Decarbonization Within the Path of Sustainable Development Goals

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ABSTRACT

Building ventilation and retrofitting strategies for homes can bring multiple benefits in the context of achieving Sustainable Development Goals (SDGs) by reducing carbon emissions in the building sector. However, current SDG approaches are fragmented, narrowly focusing on specific areas related to each goal, which now requires an integrated approach. Analyzing the relationships discovered in the literature, we can visually map these connections to understand the complexity of interactions and the diverse positive and negative effects of retrofitting strategies, ventilation standards, and the broader sustainability agenda. This mapping allows us to identify how our discipline and efforts can positively, negatively, or neutrally affect the achievement of SDGs.

KEYWORDS

Energy retrofit, ventilation, residential buildings

1 INTRODUCTION

In this presentation, we will explore the effects of thermal retrofitting of homes on the Sustainable Development Goals (SDGs). Thermal retrofitting is a key strategy for reducing carbon emissions in the residential sector, aligning with the broader goals of sustainability and human well-being. The information was gathered by a systematic review, focusing on identifying both positive and negative impacts of thermal retrofitting on various SDGs.

2. RESULTS AND DISCUSSION

The studies reviewed indicate that thermal retrofitting significantly reduces energy demand and greenhouse gas emissions through improved insulation and energy efficiency measures, which, in turn, lead to lower energy consumption, contributing directly to SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action). This reduction in energy demand also positively impacts SDG 11 (Sustainable Cities and Communities) by lowering urban energy consumption and emissions. The economic benefits of retrofitting homes are substantial, as it reduces basic utility costs, particularly benefiting low-income households and addressing SDG 1 (No Poverty) and SDG 10 (Reduced Inequality). Lower energy bills reduce energy poverty and provide economic relief to vulnerable populations. Additionally, the economic benefits extend to job creation and business opportunities in the construction and energy sectors, promoting SDG 8 (Decent Work and Economic Growth).

Improved indoor environmental quality (IEQ) is another significant benefit of thermal retrofitting. Enhanced thermal comfort, better air quality, and reduced dampness and mold improve health outcomes, aligning with SDG 3 (Good Health and Well-being). However, there are potential negative effects, such as the risk of poor indoor air quality if ventilation is not adequately addressed. Some studies highlighted issues like over-tightening of buildings and inadequate ventilation, which can cause health problems related to indoor air pollutants, negatively impacting SDG 3. Retrofitting may also enhance the aesthetic value of

neighborhoods, contributing to community pride and social cohesion (SDG 11). It can reduce social tensions and promote social equity by improving living conditions across different socio-economic groups. Reducing environmental noise through better insulation also contributes to improved community well-being.

Environmentally, there is a clear reduction in waste production due to a less frequent need for building maintenance and repairs, positively affecting SDG 12 (Responsible Consumption and Production). The lifecycle extension of buildings through retrofitting reduces the need for new construction, conserving natural resources and reducing environmental impact. The review identifies a crucial challenge in implementing effective ventilation systems to avoid negative health impacts. Integrated strategies that combine thermal retrofitting with proper ventilation are essential to maximize benefits and minimize risks.

3. CONCLUSIONS

Thermal retrofitting underlines the multifaceted benefits in achieving SDGs, emphasizing the need for an integrated approach that considers energy efficiency, ventilation standards, and broader sustainability goals. It provides a comprehensive understanding of the positive, negative, and neutral influences of thermal retrofitting on SDGs, advocating for strategic planning and implementation to maximize overall benefits and contribute to a sustainable and resilient built environment.

The search highlights a gap in quantitative analysis of the impacts, suggesting that future research should focus on the magnitude of effects to better inform policy and decision-making. Future studies should then focus on quantifying the impacts of thermal retrofitting to provide more data for policymakers. Additionally, exploring the long-term effects of retrofitting on health, social equity, and environmental sustainability will be needed to develop holistic and effective sustainable development strategies.