Abstract:

Amidst growing environmental concerns and an escalating awareness of climate change, the choice of insulation materials has gained vital importance in shaping sustainable construction practices. This study conducts a comprehensive assessment of eco-friendly insulation materials, categorizing them into traditional, innovative, petrochemical, and natural types. The primary focus is on evaluating the potential of sheep wool as an environmentally friendly and natural insulation material. Although previous research has explored the eco-friendliness of sheep wool, significant knowledge gaps persist, particularly in its applicability as a building insulation material. This study seeks to address this research gap by investigating the suitability of sheep wool to enhance thermal performance in buildings. So, the study conducted an extensive review and analytically ranked its eco-friendliness through a comparative analysis with critical evaluation, identifying the optimal environmental thermal insulation materials, considering their physical and environmental properties. This paper critically evaluates the use of sheep's wool as a sustainable alternative to traditional insulation materials. As a result, a framework is designed to evaluate and implement sheep wool insulation within the context of green building projects. The findings highlight the favorable thermal performance of sheep wool insulation, comparing with traditional materials. As a result, sheep wool emerges as a promising alternative for sustainable construction practices, offering a viable and eco-friendly insulation solution. This research offers guidelines to architects, builders, and policymakers, for using sustainable construction materials.