CHAPTER 4.0 ANALYSIS AND RESULT

4.1 Renewable Energy Policy

Since 2001, Malaysia is in experimented the renewable energy (RE) policy, focusing on market forces to deliver the expected results and experience in the treatment of RE as a mere fuel for energy production. As a result of the last eight years has valuable experience to identify problems of this approach. The main lesson is that the business-as-usual approach is not possible, appropriate or productive.

Renewable energy must be considered as the convergence of energy, industry and environment, and may be the most efficient mode can be detected. Reasons for the introduction of new converged and forward looking RE policy in the future are:

1. Market failures. The evidence suggests that the market is not the desired result, especially because of the lack of an appropriate and effective regulatory framework
2. Ensuring long-term stability, avoiding start-stop strategy, having adequacy of the results and ensure commitment from all sides
3. Enter a new sector of the economy in Malaysia
4. Recognizing that the environment is contributing to the economic growth, which can be used for innovation (as opposed to comparison with the invention)

5. Effective dissemination of RE technologies, and thereby improve human capital and use
6. Avoid conflicts with mixed signals and re-send policy that affect economic decisions

4.1.1 Development of Energy Policies on Malaysia

For 60 years the Government of Malaysia series of completely new set of energy to ensure sustainability and security of supply, and the first political parties was in 1949, when the Central Electricity Board (CEB) was originally developed, before it was going to National Electricity Board (NEB) in 1965. But in the last three decades, energy policy has facilitated a more pragmatic way of developing environmentally friendly energy. The first policy that really impacts the industry was Petroleum Development Act in 1974, vested to Petronas, the state oil and gas owner, the exclusive right in exploration, development and production of petroleum resources in Malaysia followed by National Petroleum Policy, 1975 to regulate further oil and gas in 1974. Policies which come more important were the reason of introducing the national energy policy that actually began in 1979 with three main objectives of the use, supply, and environmental protection. After that the National Depletion Policy 1980 and a year later, the four fuel diversification strategy were introduced in 1981 to prolong lifespan of the country's oil reserves for future security and stability of oil supply and the latter to pursue balanced utilization of oil, gas, hydro and coal.

Policy of diversification of fuel in Malaysia is reviewed from time to time to ensure that the soil is not too dependent on primary energy sources, particularly after the

two versions of the international oil crisis in 1973 and 1979. Policy continued in 1999 with the announcement of the new strategy of diversification of fuels Five.

In this policy, renewable energy (RE) was made the fifth fuel the energy associated with the target of 5% of electricity to the country in 2005. To achieve this goal, it was launched a program of small renewable energy (SREP) in May 2001 under the initiative of the Special Committee on Renewable Energy (SCORE), focusing on the aimed to support the government's strategy in intensifying the development and utilization of RE as the fifth fuel resource in power generation, which is also stipulated in the objectives of the Third Outline Perspective Plan (OPP) for 2001– 2010 and the 8th Malaysia Plan (2001–2005). The purpose of SREP is to facilitate a rapid deployment of the network of RE resources based small power plants. In the 9th Malaysian Plan (2006–2010), the emphasis on energy efficiency is intensified to address the nation's energy challenge in line with the sustainable development agenda.

Nevertheless, as of December 2009, RE only contribute <1% (55.5 MW) of the electrical energy production for the national grid. Because of that, Malaysian government has accepted the new Renewable Energy and Action Plan in April 2010 and will implement in 10th Malaysia Plan and beyond. One of the highlights of the Renewable Energy and Action Plan is the Feed-in-Tariff mechanism. This Feed-in-Tariff mechanism was implemented starting from 2011 to boost development of renewable energy.

4.1.2 National Energy Policy

National Energy Policy was introduced in 1979. This Policy has three main purposes. The first objective is aimed at ensuring an adequate and affordable energy

security based on the maximum use of indigenous resources. The second objective is the utilization that calls for the promotion of efficiency and conservation measures in order to eliminate unnecessary and unproductive patterns of energy. 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.

In 10th Malaysia Plan, power supply will keep on to be improved through the creation of aggressive marketplace along with the dropping power funding in stage. New Energy Policy has recognized five approaches which are:

1. Rationalizing power price steadily to equivalent market price, taking into account the present fiscal situation as well as affordability.
2. Responsibility a more tactical expansion of energy security by diversification of energy sources, and counting renewable power property. Nuclear power is also measured as an unconventional foundation of power.
3. Accelerate the execution of energy efficiency initiatives for the commercial, industrial, residential and transport.
4. Supporting governance to improve the conversion to the market price, and providing help in the direction of alleviate crash on the small earnings group.
5. Make sure that power is exercised on the basis incorporated approach and according to program to realize energy supply protection.

4.1.3 Fifth Fuel Policy under the 8th and 9th Malaysia Plan

To augment the state power rule, a Five-Fuel plan was introduced in 2001 below the 8th Malaysia preparation from 2001 to 2005. The aim was to guide the country's energy mix towards five fuels which are oil, gas, coal, hydropower and renewable power (Ministry of Energy, Green Technology, and Water, 2005). Based on this policy, Malaysia would be equipped with a sustainable model of energy development.

However, throughout the completion of the policy events have not included as expected. At the end of 2005, under the Fifth-Fuel Policy of the 8th Malaysia Plan, which projected about 500 MW of electricity from renewable sources for national purposes, there were only two projects under the Small Renewable Energy Power were supplied of 12 MW (SREP). The difference between policy and implementation clearly shows that there are barriers to effective transition from traditional to sustainable energy development (Ministry of Energy, Green Technology, and Water).

Since the goal is not reached, the government proposed policy is on the fifth fuels policy to be commissioned in 9th Malaysia from 2006-2010. The government made suggestion in promoting and advising for a new impetus to the development of renewable energy in the country. One of the recommendations is that energy efficiency in commercial buildings.

4.1.4 Renewable Energy in 10th Malaysia Plan

The Tenth Malaysia Plan is as well paying attention on promoting optional resources of producing power. The plan aims to increase the palm oil sector's donation of Gross Domestic Product (GDP) to 21.9 billion ringgits in 2015, rise from 17 billion

ringgits previous year, although the trade at present faces a few difficulties involving the small output, huge construction costs, and reliance on foreign employment.

To attain the goal, government aims to build up the palm oil trade clusters into further incorporated sites in the process to endorse different downstream actions like biofuel and oleo chemical production. The finishing plank of the Tenth Malaysia Plan is raising competency in the area and promoting environmentally welcoming production sources with a vision to promote sustainability and extenuating CO_2 emissions. By means of the energy effectiveness the government is eager to encourage innovative green building principles and has announced it's aspire of phasing out luminous light bulbs by 2014, which is projected to save 732,000 tones of carbon dioxide emissions.

4.1.5 National Policy on Renewable Energy and Action Plan

In improving current energy policy, administration had proposed new renewable energy policy that comprises a rule revelation which ensures long-term objectives that all parties should strive to achieve. Plan declaration is attracting the utilization of domestic sources of renewable energy for National Socialism, supply and socio-economic contribution. This RE and action plan contained the policy that has five objectives that covered the elements of energy security, and environmental industry as a convergent in nature. They are:

1. The increase in contributions to the mill of renewable energy
2. Growth of the sector in order to facilitate renewable energy
3. To ensure proper renewable energy production cost
4. The protection of the environment for future generations

5. In order to promote the role and importance of RE

4.1.6 Renewable Energy Act

The necessary actions that should be taken to provide the best results are:

1. Direct action or adoption of institutional mechanisms
2. Supporting activities to promote and support the growth and development of RE business

4.1.7 Feed-in Tariff (FiT)

Feed-in Tariff (FiT) is a system that allows energy that is formed as of RE resources for public services to be sold at a premium price for a certain period. This will provide a favorable and secured environment for investment that will make financial institutions to be comfortable in providing loans with longer period (at least 15 years tenure) to finance the renewable energy projects. As a result, RE projects will become bankable and can grow unhindered. Therefore, the FiT mechanism will:

1. Provide fixed revenue stream for the installed and operated RE systems
2. Only pay for the electricity produced, i.e. promoting RE system owner to install only quality RE systems and maintain the systems properly to generate more revenue
3. With a suitable degression rate, the RE manufacturers and installers are promoted to reduce the technology costs while maintaining or improving the quality and efficiency

The disadvantage of FiT mechanism is that it does not address the first cost barrier of high incremental cost. However, this can be addressed through soft loan support or as proven in some countries, this barrier will be removed by itself once the financial institutions get involved in RE projects under the secured environment that FiT mechanism provides. Independent evaluations undertaken between 2006 and 2008 reveal and confirm that a Feed-in Tariff (FiT) mechanism is very effective in introducing and growing the number of RE power plants, spurring innovation and growing the economy through the emergence of new RE Industry, as compared to the quota system or renewable portfolio standard (RPS).

Feed-in tariff needs to be introduced via a legal instrument to guarantee success and effective implementation. Therefore a new law (usually a Renewable Energy Law) will have to be introduced which contain specific details of the feed-in tariff prices and degression, the duration, obligations of various parties, and the review process. Setting up high feed-in tariff rates for the RE technology at the first instance will not guarantee a success without incorporating the other critical success factors which are described below. In almost all cases, the feed-in tariff rates are empirical values and needs to be reviewed or adjusted (of the degression) to suit the growth of RE market. Most importantly, the growth of the RE market is dependent on the available RE fund to pay for the incremental cost of the higher feed-in tariff rates, and this will then limit the achievable RE capacities. Nonetheless, this limitation (if not too small) will provide a realistic opportunity for the local RE industry to grow and mature, and not booming‘out of hand.

4.2 Opportunities and Barriers to Develop Renewable Energy

4.2.1 Opportunities

1. Biomass and Biogas

Based on the quotas set for the various RE technologies under the proposed FiT policy by the RE/Malaysia Building Integrated Photovoltaic (MBIPV) national scheme team under Department of Energy, Water and green technologies, opportunities for biomass and biogas as renewable energy (RE) resources are given to be develop within the first 10 years of use tariff (FIT) in Malaysia. Nevertheless, this does not mean that other RE technologies will be given less focus under the proposed policy. The quota on RE capacity was publicized in the Table 4.1:

Table 4.1: Cumulative Quota on RE Capacity (MW)
(Source: Final report of the Renewable Energy Policy and Action Plan)

Year Ending	Cum Biomass (MW)	Cum Biogas (MW)	Cum Mini Hydro (MW)	Cum Solar PV (MW)	Cum Solid Wastes (MW)	Cum Total RE (MW)
2011	110	20	60	7	20	**217**
2015	330	100	290	55	200	**975**
2020	800	240	490	175	360	**2065**
2025	1190	350	490	399	380	**2809**
2030	1340 (1)	410 (2)	490 (3)	851	390	**3484**
2035	1340 (1)	410 (2)	490 (3)	1677	400	**4317**
2040	1340 (1)	410 (2)	490 (3)	3079	410	**5729**
2045	1340 (1)	410 (2)	490 (3)	5374	420	**8034**
2050	1340 (1)	410 (2)	490 (3)	8874	430	**11544**

Notes to Table 4.1:

(1) Utmost possible that can be realized palm oil (EFB) and agro industry
(2) Utmost possible that can be realized from POME, farming and agro
(3) Utmost possible that can be realized from small-hydro

Quotas awarded each year for each RE technology is to put a limit on the quantity of electricity that can be paid for by the Government. It is based on the availability and cash flow organization of the RE finance that will be put below the management of the Sustainable Energy Development Authority (SEDA). This is to ensure that the RE fund can be managed more effectively.

So far, RE resources that have been approved under the proposed FiT are biomass and biogas (from plantations, agriculture, forestry and waste), mini-hydro and solar (photovoltaic).

FiT forms are part of RE law that will be submitted to Parliament in October. It is a piece of the Government's preparation to enhance RE role to Malaysia's electricity-generation blend from less than 1% in 2009 to approximately 5.5% by 2015. The increase planned in RE capacity is publicized in Figure 4.1:

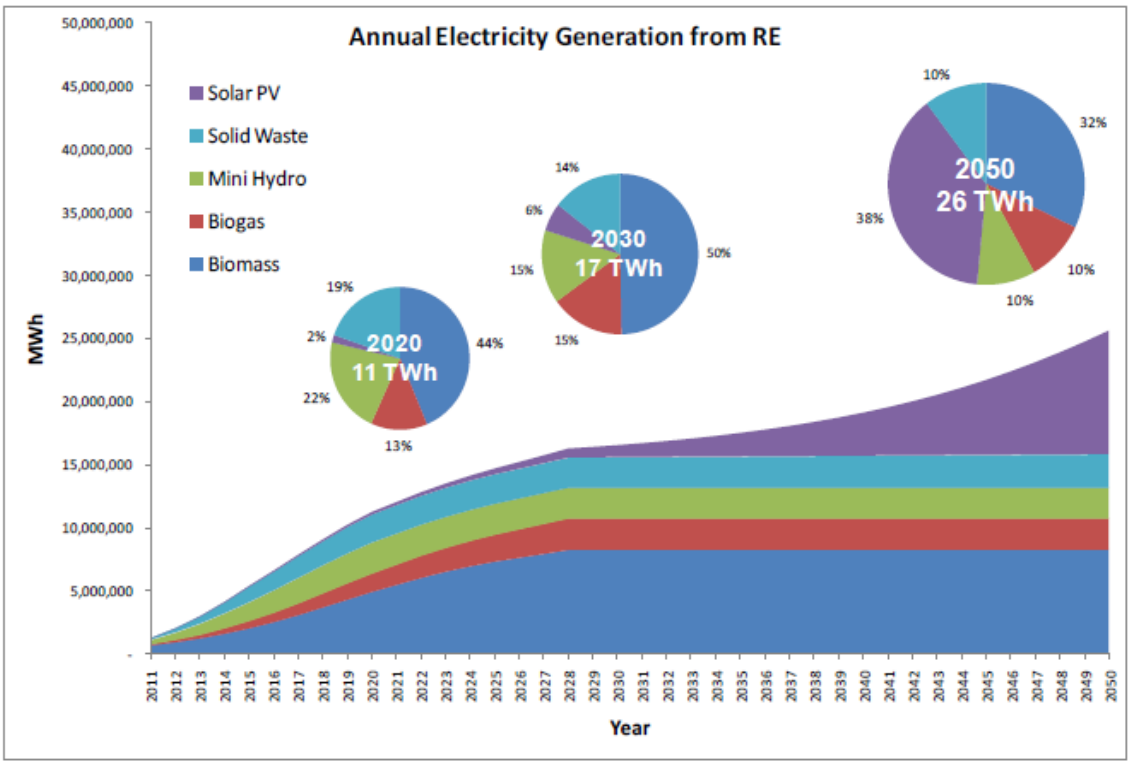

Figure 4.1: Estimated Annual Electricity Generation from RE
(Source: Final report of the Renewable Energy Policy and Action Plan)

As of now, the indicative FiT rates for every kilowatt of Renewable Energy generated are as follows: 27 to 31 cent for biomass, 28 to 32 cent for biogas, 23 to 24 cent per mini-hydro, and 85 cent to RM1.23 for solar PV. The Government believed that the FiT system would encourage the growth of renewable energy usage multi-fold from the estimated 55 megawatt (MW) to one gigawatt (GW) by 2015 and 4GW by 2030. That is in line with its aim to minimize the need for fossil-fuel power plants and reduce carbon emission.

2. Solar Photovoltaic

Apart from biomass energy, Malaysia also has the potential to emerge a large judging from the solar cell manufacturer to enter the investment in the sector. Due to that fact, a new solar energy services provider, TS Solar Energy Sdn Bhd (TS Solar)

currently has partnered Himin Solar Energy Co Ltd (Himin Solar), the largest solar player in China, to venture into the renewable energy sector.

Malaysia, which has emerged as the business centre in South East Asia as well as being the safest country here would be the preferred pick to develop the solar energy sector including as a base for the export of solar products and solutions to the region. According to the Executive Director of TS Solar, the company aimed to be among the leading supplier of photovoltaic (PV) in Malaysia over the subsequent five years with the strategic tie-up with Himin.

In Malaysia, the government has recently passed the RE Act 2011 in Parliament, indicating a strong commitment to develop the renewable energy sector in the country. With concerted efforts to develop renewable energy here, it is optimistic that the sector would see tremendous growth (NST Business Times, 13 May 2011).

4.2.2 Barriers

4.2.2.1 Economical Barriers

1. Controlled and lowering the energy prices

Average price of electricity is normally low, despite an increase of 12% in June 2006 and July 2008 of 23% (average). But on average in March 2009, the average tariffs will be reduced at a rate of 5%. Unsatisfied with the speed of tariffs in the last three years, it is important concern is that interest rates was artificially low because of the fossil fuels subsidy the Government provides (directly or indirectly) and have not

accounted the external costs. This means that the real cost of electricity is not passed on to consumers which drive to consumer expectations of low prices immortalized. In this case, the low prices act as an incentive (or even the collapse of society) to accept the tools of the purchase price up to RE. The instrument is a publicly traded company with different shareholders, owe those shareholders are required in meeting financial goals and make the profits that are able to buy RE is not the price is higher than permitted levels of retail sales.

2. Competing Incentives

The existence of market decisions to different stimuli and competitive private companies, the lowest cost to run programs or deliver the greatest benefit for them will be selected. Competition in the market for CDM improve energy efficiency and generation of RE. Based on net income tests, company will choose the approach that will maximize the benefits at lower costs.

3. Least Cost Option

RE programs or projects faced significant economic impediment because the economics of conventional energy using fossil fuels is less costly than using renewable energy sources. With such an economic situation, it is not surprising that interests in RE projects are low. However the promotion of coal as a source of fuel for power generation by policy makers, strengthens the marginalization of RE from the mainstream, because of the signals that the promotion of coal sends to businesses.

4.2.2.2. Financial Barriers

Since the current SREP approach based on private capital, the need for substantial financial resources is significant. Overview of renewable energy projects indicates that the RE struggling to get financing for developers of local financial institutions. These range from lack of knowledge or experience in financial institutions, to raise funds for RE projects, the imposition of conditions on the financing of RE conventional loans (and not comparable with non-recourse project financing approved with IPP), the evaluation of risks increased measures to reduce inconvenience to financial resources in order to reduce the risk of non-payment or non-drop. The latter completed the fall term of 8 years, the introduction of stricter conditions for use, especially for advanced stages of construction and the interest rate is higher.

Therefore, the availability of capital for renewable energy projects is sorely lacking and this adds a disincentive for private company to develop RE. Only those who have better access to capital will be able to solve financial problems. This reduces the public, and then suction applied to many renewable energy installations that are under construction and operation.

4.2.2.3 Technological Barriers

There are two limitations of technological feasibility of RE. First, the need to combine and direct costs of interconnection and also the cost of construction the system, and secondly the cost of effective and advanced RE technology.

1. Interconnect

The cost of installation of the RE network, including the strengthening of the connections referring to SREP guidelines, which are not to be borne by utility company, but through the renewable energy project proponent. This version adds the initiators of the capital costs of RE, hence raising the capital requirements and will give the financial impact of RE projects.

If these costs are borne by the producers of renewable energy, then these costs should be reflected in the prices of renewable energy, so the costs can be recovered. This would be effective in RE prices. However, because RE prices were determine without proper testing, the cost were not reflect but will reduced viability of the renewable energy projects.

2. RE Technology

This burden is particularly important because the technologies cost of renewable energy programs. Advanced RE engineering (modern and efficient gas boilers, for example), which can be imported are very expensive and subject to significant costs of technologies such as paying a fee to use the intellectual property of RE Technology.

This technology increases the cost of capital to support the company as a whole. This creates a feedback loop of higher prices in renewable energy tariffs. Therefore, only companies with sufficient financial resources can be participating, but it certainly has the potential for medium and small entrepreneurs to withdraw from this market.

4.3 Result

From overall analysis of the available RE resource, its future prospect, and also from the reviewing of Malaysia Power Plan and how it reflect the practice of RE, it is obvious that for Malaysia, the greatest potential to be used is biomass for its availability in abundance, especially in agriculture oil palm manufacturing sector. Latest, a sum of 88 MW of RE projects were signed below SREP. From this outline, 40.35 MW comes from biogas and biomass plants. Contrast with solar PV and wind, these sources do not undergo intermittency difficulty. It is able to produce electrical energy at all time since burning of fuels is desirable to generate electricity. Nevertheless, the confront remains with likely competition with other business which use the similar key sources. In addition, these sources are not totally dirt free skill because flaming of key sources is concerned to produce electrical energy.

The next is solar energy, which also contribute to a significant potential for renewable electricity. Peninsular Malaysia is rich with sunshine as it is located on equatorial area with a standard emission of 4500 kWh/m^2. Malaysia receives four to six hours of sunlight daily. Based on these data, solar PV expansion provides dazzling prospect. Nevertheless, a part of greatly capital concentrated; one more main disadvantage of solar power is necessity of huge region to generate sensible quantity of electrical energy.

Other renewable energy sources can also contribute to the electricity mix, although at a slighter size. However, regards to **wind** authority in Peninsular Malaysia, there is restraint to unused wind potentials. A number of studies and investigation were approved by different parties on feasibility of harnessing wind energy in more than a

few regions situated in Peninsular Malaysia. It has been accomplished that wind potentials are small in Peninsular Malaysia. Besides, wind energy also suffers intermittency which needs electrical compensation and storage.

Due to the research, it's shown that the great barrier suffocating RE development in Malaysia is soaring investment costs. However, this may be addressed by **Feed-in-Tariff (FiT)** system that will be launched in combination with RE Act and Action Plan in 2012. FiT are lawfully sure expenditure for electricity created by green energies like biomass, small hydro power, solar or wind plants that is being fed into the national electricity network. Throughout FiT, in which the idea of enthusiastic purchaser and enthusiastic supplier is recognized among developers and the utility corporation, the energy created will be purchased at a best cost. This system has been drafted and utilized in countries like Germany, Spain and USA and it has productively established in raising the enlargement of renewable energy.