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# COVER LETTER

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*6th, January 2025*

Dear,
I/We wish to submit an original research article entitled *"**A Comprehensive Review of Methods for Reducing Embodied Energy in Building Materials: A Quantitative Cradle-to-Gate Analysis**"* for consideration by SINERGI.

We confirm that this work is original and has not been published elsewhere, nor is it currently under consideration for publication elsewhere. We promise not to withdraw this article after it has been processed by the Editorial Team. If there is a withdrawal, we are willing to pay a penalty of USD 150 (IDR 2000K) to the SINERGI Editorial Team.

In this paper, I/we report on / show that:

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| Field | : | Architecture |
| Topic | : | Reducing Embodied Energy in Building Materials: A Quantitative Cradle-to-Gate Review |
| Brief Background | : | The building sector significantly contributes to global greenhouse gas emissions, primarily through energy consumption and material use. With increasing energy efficiency in buildings, the proportion of embodied energy (EE)—the energy used in material production, transportation, and manufacturing—becomes a critical focus for sustainability. As operational energy (OE) demand reduces, addressing EE is essential, especially in low-energy and nearly zero-energy buildings where EE can dominate total energy consumption. |
| Research Problem | : | Despite the growing emphasis on reducing embodied energy, current literature reveals variability in EE values due to inconsistent methodologies, regional practices, and unclear impacts of specific lifecycle phases. This variability complicates identifying the most effective EE reduction strategies and phases within the cradle-to-gate system. |
| Overview of Method | : | A systematic review of 63 studies was conducted using the PRISMA framework. Relevant data were extracted |

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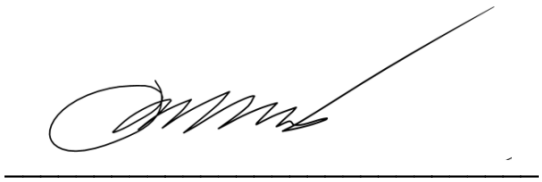
| | | from the Scopus database to categorize methods for reducing EE into three phases: material, construction method, and design. Quantitative analyses, including distribution analysis and ANOVA tests, were employed to compare the effectiveness of these methods. |
| Significant finding | : | EE reduction methods were categorized into three phases:<br>• **Material Phase,** including three approaches: mixed material intervention, production process intervention, and material substitution.<br>• **Construction Method Phase,** including two approaches**:** building component substitution and process or method substitution.<br>• **Design Phase,** focuses on interventions at the building design level.<br>The findings suggest that no single phase showed a significantly greater impact on EE reduction than the others. Integrated approaches combining strategies across multiple phases hold promise for substantial reductions in EE, emphasizing the need for future research to refine and innovate these methodologies. |

We have no conflicts of interest to disclose.

Thank you for your consideration of this manuscript.

Sincerely,
*Dewi Larasati*



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# AUTHORSHIP STATEMENT

I/We wish to submit an original research article entitled *"**A Comprehensive Review of Methods for Reducing Embodied Energy in Building Materials: A Quantitative Cradle-to-Gate Analysis**"* for consideration by SINERGI.

All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated sufficiently in work to take public responsibility for the content, including participation in the concept, design, analysis, writing, or revision of the manuscript.

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