as Malaysia possess high coast per area ratio, which is 14. The implementation of tidal energy needs more supports from the government due to its promising in energy source.

4. Renewable Energy Projects in Clean Development Mechanism

Both renewable energy and CDM are labelled as solution of environmental problems and climate change. Hence, they are in a good match contributing to sustainable development [2]. Both of them lead to sustainable development and contribute positive impacts to the nations.

By August 2012, the CDM had received a total of 4460 CDM projects in the pipelines. Out of the total CDM projects, 69% is renewable energy projects. Most of the CDM projects are related to wind, hydro and biomass energy which recorded 2,523 projects (28%), 2,280 projects (26%) and 906 projects (10%), respectively. Only 1 CDM project is regarding tidal energy which is expected to gain 1,104,000 Certified Emission Reductions (CERs) in 2012. In other word, tidal energy is foreseen to obtain 315 kCERs per year.

Among the projects, there are 108 projects or 2.42% are in Malaysia. Malaysia belongs to the group of non-Annex I. Annex I includes the countries listed under Kyoto Protocol that commit to greenhouse gases (GHGs) emission reduction. They are formed by a group of developed countries such as Denmark, United Kingdom, Australia, United States and etc. As a developing country, Malaysia has no quantitative commitments under Kyoto Protocol. Nevertheless, the country can voluntarily participate in globally reducing emissions of GHGs Besides collaborating with industrialised country investors to develop new industries and technologies, the CDM pushes developing countries like Malaysia to create cleaner environment.

As a commitment to the Kyoto Protocol, the Annex I Parties are committed to reduce quantified emissions to a certain level. The protocol limits the emissions from Annex I countries by an average of 5.2% of the 1990 level over a 5-year commitment period from 2008 to 2012. The emission reductions in developing countries are tradable under CDM. The Annex I countries thus purchase the 'emission reductions' from the non-Annex I countries such as Malaysia. Then, Malaysia can earn extra income for projects that reduce emissions by trading the certified emission reductions (CERs) to Annex I countries, besides contributing to sustainable development.

The Malaysian Energy Centre (PTM) predicts that the yearly potential in Malaysia reaches 18 million CERs in 2010. This is equal to approximately 100 million tonnes CO₂ equivalent from 2006 to 2012. Besides, PTM assumes the price range to be US\$ 3-10 per tonne CO₂ equivalent. This is equivalent to a capital flow of US\$ 0.3 to 1 billion to Malaysia by earning the carbon credits [11].

Since the ratification of Malaysia in the CDM in 2002, some of the projects' developers in the country started to apply for CDM projects. The Table 1 illustrates the number of projects applied in

CDM from 2002 to 2008. From the 7 CDM projects in year 2004, a total of 552,758 tonnes CO₂ equivalent has been eliminated, which is an encouraging result. Until February 2008, there are 48 PIN and 61 PDD received by the Malaysia Energy Centre (PTM).

Table 1. Number of CDM projects application in Malaysia

Application year	2002	2003	2004	2005	2006	2007	2008
Number of projects	3	2	7	25	21	40	4
Ton of CO ₂ equivalent/ year	121,000	407,660	552,758	2.5 million	2.6 million	9.2 million	843, 759

Source: Wan Nadia, 2008 [12]

5. Conclusion

Most of the CDM projects are renewable energy projects. It recorded 69% out of total CDM projects. This means that, renewable energy projects are more viable in getting CDM recognition. Malaysia should diversify the exploitation of renewable energy. The number of CDM projects is still low if compared to countries like China, Mexico, India and Korea.

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