Investment Feasibility Study: Solar Power Installation in Samarinda Using the Value at Risk Method = Studi Kelayakan Investasi: Pemasangan Pembangkit Listrik Tenaga Surya di Samarinda dengan Metode Value at Risk

Bagas Anandaffa Firdaus, author

Abstrak

Metode Value at Risk (VaR) berbasis simulasi Monte Carlo digunakan dalam penelitian ini untuk mengevaluasi kelayakan investasi Pembangkit Listrik Tenaga Surya (PLTS) ground-mounted di Samarinda. Metode ini memungkinkan kuantifikasi risiko finansial berdasarkan distribusi probabilistik dari indikator utama, seperti NPV, IRR, dan DSCR. Proyek ini relevan mengingat pentingnya resiliensi energi pasca disrupsi, termasuk pada industri kemasan yang semakin terdampak ketidakpastian rantai pasok dan ketergantungan energi konvensional. Dengan memanfaatkan perangkat lunak PVsyst dan pemodelan finansial tiga laporan (3-statement model), penelitian ini mengestimasi NPV sebesar Rp5.471.103.584, dengan nilai NPV at Risk (pada level 95%) sebesar Rp413.455.185, sehingga potensi kerugian nilai mencapai -Rp5.057.648.399. IRR ratarata tercatat sebesar 25,18% dan IRR at Risk sebesar 13,45%, dengan potensi penurunan pengembalian hingga -11,73%. Sementara itu, DSCR tercatat sebesar 3,21 dan DSCR at Risk sebesar 1,84, menandakan penurunan rasio pembayaran utang sebesar 1,37. Faktor risiko paling signifikan berasal dari ketidakpastian tarif listrik (PPA), diikuti oleh suku bunga dan degradasi panel. Strategi mitigasi disarankan berupa pengamanan kontrak PPA jangka panjang dan diversifikasi sumber pendanaan, guna meningkatkan ketahanan finansial investasi energi surya di Indonesia.
.....The Value at Risk (VaR) method based on Monte Carlo simulation is employed in this study to evaluate the investment feasibility of a ground-mounted Solar Power Plant (PLTS) in Samarinda. This method enables the quantification of financial risks using probabilistic distributions of key indicators such as NPV, IRR, and DSCR. The project is highly relevant given the importance of energy resilience in the post-disruption era, particularly in the packaging industry, which has been increasingly affected by supply chain uncertainties and dependence on conventional energy sources. Utilizing PVsyst software and a threestatement financial model, the study estimates an NPV of Rp5,471,103,584, with a 95% VaR of Rp413,455,185, indicating a potential value loss of -Rp5,057,648,399. The average IRR is recorded at 25.18%, while the IRR at Risk is 13.45%, reflecting a possible return reduction of -11.73%. Meanwhile, the DSCR stands at 3.21, with a DSCR at Risk of 1.84, signaling a potential drop in debt coverage ratio of 1.37. The most significant risk factor stems from electricity tariff (PPA) uncertainty, followed by interest rate fluctuations and panel degradation. Recommended mitigation strategies include securing long-term PPA contracts and diversifying funding sources to enhance the financial resilience of solar energy investments in Indonesia.