Studi Analisis Pengaruh Radiasi Matahari Terhadap Kualitas Daya Keluaran PLTS 90 kWp On Grid pada Gedung Energi Puspitek = Study Analysis of The Effect of Solar Radiation on Power Quality Output from PLTS 90 kWp On Grid at The Puspitek Energy Building

Salsabila Zahrah, author

Abstrak

Sesuai tren dan perkembangan teknologi sekarang, penerapan PLTS yang berbasis pada energi surya sebagai Energi Baru Terbarukan (EBT) di Indonesia kian hari kian meningkat. Menurut Rencana Usaha Penyediaan Tenaga Listrik (RUPTL) PT PLN Tahun 2021-2030, potensi energi surya di Indonesia relatif tinggi sebesar 207.898 MW dan potensi ini merupakan potensi terbesar dibandingkan EBT lain. Namun keberadaan energi surya bersifat intermittent karena dipengaruhi oleh banyak faktor misalnya cuaca dan awan, sehingga mempengaruhi energi listrik dan kualitas daya keluaran dari PLTS. Studi ini bertujuan untuk menganalisis pengaruh radiasi matahari terhadap kualitas daya sistem distribusi listrik dan menganalisis variasi besaran - besaran tegangan fasa, arus fasa, daya aktif, daya reaktif, daya semu, Total Distorsi Harmonik Tegangan (THDV), Total Distorsi Harmonik Arus (THDI), dan Total Distorsi Permintaan (TDD) yang terjadi. Berdasarkan hasil pengukuran secara langsung yang dilaksanakan pada Gedung Energi Puspitek dengan studi objek PLTS Rooftop On Grid 90 kWp, pengaruh radiasi surya terhadap perubahan - perubahan nilai yang relatif tidak signifikan adalah tegangan fasa, THDv dengan nilai rata - rata secara berurutan, yaitu 0,37%; 1,97% saat kenaikan radiasi matahari serta 0,29%; 2,19% saat penurunan radiasi matahari. Dan perubahan - perubahan nilai yang sangat signifikan adalah arus fasa, daya aktif, daya reaktif, daya semu, THDi, TDD dengan nilai rata rata masing - masing 89,13%; 89,98%; 89,91%; 89,97%; 32,10%; 17,08% saat kenaikan radiasi matahari serta 37,61%; 37,79%; 37,79%; 39,59%; 14,33% saat penurunan radiasi matahari.

.....In accordance with current trends and technological developments, the application of PLTS based on solar energy as New Renewable Energy "EBT" in Indonesia is increasing day by day. According to PT PLN's 2021-2030 Electric Power Supply Business Plan (RUPTL), the potential for solar energy in Indonesia is relatively high at 207,898 MW and this potential is the largest potential compared to other EBT. However, the existence of solar energy is intermittent because it is influenced by many factors such as weather and clouds, thus affecting electrical energy and the quality of the output power of PLTS. This study aims to analyze the effect of solar radiation on the power quality of the electrical distribution system and analyze variations in the magnitudes of phase voltage, phase current, active power, reactive power, apparent power, Total Harmonic Distortion of Voltage (THDV), Total Harmonic Distortion of Current (THDI), and Total Demand Distortion (TDD) that occurred. Based on the results of direct measurements carried out at the Puspitek Energy Building with a 90 kWp Rooftop On Grid PLTS object study, the effect of solar radiation on changes in values that are relatively insignificant is the phase voltage, THDv with an average value sequentially, namely 0,37 %; 1,97% when the increase in solar radiation and 0,29%; 2,19% when the decrease in solar radiation. And very significant changes in values are phase current, active power, reactive power, apparent power, THDi, TDD with an average value of 89,13% each; 89,98%; 89,91%; 89,97%; 32,10%; 17,08% when solar radiation increases and 37,61%; 37,79%; 37,79%; 39,59%; 14,33% when the

solar radiation decreases.