

Kinerja efektif dari suatu sistem PLTS adalah yang mampu memaksimalkan potensi radiasi yang diterima modul surya menjadi energi listrik. Kinerja yang optimal dari PLTS akan memberikan keuntungan finansial bagi pihak yang memasangnya. Keuntungan dapat berupa pengurangan konsumsi energi listrik PLN, atau peningkatan manfaat berupa pengurangan tagihan dari skema ekspor-impor energi. Gedung Kantor Setjen Kementerian ESDM telah menggunakan PLTS *on grid* dengan kapasitas 150,66 kWp sejak Tahun 2017. PLTS ini telah menerapkan skema ekspor impor energi, yang memungkinkan kelebihan energi listrik yang dihasilkan PLTS pada hari libur kerja dialirkan ke jaringan PLN. Sejak pembangunan, PLTS *rooftop on grid* Setjen Kementerian ESDM belum pernah dihitung kinerjanya.

Kinerja PLTS dinilai dari rasio kinerja dan tingkat *losses*-nya, dihitung dan dianalisis berdasarkan kapasitas dan output energi yang dihasilkan. Analisis ini dilakukan dengan menghitung, mengkomparasi output real dengan perhitungan manual dan simulasi menggunakan software, serta penerapannya dalam mekanisme ekspor – impor energi. Perhitungan manual dilakukan dengan menggunakan persamaan yang memasukkan faktor radiasi matahari dan *temperatur coretion factor*, serta efisiensi peralatan. Simulasi dilakukan untuk mengetahui nilai dan penyebab *losses* pada sistem menggunakan *software Pvsyst, SAM, HelioScope*. Mekanisme ekspor impor berdasarkan Permen ESDM no 49 Tahun 2018.

Rasio kinerja PLTS Setjen Kementerian ESDM secara keseluruhan berada dikisaran 0,47 – 0,64. Rasio kinerja pembangkit sesuai penempatan lokasinya, yang paling optimal *rooftop* Lt 11 dengan 0,90 - 0,98, yang terendah PLTS *carport* T3 berada dikisaran 0,05 – 0,12. PLTS menghasilkan kontribusi terhadap konsumsi secara *on grid* sebesar 22,63 % - 25,44 %. Nilai ekspor energi dari PLTS setjen KESDM ke jaringan PLN dalam skema *Net Metering* berkisar antara 8,0% – 12,0 % dari perbulan. Kontribusi ekspor terhadap pengurangan tagihan listrik adalah 1,32% - 9,60% dari total tagihan listrik gedung Heritage. Terdapat *losses* akibat *shading* sebesar 101.045,84 kWh per tahun atau 47,54%.

Kata Kunci : Rasio kinerja, Ekspor – impor, *Net Metering*, *losses*, *Shading*.

The effective performance of a solar power plant can maximize the potential of radiation received by solar modules into electrical energy. The optimal performance of the solar power plant will provide financial benefits for those who install it. The benefits can be in the form of a reduction in PLN's electricity consumption, or an increase in benefits in the form of a reduction in the bill of the energy import-export scheme. The building of the Secretariat General of the Ministry of Energy and Mineral Resources (Setjen KESDM) has used solar power plants on grid with a capacity of 150.66 kWp since 2017. The solar power plant has implemented an energy import-export scheme, which allows excess electricity generated by the solar power plant on days off to be flowed to the PLN network. Since the construction, the solar power plant of the rooftop on grid of Setjen KESDM has never been counted for its performance.

The solar power plant performance was assessed based on the ratio of its performance and the level of losses, which was calculated and analyzed based on the capacity and output of energy produced. This analysis was carried out by calculating, comparing real outputs with manual calculations and simulations using software, as well as their application in the energy export-import mechanism. Manual calculations were conducted using equations that include the solar radiation factor and temperature correction factor, as well as equipment efficiency. The simulation was carried out to find out the value and cause of losses in the system using Pvsyst, SAM, and HelioScope software. The export-import mechanism was based on the Regulation of the Minister of Energy and Mineral Resources Number 49 of 2018.

The overall performance ratio of the solar power plant of Setjen KESDM was in the range of 0.47-0.64. The performance ratio of the solar power plant according to location placement showed that the most optimal was the 11th floor rooftop with 0.90-0.98, while the lowest was the solar power plant on the T3 carport which was in the range of 0.05-0.12. The solar power plant generated contribution to consumption on grid of 22.63%-25.44%. The export value of the energy of the solar power plant of Setjen KESDM to the PLN network in the Net Metering scheme ranged from 8.0%-12.0% per month. The contribution of exports to the reduction of electricity bills was 1.32%-9.60% of the total electricity bills of the Heritage building. There were losses due to shading of 101,045.84 kWh per year or 47.54%.

Keywords: Performance ratio, Export-import, Net Metering, Losses, Shading.