



**THE AWARENESS LEVEL OF RESIDENTS ON THE  
USE OF RENEWABLE ENERGY RESOURCES FOR  
DOMESTIC USE IN SETAPAK, KUALA LUMPUR**

**BY**

**MOHAMMAD BASSAM IBRAHIM**

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## ABSTRACT

The use of renewable energy sources has proved environmental, economic, and political benefits to worldwide countries. Malaysia is one of these countries which considered renewable energy as the fifth fuel source in Malaysia in 2001. However, the generated energy from renewable sources is still below the targeted value of cumulative national energy plans in Malaysia. Awareness of the benefits of using renewable energy technologies helps on growing the use of renewable energy. Despite the possibly positive contribution of awareness level of the Malaysian population to the use of renewable energy technologies, few research studies were carried out to define the level of awareness of locals and its influence on growth rates of using renewable energy technologies. This study aimed at measuring the level of awareness of local residents of the area of Setapak in Kuala Lumpur about renewable energy sources and technologies for domestic use. It also aimed at evaluating the effect of this level on the increase of renewable energy projects and to identify the problems that face people who have used renewable energy solutions that arise from the lack of awareness. A total of 50 respondents to a questionnaire from Setapak were involved in this study. The study found from the analysis that it was that Setapak residents are familiar with renewable energy sources and technologies as most have a good background regarding renewable energy definition, usage and importance. Also, residents with higher levels of awareness of renewable energy were more likely to be aware of renewable energy usage incentives and mechanisms in Malaysia and more likely to engage in positive practice towards renewable energy sources and technologies use. However, the factors which were expected to affect the level of awareness of renewable energy especially age, income level, and level of education do not have a significant impact on the level of awareness. New generations, which have higher exposure to knowledge and higher levels of education do not have a higher awareness level. Finally, the cost of renewable energy technologies and little knowledge of renewable energy in Malaysia, energy policies and mechanisms in Malaysia, and companies who provide renewable energy sources were reported by users of renewable energy solutions as main obstacles that face future users. The study recommends the inclusion of awareness topics about renewable energy in environmental awareness programs which are guided by the government, also better marketing plans of Energy policies and mechanisms in Malaysia such as FiT and NEM mechanisms which proved effective. It was also recommended that more efforts should be spent on financing individual renewable energy solutions. Finally, encouraging more studies on awareness level evaluation of renewable energy among locals on larger scales and guided by local institutes and governmental funds.

## خلاصة البحث

الطاقة المتجددة هي واحدة من أهم الموضوعات التي يتم تناولها في عديد من البلدان ويزداد هذا الاهتمام يوما بعد يوم. إن استخدام مصادر الطاقة المتجددة له فوائد بيئية واقتصادية وسياسية للبلدان. وتعتبر ماليزيا واحدة من هذه الدول التي تعتبر الطاقة المتجددة مصدر الوقود الخامس في ماليزيا في عام 2001. بيد أن الطاقة المولدة في ماليزيا من المصادر المتجددة لا تزال أقل من المخطط له. ويشكل مستوى الوعي بالطاقة المتجددة أحد العوامل التي تؤثر على نمو استخدام الطاقة المتجددة. ولسوء الحظ، فإن عددا قليلا من برامج التوعية بالطاقة المتجددة تقام في ماليزيا. كما أنه لا توجد كمية كافية من البحوث التي تحدد إلى أي مدى يؤثر الوعي بالمستخدمين المحليين على التقدم المحرز في استخدام المزيد من مصادر الطاقة المتجددة. وتركز هذه الدراسة على مستوى الوعي لدى السكان بشأن استخدام موارد الطاقة المتجددة للاستخدام المنزلي في سيتاباك، كوالالمبور. وقد تم تحديد ثلاثة أهداف من لهذه الدراسة: قياس مستوى وعي الناس باستخدام مصادر الطاقة المتجددة، وتقييم تأثير هذا المستوى على زيادة مشاريع الطاقة المتجددة، وتحديد المشاكل التي تواجه الناس الذين بدأوا في استخدام حلول الطاقة المتجددة التي تنشأ عن نقص الوعي. وشارك في هذه الدراسة ما مجموعه 50 مشاركا من سيتاباك. وقد طلب منهم الإجابة على استبيان. وتظهر النتائج أن سكان سيتاباك على دراية جيدة بالطاقة المتجددة. ولديهم خلفية جيدة عن تعريف الطاقة المتجددة، الاستخدام والأهمية. كما تظهر النتائج أن الناس الذين لديهم دراية جيدة بالطاقة المتجددة عموما، هم أكثر معرفة بالطاقة المتجددة والآليات المتبعة لاستخدام الطاقة المتجددة في ماليزيا. ومع ذلك، فإن العوامل التي كان من المتوقع أن تؤثر على مستوى الوعي بالطاقة المتجددة إيجاباً وخاصة السن ومستوى الدخل ومستوى التعليم ليس لها تأثير كبير على مستوى الوعي. إن مستوى الوعي بالطاقة المتجددة والممارسة نحو استخدام الطاقة المتجددة تربطهما علاقة إيجابية وهامة. وقد صرح الأشخاص الذين يستخدمون حلول الطاقة المتجددة أن التكلفة هي واحدة من العقبات الرئيسية التي تواجه الناس الذين يخططون لاستخدام حلول الطاقة المتجددة. و قالوا أيضا أن معرفتهم عن الطاقة المتجددة في ماليزيا، وسياسات وآليات الطاقة في ماليزيا، والشركات التي توفر مصادر الطاقة المتجددة منخفضة. وتوصي الدراسة بإدراج موضوعات التوعية المتعلقة بالطاقة المتجددة في برامج التوعية البيئية التي تقيمها الحكومة. كما أن على الحكومة نشر سياسات وآليات الطاقة المتجددة في ماليزيا. وينبغي بذل المزيد من الجهود لتمويل حلول الطاقة المتجددة المستخدمة من قبل الأفراد. وأخيرا، ينبغي أن يقوم السكان المحليون بمزيد من الدراسات بشأن مستوى الوعي بالطاقة المتجددة.

## APPROVAL PAGE

I certify that I have supervised and read this study and that in my opinion; it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Master of Urban and Regional Planning

.....  
Zainora bt. Asmawi  
Supervisor

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Master of Urban and Regional Planning

.....  
Rustam Khairi Zahari  
Internal Examiner

This dissertation was submitted to the Department of Urban and Regional Planning and is accepted as a fulfillment of the requirement for the degree of Master of Urban and Regional Planning.

.....  
Azila Ahmad Sarkawi  
Head, Department of Urban and  
Regional Planning

This dissertation was submitted to the Kulliyah of Architecture and Environmental Design and is accepted as a fulfillment of the requirement for the degree of Master of urban and Regional Planning.

.....  
Abdul Razak Bin Sopian  
Dean, Kulliyah of Architecture  
and Environmental Design

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# **CHAPTER ONE**

## **INTRODUCTION**

### **1.1 BACKGROUD OF THE STUDY**

The target of Malaysia is to be a fully developed country in all dimensions by 2020 (Mahathir Mohamad, 1991). This development should cover economic, social, political, spiritual, psychological, and cultural dimensions(Mahathir Mohamad, 1991). The development of these dimensions is incubated in fundamental sectors that form the country such as education, health, transportation and energy to name a few. One of the main development aspects in Malaysia is the development of the energy sector.

According to the governmental statistics, the growth of energy consumption from 2001 to 2010increased from 31.515M.toe in 2001 and reached 41.477M.toein 2010, which is an increase of 31.6% (Suruhanjaya Tenaga, 2015). Energy consumption is expected to reach 98.7M.toe by 2030 (Razak, 2009).This rapid growth in energy consumption is due to two main factors; the economic growth and population increase.

Economic growth was emphasized as the main goal for vision 2020, where the plan envisioned the annual GDP growth to be 7% by 2020 (Mahathir Mohamad, 1991). However, the GDP reached an annual rate of 9.5% in 2014(Malaysia Energy Information Hub, 2014). Therefore, the energy consumption demand grew beyond what was perceived due to the large increase in development in agriculture, industrial and services sectors.

The second factor was the population increase. The population in Malaysia increased from 18.1 million in 1990 to 30.6 million in 2014 (Malaysia Energy Information Hub, 2014). This growth led to an increasing rate of urbanization which is expected to reach 75% by 2020 (Federal Department of Town and Country Planning, 2010). However, meeting the demand on energy includes using different energy resources, which increased concerns about the environment in general. Therefore, the inclusion of renewable energy (RE) as the fifth fuel source has been stated in the Eighth Malaysian plan 2001-2005 (The Economic Planning Unit, 1999). Biomass, biogas, municipal waste, solar and mini-hydro are the main resources of RE in Malaysia where biomass is the most important source and mini-hydro is the least (The Economic Planning Unit, 1999).

Consequently, the ninth Malaysian plan 2006-2010 set a goal to increase the use and implementation of renewable energy and generate 350 MW from RE resources (The Economic Planning Unit, 2006). Unfortunately, the actual energy that was generated from renewable energy sources was only 41.5 by the end of 2010 (The Economic Planning unit, 2010)

A new mechanism was implemented according to the Tenth Malaysian plan 2011-2015 to accelerate renewable energy which is called the Feed-in Tariff (FiT) mechanism (The Economic Planning unit, 2015). FiT is a system which involves the public in generating energy from RE resources by “obliging Distribution Licensees (DLs) to buy from Feed-in Approval Holders (FIAHs) the electricity produced from renewable resources (renewable energy) and sets the FiT rate” (Sustainable Energy Development Authority Malaysia, 2011) . After this mechanism was applied, the growth of using RE increased significantly; it increased five folds by the end of 2015 (The Economic Planning unit, 2010).

A summary of renewable energy implementation plan in Malaysia from 2001 to 2020 is shown in table 1.1.

Table 0.1 Summary of renewable energy implementation in Malaysian plans including the goals set by MW in each plan

Malaysian plans	Year	Targets to be achieved	Achievements
8 <sup>th</sup> Malaysian plan	2001- 2005	Considering renewable energy as the fifth fuel source in Malaysia consumption	Generating 12 MW from two implemented projects. Preparing a development roadmap for solar, hydrogen and fuel cells.
9 <sup>th</sup> Malaysian plan	2006-2010	350 MW is expected to be generated and connected to the grid. 300 in Peninsular Malaysia and 50 MW in Sabah	41.5 MW were generated (less than 1% of the total generated electricity in Malaysia).
10 <sup>th</sup> Malaysian plan	2011-2015	985 MW is expected to be generated, contributing 5.5%Malaysia's total expected energy that will be generated.	243 MW were generated (About 1.5% of the total generated electricity in Malaysia). Applying Feed-in Tariff mechanism
11 <sup>th</sup> Malaysian plan	2016-2020	2080 MW is expected to be generated, contributing7.8% Malaysia's total expected energy that will be generated.	-

It is argued that one of the success factors of the FiT system is the involvement of the public. The ability to generate an income using RE resources as well as the awareness of using RE sources in individuals were important factors.

The importance of public awareness towards environment and sustainability supported by awareness of the use of RE sources was emphasized and demonstrated in the agenda 21 which represents an international commitment(United Nations, 1992).

Public awareness includes the awareness towards using RE technologies and the sense of responsibility towards the environment. For instance, USM university established the centre of education and training in renewable energy and energy efficiency to increase public awareness of the positive attributes of RE and energy efficiency (EE) measures (The Economic Planning Unit, 1999)

In Malaysia many environmental awareness programs can be found. Department of Environment (DOE) which is under the ministry of natural resources and environment frequently conducts many of these programs such as, Malaysia national environment day, environmental awareness camp (KeKAS) and environmental award (Ministry of Natural Resources and Environment Malaysia, 2017). Some of the awareness programs are guided by the ministry of education. In 1991, the ministry of education decided to include environmental education in the educational system (Aminrad, Zakariya, Hadi, & Sakari, 2012).

These environmental awareness programs encourage people to support the sustainability of the environment and protect it. Yet the emphasis on the awareness of the role of renewable energy to preserve the environment is not well established.

## **1.2 STATEMENT OF THE PROBLEM**

Although there are many efforts from the governments and authorities to implement renewable energy as a fifth fuel source in Malaysia, the produced energy which is generated from RE is still below the targeted value from each plan. Awareness of renewable energy could have a positive effect on such a problem however:

- i. As the level of awareness of RE sources use affects the rate of growth, there are not many available studies that study the level of awareness towards the use of RE resources.
- ii. Also, the effect of awareness of RE resources of local users in Malaysia was not adequately measured through studies to define the importance of awareness programs to increase the use of RE.

### **1.3 RESEARCH QUESTIONS**

Three research questions have been identified as:

- i. What is the level of people awareness towards using renewable energy sources in Kuala Lumpur?
- ii. How does this level affect the increase of use of renewable energy sources?
- iii. What are the problems that face people who decide to use renewable energy solutions that arise from the lack of awareness?

### **1.4 RESEACH OBJECTIVES**

The study aims to achieve the following objectives:

- i. To measure the level of people's awareness towards using renewable energy sources.
- ii. To evaluate the effect of this level on the increase of renewable energy projects.
- iii. To identify the problems that face people who started to use renewable energy solutions that arise from the lack of awareness.

## 1.5 SCOPE OF THE STUDY

The study will focus on determining the level of awareness and its effects on renewable sources use in the area of Setapak, Kuala Lumpur for residential uses.

The residents will be asked to provide background information regarding possible impactful factors such as age, level of education and electricity consumption.

They will also be asked to define concepts and identify resources and practices of renewable energy, and accordingly their level of awareness of the subject will be evaluated. The study will include both users and non-users of renewable energy technologies for residential use.

They will also be asked about renewable energy in Malaysia, energy policies and mechanisms in Malaysia and awareness programs guided by the government to determine the added value of these programs towards renewable sources usage.

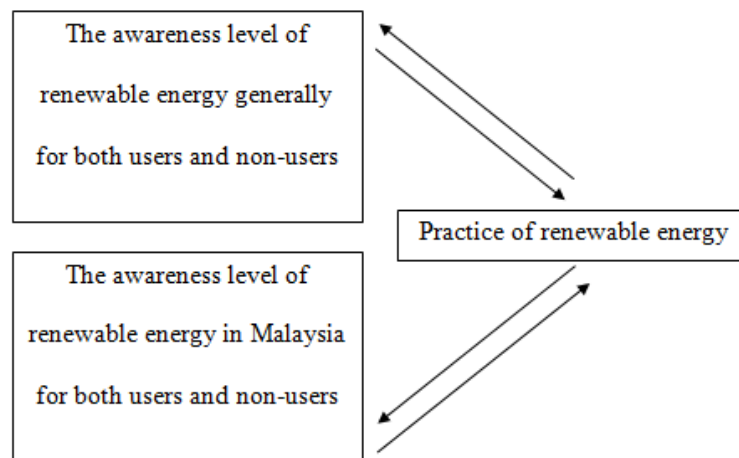


Figure 0.1: Scope of study elements and the relationship between them

## 1.6 STRUCTURE OF THE STUDY

This section explains the outline of chapters in the study. Chapter 1 provides an insight about the problem of the study and enumerates research questions and

objectives. Chapter 2 provides a detailed background about subjects related to the study including the definition of renewable energy resources, the importance of the use of such resources. It later discusses the potential and governmental plans of renewable energy implementation in Malaysia. Renewable energy awareness levels and programs are also discussed in this chapter.

Methods of measuring the level of awareness of a select sample and evaluating results methods are discussed and specified in chapter 3, also the design of the survey is discussed. And chapter 4 discusses the results of the survey carried out.

Finally chapter 5 summarizes findings and lists conclusions of the study and provides recommendations for awareness programs implementation.

## **1.7 SIGNIFICANCE OF THE STUDY**

In this research the relationship between the awareness level of community in Kuala Lumpur towards using renewable energy sources and the growth in using it will be determined. This will highlight awareness importance in a number of aspects.

### **1.7.1 .Significance towards Planning Programs**

Renewable energy is considered as the fifth fuel source in Malaysia. According to Malaysian plans preserving energy and increasing usage of renewable energy sources is one of the main goals. This study will help in determining the level of awareness of the community which contribute to the rates of using renewable energy in Malaysia. After this, plans and programs should consider the level of Malaysian residents awareness towards RE. Also, measuring the level of awareness will help to know the most suitable way to increase the awareness level.

### **1.7.2 . Significance towards Community**

By increasing the level of awareness towards using renewable energy sources, the public should develop a better sense of accountability and responsibility to save their environment and its resources. They should also be motivated by savings that could occur on their electricity bills by increasing the use of renewable energy sources.

### **1.7.3 . Significance towards Ethical Value**

By promoting the level of awareness towards using renewable energy sources, maintaining ethical measures related to the environment would be better applied and understood by the public.

It is also important to highlight the motivation of Malaysians to keep up to the ethical standards towards the environment set by their native religion which is Islam, where protecting the environment is considered as part of Iman.

## **1.8 CONCLUSION**

The growth in demand of energy in Malaysia is significant and has led to national Malaysian plans to implement renewable energy technologies since 2001. Generally targeted values of generated power from renewable energy were not achieved so far. However, the implementation of some mechanisms that involved the public in the process indicated a significant rise in generated power levels. Therefore, this study is aims at evaluating the effect of the public's level of awareness about renewable energy resources in Malaysia and governmental incentive programs on the use of renewable energy technologies for residential use.

## **CHAPTER TWO**

### **LITRRATURE REVIEW**

#### **2.1 INTRODUCTION**

Renewable energy resources can be defined as resources which can “capture their energy from existing flows of energy or on-going natural process”(Science Daily, 2016) such as wind, sunshine and geothermal heat. What distinguishes renewable energy sources is that these sources can be replaced naturally in a short period of time(Science Daily, 2016). The energy in these sources can be converted to suitable forms of energy which can be used in different usages such as electricity, heating and transportation. Energy that renewable energy sources can produce exceeds the current global need by 3000times(Ellabban, Abu-rub, & Blaabjerg, 2014).

Human used renewable energy sources in the past; Europeans used water energy to power mills 200 BC(Williams, 2006). However, fossil fuels were known for humans as the main source of energy since 1800s, where coal and petroleum were the main elements of that fuel (McNeill, 2008).

Fossil fuels were heavily depended on since their discovery. However, in October 1973 until March 1974, an energy crisis happened in many countries in the world when some Arab countries decided to implement an oil embargo on United States of America, Western Europe and Japan due to their support to Israel in Yom Kippur war(Parish, 2009). Therefore, affected countries realized the possible threat among energy security status. Concurrently, the awareness of the bad effects of fossil fuel use on the environment was surfacing(95th Congress U. S. (1978),

1978).Accordingly, new policies and strategies were announced to achieve energy security and conserve the environment. Policies and strategies to generate energy from renewable energy sources were amongst such plans (95th Congress U. S. (1978), 1978).

Nowadays, the use of renewable energy expands day by day.For example in 2012, renewable sources in Scotland generated about 12% of Scotland’s total final energy consumption. Also in Italy in 2015, about 7.8% of total electricity demand was produced from solar energy(Renewable Energy Policy Network for the 21st Century, 2016). Table 2.1 clarifies the amount of energy which was generated from renewable energy sources all over the world (Renewable Energy Policy Network for the 21st Century, 2016). However, fossil fuels energy sources form about 76.6% of world-wide total primary energy supply(Enerdata, 2016)

Table 2.1 Summary of renewable energy sources types and energy generated from these sources in GW in 2014 and 2015 (REN21, 2016).

Renewable source	Generated energy in 2014	Generated energy in 2015
Hydropower capacity	1,036	1,064
Bio-power capacity	101	106
Geothermal power capacity	12.9	13.2
Solar PV capacity	177	227
Concentrating solar thermal power capacity	4.3	4.8
Wind power capacity	370	433

In Malaysia, renewable energy was considered as the fifth fuel source (The Economic Planning Unit, 1999).Five resources were considered as effective sources that can be used and can produce efficient and robust energy. These five resources are biomass, biogas, municipal waste, solar and minihydro which are ordered according to importance respectively (The Economic Planning Unit, 1999).