ANALISIS *EMBODIED ENERGY* BANGUNAN MENGGUNAKAN DATA SPASIAL *GOOGLE EARTH* DAN QGIS: STUDI KASUS PADA 41 BANGUNAN DI KOTA SALATIGA

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INTISARI

Pembangunan infrastruktur terus meningkat di berbagai daerah, termasuk di kota kecil seperti Salatiga. meskipun *embodied energy* (EE), yaitu akumulasi energi dalam siklus hidup material bangunan, dapat menjadi salah satu pertimbangan dalam pengambilan keputusan pembangunan berkelanjutan, perhatian terhadap aspek ini masih sangat terbatas, terutama di kota kecil. Penelitian ini dilakukan untuk memberikan gambaran awal mengenai kondisi EE pada bangunan di kawasan tersebut.

Penelitian dilakukan dengan tujuan menganalisis nilai EE bangunan di Kecamatan Tingkir, Kota Salatiga, dengan pendekatan konservatif. Metode meliputi observasi lapangan, ekstraksi data spasial menggunakan *Google Earth Pro*, serta pengolahan data dengan QGIS. perhitungan dilakukan secara manual berdasarkan volume material, densitas, dan faktor EE yang diperoleh melalui literatur. Bangunan diklasifikasikan menurut fungsi untuk mengidentifikasi prioritas konservasi energi.

Hasil penelitian menunjukkan variasi nilai EE yang signifikan antar bangunan, dengan bangunan komersial bertingkat memiliki nilai EE tertinggi. Strategi konservasi yang disarankan mencakup efisiensi material, retrofit bangunan eksisting, dan penerapan teknologi ramah lingkungan untuk mendukung pembangunan berkelanjutan.

Kata kunci: *embodied energy, konservasi energi, pembangunan berkelanjutan*

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AN ANALYSIS OF BUILDING EMBODIED ENERGY USING SPATIAL DATA FROM GOOGLE EARTH AND QGIS: A CASE STUDY OF 41 BUILDINGS IN SALATIGA

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ABSTRACT

Infrastructure development continues to grow in various regions, including in smaller cities like Salatiga. Although Embodied Energy (EE), defined as the total energy accumulated throughout the life cycle of building materials, could serve as one of the considerations in sustainable development decision-making, attention to this aspect remains very limited, particularly in small cities. This study aims to provide an initial overview of EE conditions in buildings within the area.

The research was conducted with the goal of analyzing the EE values of buildings in Tingkir District, Salatiga City, using a conservative approach. The methods involved field observations, spatial data extraction with Google Earth Pro, and data processing using QGIS. Calculations were carried out manually based on material volume, density, and EE factors obtained from literature sources. Buildings were classified according to their function in order to identify priorities for energy conservation efforts.

The findings reveal significant variations in EE values among buildings, with multi-storey commercial structures showing the highest levels of EE. Recommended conservation strategies include the use of energy-efficient materials, retrofitting existing buildings, and the adoption of environmentally friendly technologies to support sustainable development.

Keywords: embodied energy, energy conservation, sustainable development

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