

EVALUASI DAMPAK LINGKUNGAN AKIBAT EMISI POLUTAN, AIR LIMBAH, SERTA LOGAM BERAT PADA ABU TERBANG, ABU DASAR, DAN OLI BEKAS DARI KEGIATAN PRODUKSI 1 kWh LISTRIK PLTU BATU BARA 660 MW PT CIREBON ELECTRIC POWER

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INTISARI

Evaluasi dampak lingkungan dari kegiatan produksi 1 kWh listrik PLTU batu bara 660 MW milik PT Cirebon Electric Power telah dilakukan. Penelitian bertujuan untuk memperoleh data inventaris, mengetahui nilai dampak dari 12 potensi dampak lingkungan, mengetahui *hotspot*, dan melakukan analisis sensitivitas serta skenario pengelolaan dari kegiatan produksi 1 kWh listrik tersebut.

Data inventaris yang diperoleh, yaitu masukan dan keluaran berupa massa dan energi pada periode Januari-Desember 2020 merupakan data primer dari PT Cirebon Electric Power, data sekunder yang berasal dari *ecoinvent 3.5 APOS LCIA* dan jurnal internasional. Data inventaris dianalisis melalui pendekatan *Life Cycle Assessment* (LCA) menggunakan perangkat lunak openLCA 1.10.3 dengan metode LCIA CML-IA 2001 (*midpoint*) dan *ecoinvent 3.7 LCIA method*. Hasil LCIA tersebut dibandingkan dengan beberapa analisis sensitivitas dan skenario.

Hasil analisis LCA menunjukkan bahwa emisi dan limbah dari kegiatan produksi 1 kWh listrik yang memberikan potensi kerusakan terhadap 12 dampak lingkungan. *Hotspot* dari dampak GWP terdapat pada konsumsi listrik, *hotspot* dari dampak ODP dan ADP terdapat pada unit proses produksi LDO (*cradle*), *hotspot* dari dampak POCP dan AP terdapat pada unit proses produksi batu bara (*cradle*), *hotspot* dari dampak EP terdapat pada unit proses *boiler*, serta *hotspot* dari dampak HTP, FAETP, FSETP, MAETP, MSETP, dan TAETP terdapat pada hasil samping kegiatan produksi listrik berupa abu terbang dan abu dasar. *Hotspot* dari keseluruhan kegiatan produksi listrik berada pada unit proses *boiler*. Hasil analisis sensitivitas menunjukkan pengaruh dari ruang lingkup terhadap dampak ODP, ADP, POCP, AP, dan GWP pada ruang lingkup *gate-to-gate*, sedangkan analisis sensitivitas sistem siklus air, metode LCIA, dan kualitas data tidak memberikan pengaruh terhadap nilai 12 dampak lingkungan. Skenario pengelolaan abu terbang, abu dasar, dan oli bekas menunjukkan penurunan persentase terhadap dampak HTP, FAETP, FSETP, MAETP, MSETP, dan TAETP, sedangkan skenario pengelolaan refrigeran menunjukkan penurunan persentase terhadap dampak ODP.

Kata kunci: dampak lingkungan, emisi, *Life Cycle Assessment*, PLTU batu bara

***ENVIRONMENTAL IMPACT EVALUATION AS A RESULT OF
POLLUTANT EMISSIONS, WASTEWATER, AND HEAVY METAL IN FLY
ASH, BOTTOM ASH, AND USED OIL FROM PRODUCTION OF 1 kWh
ELECTRICITY IN 660 MW COAL-FIRED POWER PLANT IN
PT CIREBON ELECTRIC POWER***

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ABSTRACT

A study about environmental impact evaluation from production of 1 kWh electricity in 660 MW coal-fired power plant on PT Cirebon Electric Power has been done. The study aimed to obtain inventory database, determine the value of impact in 12 environmental impact potentials, determine hotspots, analyze sensitivity and scenario managements from production of 1 kWh electricity in its power plant.

The study started with an inventory data obtention which includes inputs and outputs in form of mass and energy within the period of January-December 2020 using primary data provided by PT Cirebon Electric Power, secondary data provided by ecoinvent 3.5 APOS LCI and international journals. The inventory data analyzed through Life Cycle Assessment (LCA) approach using openLCA 1.10.3 software with CML-IA 2001 (midpoint) LCIA method and ecoinvent 3.5 LCIA method. The LCIA result is compared with sensitivity and scenario analysis.

The result of study shows the emission and waste from 1 kWh electricity production resulting in 12 environmental impact potentials. The hotspot for GWP is resulted by consumption of electricity. Meanwhile, the hotspot for ODP and ADP are resulted by LDO production (cradle). The hotspot for POCP and AP are located in coal production (cradle), and hotspot for EP is located in boiler. The hotspot for HTP, FAETP, FSETP, MAETP, MSETP, and TAETP are resulted by fly ash and bottom ash. The main hotspot from its electricity production is located in boiler. The sensitivity analysis result showed an influence of LCA scope to ODP, ADP, POCP, AP, and GWP using gate-to-gate. Meanwhile, the sensitivity analysis of water cycle system, LCIA method, and data quality are not showing a different result. Management of fly ash, bottom ash, and used oil scenarios indicates a decrease in the percentage of HTP, FAETP, FSETP, MAETP, MSETP, and TAETP, meanwhile refrigerant management scenario indicates a decrease in the percentage of ODP.

Keywords: coal-fired power plant, emission, environmental impact, Life Cycle Assessment