

The Impact of Smart Materials Usage in Buildings Envelope: an Approach to Investigate Energy Consumption Versus The Aesthetics Forming The City Image in New Agglomerations

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Abstract. The notion of creating New Agglomerations often demonstrates the challenge between maintaining city's identity and the necessity to adopt contemporary building materials. The main target in the current era is to monitor the degree of sustainable strategies adopted while defining the potential materials used whether in the construction process or for final building envelopes. This study aims to evaluate the implications of energy-saving potential of smart glazing materials in building envelopes through a comparative analysis creating the emergent city image created by building façade systems. A thorough review presents various types of smart glazing materials performance versus traditional glazing systems, in terms of heating and cooling results. The research presents a case study of actual buildings deploying smart glazing systems to provide real-world evidence of their energy-saving potential. The results showed that smart glazing materials can significantly reduce energy consumption compared to traditional glazing systems. The results also indicated that the performance of smart glazing materials varies with different types of materials, and the specific energy-saving potential depends on factors such as building orientation, glazing area, and climate conditions. This study provides insights related to emergent design decisions for new agglomerations in terms of energy-efficient building envelopes and energy consumption strategies.

Keywords: *Energy consumption, new agglomerations, building envelope, energy plus, smart materials, adaptive system.*

