



THE STATUS OF WIND RESOURCE ASSESSMENT (WRA) TECHNIQUES, WIND ENERGY POTENTIAL AND UTILISATION IN MALAYSIA AND OTHER COUNTRIES

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ABSTRACT

Current dependency on finite reserves fossil fuels and adverse environmental effects of conventional power system created new dimension interest in renewable energy sources toward building a sustainable and reliable energy in the near future. Wind energy is renewable and considered as one of the safest, cleanest and fastest growing forms of renewable energy in the world. Generation of electrical energy from wind can only be possible where there is considerable wind resource exists. For this reasons an accurate wind resource evaluation is a vital tool for harnessing energy content in a wind. This paper is critically reviews different techniques used in wind resource assessment, prospects and challenges of utilizing wind energy in some developed and developing countries; however recent progress and development of wind energy potential and utilizations in the countries neighboring Malaysia are discussed. Several recent wind energy potential studies, areas that are suitable for exploitation of wind energy for electrical power generation as well as the current situation of wind energy utilization in Malaysia and possible recommendations were presented.

Keywords: renewable energy, wind energy, Malaysia, wind resources assessment, wind energy potential, wind energy utilization.

1. INTRODUCTION

All countries of the world aim to provide sustainable energy in order to meet social and economic developments. In this regard energy is a vital resource and one of the key factors for the progress of any nation. Energy demands have increase rapidly due to urbanization, industrialization and population growth. Fossil based fuels pollutes lower layer of the atmosphere, generates greenhouse gases and acidification, moreover the resources is limited, and currently the rate of exploitation is expected to deplete within the next centuries [1-3].

Energy crisis witnessed in the early 70s makes other options such as natural gas; coal and hydro become viable [4-5]. The current focus of the world today is better and sustainable energy sources. In relation to the above, renewable energy resources can serve as catalyst for energy generation in the near future. Renewable energy sources, wind, solar, geothermal, hydro, biomass and ocean thermal energy have attracted much interest and attention from all over the world due to their unique inexhaustible and non-polluting characteristics. Wind energy as one of those important sources is perhaps the most suitable, most effective and inexpensive sources for electricity production as a result; it is vigorously pursued in many countries [6].

Wind power utilization in the world is currently at the scale-up development, the total installed global power capacity at the end of 2012 is 282, 482MW of this 38.67% installed Europe, followed 34.63% in Asia, 23.92% in North America, 1.24% in Latin American and Caribbean, 1.14% in pacific region and 0.4% in Middle East and Africa [7]. The global annual and cumulative

installed wind capacity from 1996-2012 is shown in Figures 1 and 2, respectively.

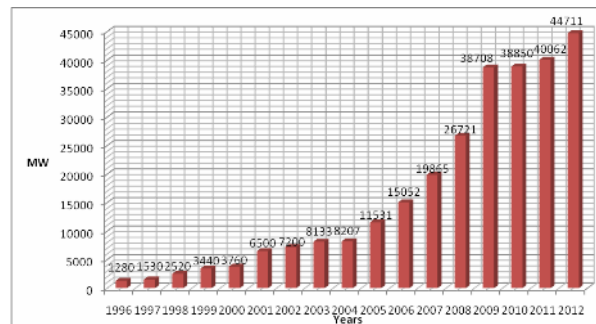


Figure-1. Global annual installed wind capacity.

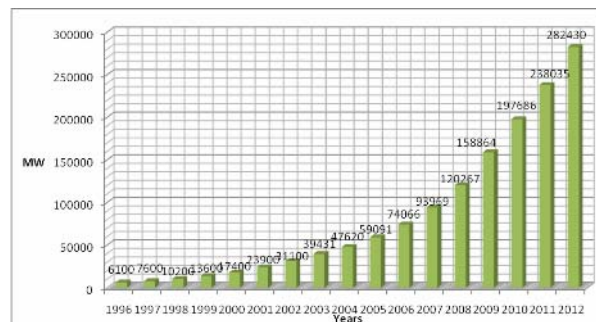


Figure-2. Global cumulative installed wind capacity.

Considering rapid development of wind energy applications in the world scenario, it become necessary to identify the conventional practices of wind energy