APLIKASI *MATLAB* UNTUK ESTIMASI KUANTITAS SEL SURYA SEBAGAI CATU DAYA PENCAHAYAAN GEDUNG

ABSTRAK

Sumber energi surya sebagai salah satu sumber energi ramah lingkungan sangat penting untuk dikembangkan dalam menghadapi era krisis minyak dan krisis polusi lingkungan sat ini. Kuantitas sel surya untuk catu daya pencahayaan gedung diestimasi sesuai kebutuhan pencahayaan standar yang ditetapkan oleh Badan Standardisasi Nasional Indonesia (SNI No. 6197: 2011), agar terwujud efisiensi energi listrik pencahayaan gedung sehingga kuantitas sel surya yang dibutuhkan minimum.Untuk mewujudkan tingkat pencahayaan sesuai standar perlu perhitungan efikasi lampu minimum agar intensitas daya standar tiap ruang tidak terlampaui.

Penelitian dimulai dari identifikasi fungsi ruang agar disesuaikan dengan tingkat pencahayaan dan intensitas daya standarnya. Selanjutnya pengukuran panjang, lebar dan tinggi ruang untuk memprogramkan optimasi koefisien utilitas lampu terkait indeks ruang. Dari ke 2 langkah tersebut dapat dihitung efikasi minimal lampu sebagai acuan pemilihan lampu. Dengan data radiasi rata-rata dan menghitung energi konsumsi pencahayaan, serta data modul surya, kuantitas sel surya dapat diestimasi. Perhitungan pencahayaan keseluruhan ruang dilakukan secara simultan dengan memanfaatkan matriks diagonal menggunakan *MATLAB.*

Hasil menunjukkan bahwa desain pencahayaan seluruh ruang menyediakan tingkat pencahayaan di atas standar dengan intensitas daya listrik di bawah standar. Energi seluruh lampu sebesar 9,504 KWh tiap hari. Untuk suplai energi tersebut dibutuhkan 5 unit modul surya dengan kapasitas daya puncak 245 Watt.

Kata kunci:
Pencahayaan, koefisien utilitas, efikasi, intensitas daya listrik,

MATLAB APPLICATIONS TO ESTIMATE THE QUANTITY OF SOLAR CELLS AS A POWER SUPPLY OF BUILDING LIGHTING

ABSTRACT

Solar energy as a source of environmentally friendly energy is very important to be developed in the era of the oil crisis and environmental pollution nowadays. The quantity of solar cells for power supply of the building lighting is estimated according to the needs of lighting standards established by the National Standardization Agency of Indonesia (SNI No. 6197: 2011), in order to realize the energy efficiency of electric lighting of buildings so that the quantity of solar cells needed to realize will be minimum.To realize the standard lighting levels, it is necessary to have efficacy measurement calculations so that the default power intensity of each room is not exceeded.

This study is initiated by the identification of space function to be adjusted to the intensity level of the lighting and power standards. Further measurements of length, width and height space to program optimization related to the coefficient of light utility space index are also applied. From those two steps, it can be calculated the minimum efficacy as a reference of light lamp selection. With the average radiation data and the energy consumption of lighting calculation, as well as data of solar modules, then, the solar cell quantity can be estimated. Overall room lighting calculations is performed simultaneously by utilizing a diagonal matrix with *MATLAB* application.

The results show that the design of the lighting throughout the room provides light levels above the standard with sub-standard intensity of the electric power. The entire light energy spent is 9.504 kWh per day. To supply the energy, it is required 5 units of solar modules with a capacity of 245 Watt peak power.

Keywords:
Lighting, utility coefficient, efficacy, the intensity of the electric power.