

**PENERAPAN METODE *MULTI-CRITERIA DECISION MAKING*: STUDI
KELAYAKAN SISTEM ENERGI TERBARUKAN *HYBRID* DI KAWASAN
IKN NUSANTARA**

SKRIPSI

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Untuk memperoleh gelar Sarjana Teknik Elektro

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IKN NUSANTARA**

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ABSTRAK

Konsumsi energi konvensional di Indonesia didominasi oleh penggunaan batu bara, minyak dan gas. Penggunaan energi konvensional khususnya pada pembangkit listrik dalam jangka waktu yang lama akan berdampak serius terhadap perubahan iklim dunia. Untuk mengurangi konsumsi bahan bakar konvensional khususnya pada pembangkit maka perlu diganti dengan penggunaan energi terbarukan dan ramah lingkungan (*renewable energy*). Dalam memutuskan pembangkit terbaik dan cocok untuk diimplementasikan pada suatu daerah diperlukan metode *Multi Criteria Decision Making Analytic Hierarchy Process* (MCDM AHP) untuk mendapatkan prioritas atas solusi yang diberikan. Dalam penelitian ini terdapat 3 jenis alternatif *renewable energy* yang digunakan dan ditetapkan 2 jenis pembangkit berdasarkan urutan prioritas hasil analisis metode AHP yang disimulasikan dalam sistem *Hybrid renewable energy sistem* yaitu *hydropower* dan tenaga surya. Untuk mengetahui kelayakan perancangan sistem tersebut digunakan *software Hybrid optimization model for electric renewables* (HOMER) yang dimana hasil dari optimasi HOMER menghasilkan nilai *net present cost* (NPC) sebesar Rp.22.058.010.000,00 *Cost of Energy* (COE) Rp.418,74 dan *Operational and maintenance* (O&M) selama 25 tahun sebesar Rp.1.129.780.000,00 dengan dapat membangkitkan energi 2.515.101 kWh/tahun. Dengan demikian Penerapan Metode *Multi Criteria Decision Making* studi kelayakan sistem energi terbarukan *hybrid* dikawasan IKN Nusantara layak untuk dikembangkan dan diteliti lebih lanjut.

Kata Kunci: *Hybrid renewable energy system, Analytic hierarchy process, Hybrid optimisation model for electric renewables*

ABSTRACT

Conventional energy consumption in Indonesia is dominated by the use of coal, oil and gas. The use of conventional energy, especially in power generation in the long term will have a serious impact on global climate change. To reduce the consumption of conventional fuels, especially in power generation, it is necessary to replace them with the use of renewable and environment friendly energy (renewable energy). In deciding the best and suitable generation to be implemented in an area, the Multi Criteria Decision Making Analytic Hierarchy Process (MCDM AHP) method is needed to get priority for the given solution. In this study, there are 3 types of alternative renewable energy used and 2 types of generation are determined based on the priority order of the results of the AHP method analysis which is simulated in the Hybrid renewable energy system, namely hydropower and solar power. To find out the system design, the hybrid optimization model software for renewable energy (HOMER) which results from HOMER optimization produces a net present cost (NPC) value of Rp. 22,058.010,000.00 Cost of Energy (COE) Rp.418.74 and Operational and Maintenance (O&M) for 25 years amounting to Rp. 1,129,780,000.00 with the capacity to generate 2,515,101 kW/year of energy. Thus, the application of the multi-criteria decision-making method for the study of renewable energy systems in the hybrid area of IKN Nusantara is feasible to be developed and researched further.

Keyword: Hybrid renewable energy system, Analytic hierarchy process, Hybrid optimization model for electric renewables

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