

ARAHAN PENATAAN KAWASAN KAMPUS UNIVERSITAS DIPONEGORO TEMBALANG DENGAN PENDEKATAN ZERO CARBON CAMPUS

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INTISARI

Berdasarkan pada komitmen yang dibuat oleh Presiden ditahun 2009 untuk secara swadaya mengurangi emisi karbon sebesar 26%, dengan tambahan 15% dengan bantuan internasional pada tahun 2020. Komitmen ini juga dibarengi dengan target mempertahankan pertumbuhan ekonomi sebesar 7%.

Pemindahan kampus UNDIP bawah ke lokasi baru di kawasan Tembalang juga menimbulkan persoalan baru terutama masalah transportasi yaitu semakin tingginya penggunaan transportasi pribadi dan berkurangnya wilayah hijau karena pertambahan jumlah bangunan-bangunan baru serta infrastruktur yang menimbulkan dampak negatif terhadap lingkungan adalah tingginya emisi karbon yang dihasilkan pada kawasan kampus. Berpijak dari hal tersebut, maka penelitian ini penting dan perlu dilakukan dengan tujuan untuk: (a) menganalisis jejak karbon terkait emisi karbon yang dihasilkan dari perjalanan harian civitas akademika dan konsumsi energi pada bangunan (b) merumuskan arahan penataan kawasan yang mendukung terciptanya kawasan *zero carbon campus*.

Dalam melakukan penelitian ini metode yang digunakan adalah deskriptif kuantitatif, yaitu mendeskripsikan gambaran terhadap suatu objek penelitian yang diteliti melalui sampel atau data yang telah terkumpul dan kemudian dari data yang terukur diolah dalam bentuk angka-angka yang dirumuskan dalam tabel dan grafik persentase dari hasil olahan data statistik. Wilayah penelitian meliputi Kampus Universitas Diponegoro Tembalang. Variabel penelitian adalah transportasi darat (motorized /non-motorized) yang digunakan oleh civitas akademika didalam kawasan kampus dan kawasan terbangun (fakultas teknik & fakultas ekonomika dan bisnis sebagai sampel bangunan).

Hasil temuan secara garis besarnya, yaitu: (a) moda transportasi yang dominan adalah kendaraan bermotor pribadi (motor) dengan prosentase emisi karbon adalah 87% dari total emisi kawasan (3.295.774 gramCO₂-ek) dari transportasi darat, (b) keterbatasan ruang parkir tidak seimbang dengan permintaan parkir yang terus meningkat, kapasitas parkir (off-street) yang kurang mengakibatkan beban parkir terakumulasi dibadan jalan sehingga mengakibatkan kemacetan, serta jarak kantong parkir ke beberapa gedung melebihi jarak maksimum orang berjalan (500 meter), (c) peningkatan infrastruktur kawasan masih mementingkan pengguna kendaraan bermotor (motorized) saja sementara untuk berjalan dan bersepeda (non-motorized) masih minim, (d) wilayah utara didominasi oleh bangunan dengan ketinggian ≥ 3 lantai berpotensi untuk energi terbarukan matahari, wilayah selatan berpotensi untuk energi terbarukan kombinasi angin & matahari, (e) hampir seluruh bangunan memiliki ketebalan lebih dari 16 meter (tanpa atrium), pendingin buatan (AC) menggunakan energi terbesar dalam bangunan sehingga menghasilkan nilai emisi karbon terbesar (2.495.260gramCO₂-ek), (f) letak ruang terbuka hijau umumnya mengelilingi bangunan, vegetasi peneduh & pengarah dominan berada disekitar bangunan, taman publik, dan sebagian jalur jalan.

Dari hasil temuan maka dapat disimpulkan bahwa nilai emisi karbon di kawasan Kampus UNDIP Tembalang telah melebihi ambang batas maksimum, sehingga perlu adanya arahan penataan kawasan (design guidelines) secara berkelanjutan melalui pembangunan yang rendah emsisi karbon dan pengembangan sistem transportasi yang efisien dalam mengurangi emisi karbon.

Kata Kunci : Emisi karbon, GRK, *zero carbon*, kampus, kendaraan bermotor, kendaraan tidak bermotor, transportasi darat, dan bangunan.

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DESIGNING THE CAMPUS AREA OF DIPONEGORO UNIVERSITY TEMBALANG BY APPLYING A ZERO CARBON CAMPUS DESIGN APPROACH

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ABSTRACT

According to the commitment which was issued by the President in 2009, the carbon dioxide emission must be decreased 26%, and by the international help, in 2020, there is additional carbon dioxide reduction about 15%. This commitment is set together with the target of maintaining 7% economic growth.

Moving the low-located UNDIP campus to the new place in Tembalang area undeniably forces a new problem such as transportation. This area will get more private vehicles which will affect the decreasing of green area since the existence of new buildings and the infrastructures have a negative impact to the surrounding environment mainly because of the height of carbon dioxide emission resulted from the campus area. Considering those things, this research is significantly important and need to be done aiming at : (a) analyzing the footprints of carbon dioxide related to the emission as a result of daily commute of the UNDIP students and the building energy consumption, (b) formulating the concept to design the area which supports the idea of a zero carbon campus design.

This research was done by applying descriptive qualitative method which mainly describes the objects of the research through the sample or the data which has been compiled. Then, the measured data were analyzed and classified in the form of numbers which was formulated in percentage tables and charts as a result of data analyses. The area of the research included Tembalang-located Diponegoro University. The variables of the research were the road transportation used in the campus area by all staff, students, lecturers and other related parties taking part in Diponegoro University, and the building area (Faculty of Technique and Faculty of Economic and Business as a sample of buildings).

The results of the research generally were: (a) the dominant vehicle in the campus was mainly private vehicle which in this case were motorcycles. The vehicles contributed 87% of the carbon dioxide emission from the total of emission in the area (3.295.774 gramCO₂-ek), (b) the limited parking areas was not sufficient from the increasing parking demand. The low capacity of the parking area (off-street) affected the traffic jam since the parking extended to the road. In addition, the distance between the parking area and the road in several buildings were too close to the maximum distance of pedestrian (500 meters), (c) the infrastructures building was mainly focusing on the motorized vehicle. In contrast, the building of infrastructures for pedestrian and bicycle rider were still lack of attention, (d) the northern part of the campus was dominated by mostly ≥3 stories buildings which were genuinely potential for solar renewable energy, the southern part of the campus had a potential to wind and solar renewable energy, (e) mostly, the buildings was 16 meters thick (without atrium), air conditioners spent the most energy in the buildings, so, it contributed the highest level of carbon dioxide emission (2.495.260gramCO₂-ek), (f) the location of green park generally located around the buildings, the dominant shade vegetations were located around the buildings, public park, and some parts of the campus street or avenue.

From the result of the research, in conclusion, the level of the carbon dioxide emission were over the maximum level, so that, there should be an ongoing guidance to design the campus area through designing a low carbon dioxide emission building and developing the efficient transportation system to reduce the carbon dioxide emission.

Keywords : Carbon dioxide emission, GHG, *zero carbon*, *campus*, motorized vehicle, non-motorized vehicle, road transportation and buildings.

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