

EVALUATING THE RENEWABLE ENERGY SOURCES IN MALAYSIA

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# EVALUATING THE RENEWABLE ENERGY SOURCES IN MALAYSIA

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*DEDICATED TO...*

*MY BELOVED FAMILY AND FRIENDS,*

*MY SUPERVISORS*

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## ABSTRACT

Energy consumption has risen in Malaysia because of the developing strategies and increasing rate of population. Depletion of fossil fuel resources, fluctuation in crude oil prices, and emission of new environmental problems due to the greenhouse gases effects of fossil fuel combustion have convinced governments to invest in development of power generation based on renewable energy resources. Recently, power generation from the renewable energy resources has been taken into account in the energy mix of every country to supply the annual electricity demand. The current work will give an overview of the renewable energy sources in Malaysia emphasizing more on the marine renewable energy sources status for Malaysia in terms of the available methods of resource assessment, potentiality and the existing policies that support the utilization of the marine renewable energy as an alternative source of energy. A survey was carried out to analyze the best possible methods for the resource assessment of Marine Renewable Energy as well as the resource potentiality in Malaysia. Based on the survey carried out, it was found that Malaysia has a great potential in Wave Energy and Wind Energy, where the potential for Wave Energy and Wind Energy is found to be approximately 53% and 24% which is significantly a higher number considering the ocean conditions in Malaysia and also the survey result was compared by calculating the power being generated by Wave and Wind in Kuala Terengganu region and it can be projected that Wave and Wind energy has the highest potential as agreed by most of the respondents . The results obtained in this research are significant for the growth of Ocean Renewable Energy in Malaysia if used on a large scale.

## ABSTRAK

Penggunaan tenaga telah meningkat di Malaysia kerana strategi pembangunan dan peningkatan kadar penduduk. Pengurangan sumber bahan api fosil, turun naik harga minyak mentah, dan pelepasan masalah alam sekitar yang baru disebabkan oleh gas-gas rumah hijau kesan pembakaran bahan api fosil mempunyai kerajaan yakin untuk melabur dalam pembangunan penjanaan tenaga berasaskan sumber tenaga yang boleh diperbaharui. Baru-baru ini, penjanaan tenaga daripada sumber tenaga boleh diperbaharui telah diambil kira dalam campuran tenaga bagi setiap negara untuk membekalkan permintaan elektrik tahunan. Kerja-kerja semasa akan memberi gambaran keseluruhan daripada sumber yang boleh diperbaharui tenaga di Malaysia memberi penekanan lebih kepada status yang boleh diperbaharui sumber tenaga marin bagi Malaysia dari segi kaedah yang ada bagi penilaian sumber, potensi dan dasar-dasar yang sedia ada yang menyokong penggunaan tenaga boleh diperbaharui marin sebagai sumber tenaga alternatif. Satu kajian telah dijalankan untuk menganalisis kaedah terbaik untuk penilaian sumber Laut Tenaga Diperbaharui dan potensi sumber di Malaysia. Berdasarkan kajian yang dijalankan, didapati bahawa Malaysia mempunyai potensi yang besar dalam Gelombang Tenaga dan Tenaga Angin, di mana potensi Gelombang Tenaga dan Tenaga Angin didapati kira-kira 53 % dan 24 % yang ketara jumlah yang lebih tinggi memandangkan keadaan laut di Malaysia dan juga hasil kaji selidik itu telah dibandingkan dengan mengira kuasa yang dihasilkan oleh Wave dan Angin di kawasan Kuala Terengganu dan ia boleh mengunjurkan Wave dan tenaga angin mempunyai potensi tertinggi seperti yang dipersetujui oleh kebanyakan responden. Keputusan yang diperolehi dalam kajian ini adalah penting untuk pertumbuhan Lautan Tenaga Diperbaharui di Malaysia jika digunakan secara besar-besaran.

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# **CHAPTER 1**

## **INTRODUCTION**

### **1.1 Overview**

This chapter covers the background of the study, problem statement, objectives and scope of the project.

### **1.2 Background of the study**

Energy is a vital commodity and is closely linked with the climate change and development. Energy is needed for basic human needs for cooking, heating, lighting, boiling water and for other household - based activities. Energy is also required to sustain and expand economic processes like agriculture, electricity production, industries, service and transport. It is commonly suggested that the access to energy is closely linked with the development and economic well-being and that alleviating energy poverty is a prerequisite to fulfill the Millennium Development Goals.

Fossil energy resources are limited and fossil energy use is associated with a number of negative environmental effects, therefore energy has become a major geopolitical and socio economic issue. This development puts pressure on all the countries around the world. The pressure on developing countries may be even greater, because they are currently in the process of development which requires higher energy resources

for achieving higher living standards. High population levels and high fossil fuel reliance increase this pressure even more. To meet energy security, reduce pressure on fossil energy resources and to ensure a higher environmental quality, the share of low - polluting renewable and clean energy should be enhanced.

Renewable energy can be generally defined as sources of energy that does not run out with use over time. They are found in abundance around us and they have been part of human's daily lives for so long that they used to be taken for granted. Other definitions of renewable energy are 'energy obtained from the continuous or repetitive currents of energy recurring in the natural environment ' and ' energy flows which are replenished at the same rate as they are used' (IEA).

Mankind has been traditionally using renewable energy for thousands of years whether it is solar, water, wind or bio energy. With the advent of time, the technology develops and expands. But up until the 19th century, the scale on which renewable resources are implemented is relatively small, typically for individual use or for small communities in the agriculture or industrial field. 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 crises in 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.

The key issue that motivates the drive towards exploring renewable technology is sustainability. The present system rely mainly on fossil fuels, i.e. coal, natural gas and oil which are consumed far more than the amount it is produced. It has been estimated that there are over 861 billion tonnes of proven coal reserves worldwide. This means that there is enough coal to last us around 112 years at current rates of production. In contrast, proven oil and gas reserves are equivalent to around 46 and 54 years at current production levels. Total world proved oil reserves reached 1687.9 billion barrels at the

end of 2013, sufficient to meet 53.3 years of global production. The reserves of NG and oil are projected to deplete after 39 and 25 years, respectively (World Bank database).

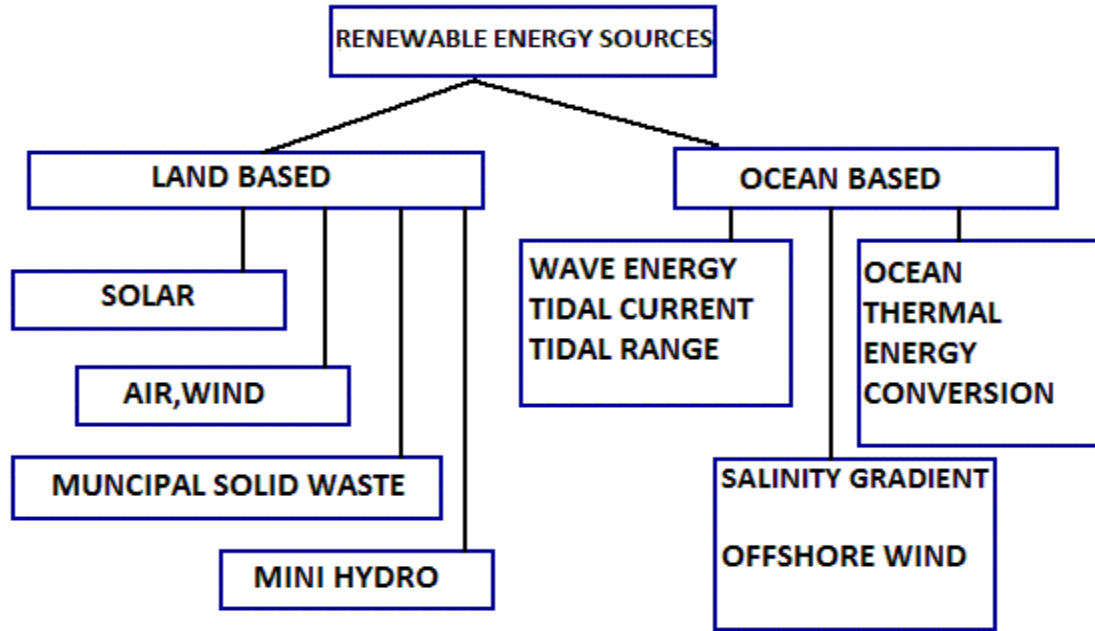
However, according to the International Energy Agency's findings published in June 2006, world production of liquid fuels is expected to reach the peak at around 2014. For natural gas, peak production is anticipated at around 2030. The overall resource will then be in declining pattern and by 2030 the demand will exceed production by 18%. Therefore, sustainability in fossil fuels will be an issue in the long term. On the other hand, renewable sources provide a healthy prospect for sustainability because they are resources that are almost unaffected although used continuously and in large volumes.

Another aspect under sustainability is the environmental issues. Conventional electricity generation produces carbon dioxide, which is released to the atmosphere. This contributes to the greenhouse effect and the phenomena of global warming. Other emissions such as sulphur dioxide and nitrogen dioxide may also be produced, depending on the type of fossil fuel and method of burning. Renewable energy helps in reducing this, playing a role in making the world a healthier place for humans to live in.

The situation in Malaysia is no different. The final energy consumption is expected to reach to 98.7 Metric tons in the year of 2030, which will be nearly three times than the 2002 level Najib et al., (2009)[1]. Renewable energy could be the alternative source for the energy production. These renewable energy technologies includes, water (hydroelectric and marine energy), solar (thermo and photovoltaic), wind (single turbine or wind field), geothermic sources and biomass, Lucia et al., (2010)[2]. Malaysia which is located in Southeast Asia on the South China Sea between 100° and 120° in east longitude, 1° and 7° North of the Equator, has all these renewable energy resources in abundance, but most of these energy resources are yet to be exploited. The government is also giving serious attention in the need to find and utilize



renewable resources to add to the energy supply mix. Apart from the apparent issues discussed, the country is also looking for ways to diversify the current energy resource.



**Figure 1.1** Different Sources of Renewable Energy

### 1.3 Problem Statement

The potential of alternate energy sources is one of the options being explored by many countries including Malaysia to reduce the dependency on fossil fuels. Malaysia has a lot of Potential for all the Renewable Energy sources but due to **lack of availability of data** for marine renewable energy sources such as **Ocean Thermal Energy Conversion, Salinity Gradient, Tidal Current, Tidal Range, Wave Energy**, so there is a need to address the huge challenge of assessing the sources in order to determine their potential.

## **1.4 Objectives**

The objectives of this project are as follows:

- a. To identify the various renewable energy sources available in Malaysia with emphasis on the marine renewable energy sources such as OTEC, Salinity Gradient, Tidal Current, Tidal Barrage and Wave Energy in particular.
- b. To identify the importance, usage and methods of estimation (evaluation) of the different renewable energy sources, especially the marine renewable energy in Malaysia.
- c. To examine the future prospects of these sources for the development of the country.

## **1.5 Scope of the study**

- To present the usage of resources in electricity production in the past and in the future in Malaysia.
- To identify and develop methods that can be used for evaluating the renewable energy sources in Malaysia.
- To present an analysis of the measures recommended to be taken in Malaysia for an improvement into the development of the renewable energy sector.

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