Analisis Emisi Karbon Dioksida dari Sektor Transportasi di Daerah Istimewa Yogyakarta

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INTISARI

Daerah Istimewa Yogyakarta (DIY) merupakan wilayah dengan tingkat mobilitas penduduk yang tinggi. Pertumbuhan progresif di berbagai bidang mendorong peningkatan aktivitas transportasi. Jumlah kendaraan bermotor yang terus bertambah seiring pertumbuhan penduduk berdampak pada peningkatan emisi gas buang kendaraan bermotor, khususnya emisi karbon dioksida (CO_2) sebagai penyumbang utama gas rumah kaca. Dengan mempertimbangkan kebijakan yang telah diterapkan, diperlukan analisis untuk menekan potensi peningkatan tersebut. Tujuan penelitian ini adalah mengkaji besaran emisi CO_2 di DIY beserta persebarannya di lima kabupaten/kota di DIY.

Unit analisis penelitian mencakup Kabupaten Sleman, Bantul, Gunungkidul, Kulon Progo, dan Kota Yogyakarta selama lima tahun terakhir, yaitu dari 2019 hingga 2023. Penggunaan data sekunder jumlah kendaraan dikategorikan ke dalam sepeda motor, mobil penumpang, bus, dan truk yang bersumber dari Badan Pusat Statistik DIY. Metode penelitian secara kuantitatif dilakukan menggunakan rumus perhitungan emisi IPCC Guidelines 2006 pendekatan Tier 1. Perhitungan emisi mempertimbangkan faktor jumlah kendaraan, konsumsi bahan bakar, dan faktor emisi nasional dengan modifikasi. Hasil perhitungan dianalisis secara deskriptif dan spasial disajikan dalam tabel, grafik, serta peta.

Hasil analisis emisi CO_2 di Kabupaten Sleman selama 2019-2023 menunjukkan emisi tertinggi, mencapai 5.666,7-ton CO_2/km pada 2023, sementara Kabupaten Kulon Progo mencatatkan emisi terendah, yakni 696,2-ton CO_2/km. Peningkatan selama lima tahun konsisten pada setiap wilayah. Mobil penumpang menjadi penyumbang utama emisi dengan rata-rata 1.267,8-ton CO_2/km pada 2023, diikuti oleh bus dengan kontribusi terendah 76,6-ton CO_2/km. Jumlah sepeda motor yang lebih banyak di semua wilayah tetap menghasilkan emisi yang lebih rendah dibandingkan mobil penumpang karena konsumsi bahan bakar dan faktor emisi. Selama periode penelitian, Kabupaten Sleman memiliki emisi per kapita tertinggi akibat kepadatan penduduk yang tinggi. Sementara itu, Kota Yogyakarta menunjukkan angka tertinggi pada emisi per kilometer, dipengaruhi oleh panjang jalur jalan dan luas wilayah yang lebih kecil.

Kata Kunci: Emisi CO_2, Transportasi, Daerah Istimewa Yogyakarta

Analysis of Carbon Dioxide Emissions from The Transportation Sector in Special Region of Yogyakarta

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ABSTRACT

The Special Region of Yogyakarta (SRY) is an area with a high level of population mobility, supported by economic, social, cultural, and educational activities. The progressive growth in various sectors encourages an increase in transportation activities. The rising number of motor vehicles, in line with population growth, impacts the increase in emissions from vehicle exhaust, particularly carbon dioxide (CO_2) emissions, a major contributor to air pollution and greenhouse gases that trigger global warming. Considering existing policies, further analysis is needed to mitigate the potential increase in CO_2 emissions. This study aims to assess the volume and distribution of CO2 emissions across five regencies/cities in SRY.

The units of analysis in this study focus on Sleman, Bantul, Gunungkidul, Kulon Progo, and Yogyakarta City over the past five years (2019–2023). The data used are secondary data on the number of vehicles based on four types: motorcycles, passenger cars, buses, and trucks, were obtained from the SRY Central Statistics Agency. The research method is conducted quantitatively using emission calculation formulas based on the Tier 1 approach. The emission calculations consider factors such as the number of vehicles, fuel consumptions, and national emission factors. The results are analyzed descriptively and spatially, presented in tables, charts, and maps.

Based on the analysis results, it is found that CO_2 emissions emitted by the transportation sector have increased consistently in each unit of analysis over the five-year period. The highest CO_2 emissions during 2019–2023 are found in Sleman Regency, reaching 5,666.7 tons of CO_2/km in 2023, while Kulon Progo had the lowest at 696.2 tons of CO_2/km. Passenger cars were the largest contributors, with an average of 1,267.8 tons of CO_2/km in 2023, while buses had the lowest contribution at 76.6 tons of CO_2/km. Although motorcycles outnumbered passenger cars, their emissions were lower due to lower fuel consumption and emission factors. Based on the total road length, Yogyakarta City has the greatest emissions per kilometer. Furthermore, according to population data, Sleman has the highest emissions per capita due to its high population density.

Keywords: CO_2 Emissions, Transportation, Special Region of Yogyakarta