

## **CHAPTER 5.0      DISCUSSION**

### **5.1      Biomass and Solar Technology**

Renewable Energy (RE) properties are dependable, resourceful and viable as compare to other conservative technology. In excess of the recent decades, bigger exercise of Renewable Energy has led to considerable enhancement in renewable energy technology. Manufacturer and institutional tools such as biomass boilers, photovoltaic systems, cogeneration systems and solar hot water can provide immediate benefits for many companies in Malaysia. Some examples to show the decisions and successful solutions of RE are:

#### **1. Biomass Boilers**

These boilers generate vapor as of existing waste such as empty oil palm fiber, sawdust or shells as an alternative to fossil fuels. Burning with overload air liquid produces combustion gases that also produce hot steam in heat exchangers. Creating conversion of biomass can be constructed without any technical problem or superiority and foreign vessels and facilities should be available in the market.

#### **2. Cogeneration Plants**

Commencing a source of energy, both electricity and heat can be created simultaneously at the same time head of the fuel that needed to save energy. In the case of conventional fuels, it converts only 35% to 55% for energy consumption, hence increasing the efficiency of cogeneration to 75%.

### **3. Palm Oil Boiler**

New boilers for the oil industry are specially built to burn the plants waste with effective local emissions of waste materials which will provide a continuous green production and sustainability.

### **4. Photovoltaic Technologies**

These machines are exposed to direct sunlight in the change to electrical power that produce year-round sunshine flows freely available for lighting and other energy needs for homes, factories and offices for activation.

### **5. Solar Thermal Technologies**

The use of solar energy to heat water or air, the houses and commercial use solar dryers or water heater extract free resources that meets the high standards and offer better wages.

## **5.2 RE Resources Opportunities**

Market solutions for renewable energy sources, was expected to shot in the near point of view. With the implementation of specific projects, local producers may be useful to pay attention to this growing market and take advantages of business opportunities and less energy cost. There are several important factors that are used for decisions for abundant sources of renewable energy and initiative:

1. RE sources is relatively low or no cost of fuel – Industrial production, such as palm oil mills and sawmills, have prepared a large amount of waste that must be eliminated. Energy production takes place on it and offer direct financing for enterprises.

2. RE projects will put aside cash in the durable – Comparison of fuel costs indicate that RE was reduced operating costs and also energy costs in general. Over the RE machinery, fuel cost savings are return on the investment.
3. RE power technologies are extremely forceful – Oil prices is still expensive, but initially the RE equipment was costs effective even with high expenditure at first. Additionally, local producers already fit and install high-quality of solar and biomass energy machinery.
4. RE converts biomass waste into profit – Government programs had provided the local industry to invest in the RE and organized purchase agreement of energy and limit low capital and growth revenue.

Biomass projects in Malaysia are possible. Commercial interests can select more than a few options for saving and efficient use of RE (Green Technology of Malaysia) including several options:

1. **Option 1: *Transition from fossil fuels to biomass fuels as of cheaper.***

Most plants use oil boilers. The transition from biomass fuels will reduce the cost and steam production make is cheaper by a factor of three. A typical system requires 10 tones per hour of the initial investment of RM 2.3 million, but saving from smaller fuel consumption are expected to be per month of RM 300,000. In this way, the return on investment is achieved in the first fiscal year.

2. **Option 2: *Connect presented oil palm cogeneration plant to the network.***

Most of the plants are already producing steam and electricity, but not enough of them have enough energy for their own use. The network allows plants to produce more energy without the waste since the excess energy is sold. With existing cogeneration plant, it is combine sets of RM 850 thousand per years after the investment of RM 1.5 million for the network connected (assuming approximated).

3. **Option 3: *Take advantage of new biomass technologies in the field of woodworking industry.***

Replacing diesel generators with biomass boilers and steam turbines not only reduces expenses but also uses a constant supply of waste. Relatively, it is indicating that the cost of electricity from diesel engines produced 2.5 times more than biomass.

4. **Option 4: *Solar energy and solar thermal installation in commercial buildings.***

Hotels, schools and other institutions use large amounts of hot water. Changing the current electrical heaters with solar electric resulted in significant energy savings. The investment costs of solar water heater is RM 50 000 – five times more than electric heater. In addition, current electric heating cost RM 1200 per months, hence investments in solar energy was recovered in less than four years.

### **5.3 Public and Private Sector Benefits**

With present expenditure rates and prices, fossil fuels will be exhausted in a substance of decades. Adopting optional energy sources is very important to sustain the progress and success of the country. International trends illustrate that RE resources are gaining a better contribute to energy programs, particularly in Europe and the USA. Ranges of RE hard works also encourage latest economic actions and the achievable spin-off potential may well produce latest exports as well as employment. These developments augur well for Malaysia because of the nation's profusion of RE.

Referring to the DANCED (Danish Cooperation for Environment and Development) research in 1999, power sources of biomass that come from wood residues, rice husks, and palm oil bunches, also municipal wastes, mutually through solar power report over 90% of RE prospective in Malaysia. RE donations to the public economics of biomass can achieve about ten billion annually. Although by just 5% share of renewable energy of public power production, the nation saves up to 2.8 billion for petroleum trade in expenditure in excess of 20 years

The 9th plan provides for Malaysia aim in advance growth as well as consumption of RE resources by sustaining initiatives for example the Small Renewable Energy Power Program (SREP) and Renewable Energy Power Purchase Agreement (REPPA). In 2012, renewable energy is projected toward producing and connecting about 300 MW of power to the network in Malaysia (excluded Sabah and Sarawak), with 50 MW further to the network in Sabah. The scheme in addition encourages additional renewable energy resources like solar hybrids as well as the development of biomass cogeneration. Adding up to the whole paybacks are the subsequent public and

private sector spin-offs consequence from the realization of RE and its associated actions:

1. Enlarge in restricted production of RE-related utensils, for example boilers, solar panels and water heaters, and also the amplifying in the creation, maintenance and action of biomass power plants.
2. A larger stress on R&D actions for restricted exportable RE technologies, with a prospect to build up options for future trading of CO<sub>2</sub> emissions.
3. Production of profits from the trade of energy to the major grid and protection of fossil fuels that decrease the reliance on energy imports.
4. Enhanced corporate image with “green” technologies and a possibility to open up marketing opportunities.
5. A rising in fuel conducting services, as well as collection, logistical, management, storage, and transportation services and the construction of RE-related businesses, for example the trading companies for renewable energy resources.

## **CHAPTER 6.0 CONCLUSION AND RECOMMENDATIONS**

### **6.1 Conclusion**

From results and analysis in Chapter 5, it is clear that for Malaysia most of the biomass can be used because of its availability in abundance, especially in the agricultural sector such as oil industry. The next is solar energy, which also contribute to a significant potential for renewable electricity. Other renewable energy sources can also contribute to the electricity mix, although to a lesser extent.

Over the past 10 years, Malaysia has implemented various efforts and initiatives for renewable energy such as SREP, BioGen, MBPIV and SURIA 1000 programs. The growth in the generation of renewable energy has been slow, but it was gradually increase over time and shown an upward trend, as more people took advantage of the government support that are provided. However, Malaysia must be presented a more proactive approach, to create a level playing field for renewable energy technology investors and provide the legal framework to facilitate greater involvement of governments, NGOs and also the general public.

From the study of development and commercialization of RE in Malaysia, it was believed that the palm oil industry waste has the opportunity to be used to produce electricity. As a target participant in the palm oil sector is always the electricity from biomass and biogas, a higher rate (21 cent/kWh), compared to the mini-hydro (17 cent/kWh) are indicated. There are many different conversion technologies that can be used to produce renewable energy. Research and Development in these areas is focusing on the newer innovative solutions and cost-effectively technologies.

There were some constraints and market barriers that hinder the development of renewable energy sources and technologies need to be removed. Other incentives (e.g. tax incentives for renewable energy technologies, improving access to finance and green effort) should be introduced to the use of renewable energy sources. In addition, the need to strengthen the capacity of key players should be take under consideration.

Policies play an important role in promoting development of renewable energy. The government has a number of policies to integrate renewable energy in the system. However, current policies are not sufficient to ensure their survival. It is important to ensure that Malaysia is balance in political strikes and continue to use renewable energy for sustainable development in the future.

## **6.2 Recommendations**

Below are some recommendations towards the future of this study:

### **1. Further the Area of Study On Specific Renewable Energy Resource**

The research can be specialized into the more detailed subtopic such as the Biomass Potential or Solar Potential alone rather than to study about the overall potential resources of renewable energy that available. It is suggested to choose between biomass and solar energy because these two sources are labeled as the most potential energy resources available and suitable to implement in Malaysia.



## **2. Software Enhancement for the Computation on Renewable Energy**

Webpage can be implemented to give more information about renewable energy and its potential in Malaysia and also to makes it easier to obtain data about the renewable resources. Besides that, educational software also can be made so that youngster can catch the attention of electricity generated especially biomass and solar power generated to make them feel enthusiastic to learn and can produce great engineer in prospect.