Analisis keekonomian dan risiko pembangunan pembangkit listrik hibrid mikrohidro dan PV Distrik Hingk, Kabupaten Pegunungan Arfak, Papua Barat = Economic and risk analysis of microhydro and PV hybrid power plant development at Hingk District, Arfak Mountains Regency, West Papua

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Abstrak

Indonesia memiliki target rasio elektrifikasi untuk semua provinsi sebesar 100% dalam RUPTL 2018-2027. Namun sampai saat ini masih banyak daerah di Indonesia yang belum mendapatkan aliran listrik. Khususnya di Distrik Hingk, Kabupaten Pegunungan Arfak, Papua Barat. Sulitnya medan menjadi tantangan pembangunan jaringan listrik di sana. Pembangkit Listrik Hibrid Mikrohidro dan PV merupakan solusi yang tepat untuk menghadirkan listrik di sana. Sebelum dilakukan pembangunan diperlukan analisis keekonomian dan risiko dengan melakukan variasi terhadap skenario kebijakan dan investasi. Dalam penilitian ini dilakukan analisis ekonomi dan risiko terhadap kelayakan pembangunan pembangkit. Analisis ekonomi dilakukan dengan menghitung NPV,IRR dan payback period. Analisis risiko dilakukan dengan metode monte carlo. Analisis dilakukan terhadap sistem hybrid seri, sistem hybrid switched, dan sistem hybrid paralel. Berdasarkan hasil perhitungan didapatkan untuk sistem hybrid seri nilai NPV $232.444 dan IRR 15% dengan payback period selama 6,9 tahun. Sistem hybrid switched memiliki nilai NPV $252.747 dan IRR 17% dengan payback period selama 6,13 tahun. Sistem hybrid paralel memiliki nilai NPV $286.340 dan IRR 20% dengan payback period 4,94 tahun. Dari hasil simulasi didapatkan bahwa semua sistem hybrid layak untuk digunakan dan sistem hybrid paralel akan memberikan keuntungan terbesar jika diaplikasikan. .....According to RUPTL 2018-2027, Indonesia targets a 100% electrification ratio for all provinces. However, there are a lot of areas in Indonesia that are still lack of proper electricity access, for example at the Hingk District, Arfak Mountains Regency, West Papua. One of the main challenges of building a proper electricity infrastructure in that area is the difficulty of the terrain. A hybrid power plant of hydroelectric power and photovoltaic is the right solution to this problem. Prior to the development of the power plant, a feasibility study that consists of economic and risk analysis is done by simulating different policies and various investment schemes. All of these simulations are compared to each other to obtain the most feasible option that will attract investors to invest in this project. Economic analysis and risk were carried out on the feasibility of building a power plant. Economic analysis is done by calculating the NPV, IRR and payback period. Risk analysis is done by the Monte Carlo method. The analysis was carried out on series hybrid, switched hybrid, and parallel hybrid. Based on the calculation results obtained for the hybrid series system the NPV value is $ 232,444 and the IRR is 15% with a payback period of 6.9 years. The switched hybrid system has s NPV $ 252,747 and an IRR of 17% with a payback period of 6.13 years. The parallel hybrid system has NPV values of $ 286,340 and IRR of 20% with a payback period of 4.94 years. From the simulation results, it was found that all hybrid systems are feasible to be built and the parallel hybrid system is the best choice to be applied.