The Study on Potential of Electrical Power and Energy Resulted From Wave Generated by Wind

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SUMMARY

The need for energy in Indonesia is increasing in line with economic and population growth. The increasing demand for electrical energy would not generate a big problem if the installed electric capacity is sufficient to accommodate all the needs of society. Ironically, conventional energy sources such as fossil fuels which are the main energy sources in Indonesia have limited reserves. One policy of the Ministry of Energy and Mineral Resources in addressing national issues is the diversification of energy supply and utilization of new energy sources, one of which is marine energy sources. Ocean energy sources that can efficiently be converted into electrical energy is the sea wave. This study aims to determine the potential energy and electricity that can be generated from wind-generated wave in Tangerang, Cilacap, Semarang, Surabaya, Banyuwangi, Kalianget, and Denpasar.

This study took the wind data from Weather Underground during the year of 2013. Data at the interpolated interval of 1 hour were used to calculate the ocean waves components, which are wave hight (H) and wave period (T). Wave generation method used in this research are SMB (Sverdrup-Munk-Bretschneider), Wilson, JONSWAP (Joint North Sea Wave Project), and CEM (Coastal Engineering Manual). Around 33% of total wave generated using the above methods were found to be significant in this research. A comparative analysis between and among the generation method was done using MAE and Scatter Index value. Potential energy and electric power are calculated at each dominant wind direction based on wind rose diagram by using Oscillating Water Column model that has a chamber size of 10 m x 18 m.

SMB method is most accurate method to be used in the calculation of wave generation than the other methods. Based on the analysis using MAE values and scatter index, the result show that most of the SMB method has a lower value than the other three methods. Each study site has different

potential energy and power. The larger wave height, the greater potential energy will be generated. While the amount of power is inversely proportional to the wave period. Results presentation and distribution of wind energy potential and power calculations are used as a determinant of the direction of the power plant, which is the dominant wind direction that produces the largest potential for energy and power.