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ECONOMY-WIDE MATERIAL FLOW ANALYSIS FOR STREAMLINING THE VIETNAM CEMENT INDUSTRY IN 2022 – 2024

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Abstract

Vietnam is one of the world's largest cement producers, yet environmental assessments of the sector still focus mainly on energy and emission intensities, overlooking material extraction, stock accumulation, and system-wide resource pressure. This study applies an economy-wide Material Flow Analysis (MFA) framework, following Eurostat methodology, to analyze the material metabolism of Vietnam's cement industry from 2022 to 2024, integrating physical flow accounts, environmental extensions, and resource productivity indicators (GDP/DMI and GDP/TMR). The results show a structurally extraction-dependent system, where domestic minerals dominate material inputs and substitution by secondary materials remains limited. Despite declining production volumes, net additions to stock remain high, locking long-term environmental impacts into the built environment. Resource productivity indicators reveal relative rather than absolute decoupling, as apparent efficiency gains are mainly driven by demand slowdowns rather than structural changes in production. CO₂ intensity declined over the study period, indicating operational improvements; however, system-level carbon pressure remains high due to production scale, export dependence, and continued clinker-intensive pathways, sustaining exposure to transition and trade-related risks. By revealing structural drivers of environmental pressure beyond intensity metrics, this study demonstrates the value of EW-MFA as a corrective lens and provides a quantitative basis for developing an environmental pillar assessment model for Vietnam's cement industry.

Key words: cement industry, economy-wide, material flow analysis, sustainability, Vietnam

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