Study Life Cycle Assessment Lampu Light Emitting Diode (LED) Flourescent Serta Kajian Retrofit Penggunaan Lampu di Gedung Perkantoran = Study Life Cycle Assessment of Light Emitting Diode (LED) Fluorescent Lamp and Retrofit Study on the Use of Lighting in the Office Building

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Abstrak

Lampu sebagai salah satu pencahayaan buatan merupakan produk yang dibutuhkan didalam kehidupan sehari-hari. Produk lampu saat ini melakukan transisi ke produk lampu LED yang merupakan jenis lampu yang mempunyai kelebihan hemat energi, umur lampu lebih lama dan juga tidak mengandung merkuri. Penelitian ini melakukan kajian dampak lingkungan menggunakan metode Life Cycle Assessment (LCA) pada produk lampu LED Fluorescent. Analisis retrofit dilakukan untuk mengetahui penghematan energi, penghematan tagihan dan penurunan karbon dari proses penggantian lampu. Kajian LCA menggunakan software openLCA. Batasan sistem pada penelitian ini adalah gate-to-gate. Metode penilaian dampak menggunakan 2 metode yaitu CML-IA Baseline dan Cumulative Energy Demand (CED). Kajian retrofit melakukan analisis konservasi energi dan analisis biaya. Berdasarkan hasil analisis LCA produk lampu LED, penilaian dampak lingkungan dengan CML IA-Baseline menghasilkan nilai dampak tertinggi yaitu marine aquatic ecotoxicity sebesar 1,2E-01.Hasil penilaian dampak dengan menggunakan CED menghasilkan nilai dampak tertinggi adalah non-renewable energy sebesar 161,7 MJ. Hasil analisis retrofit menunjukkan bahwa dengan melakukan penggantian lampu dari lampu konvesional fluorescent ke lampu LED fluorescent maka akan terjadi penghematan energi sebesar 66.470,40 kWh/tahun. Penghematan tagihan sebesar Rp112.968.438,91/tahun. Dari hasil penghematan energi maka emisi karbon yang dapat dikurangi sebesar 55,84 ton CO/tahun. Dan diperoleh keuntungan dari hasil penjualan karbon sebesar Rp 3.886.125/tahun.

.....Lamps as one of the artificial lighting are products needed in everyday life. Recently, transition to LED lamp products is needed which is a type of lamp that has the advantages of being energy efficient, longer lamp life, and also does not contain mercury. In this study, an environmental impact study was conducted using the Life Cycle Assessment (LCA) method with the aim of determining the environmental impact value of LED fluorescent. Retrofit analysis was also carried out to determine the energy savings, bill savings, and carbon reduction from the lamp replacement process. The LCA study process was carried out using openLCA software. The system boundaries in this study are gate-to-gate. The impact assessment method is carried out using 2 methods, namely CML-IA Baseline and Cumulative Energy Demand (CED). The retrofit study was carried out by conducting an energy conservation analysis and the cost analysis. Based on the results of the LCA analysis of LED lighting products, the environmental impact assessment with CML IA-Baseline produced the highest impact value, namely marine aquatic ecotoxicity of 1.2E-01. The results of the impact assessment using CED produced the highest impact value, namely non-renewable energy of 161,7 MJ. The results of the retrofit analysis show that by replacing lamps from conventional fluorescent lamps with LED fluorescent lamps, there will be energy savings of 66,470.40 kWh/year and bill savings of Rp112,968,438.91/year. From the results of energy savings, carbon emissions can be reduced by 55,84 tons

of CO/year. And the profit from the sale of carbon is Rp 3.886.125/year.