

Environmental Impact of Autoclaved Aerated Concrete in Modern Construction: A Case Study from the New Egyptian Administrative Capital

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Abstract : Building materials selection is critical for the sustainability of any project. The choice of building materials has a huge impact on the built environment and cost of projects. Building materials emit huge amount of carbon dioxide (CO₂) due to the use of cement as a basic component in the manufacturing process and as a binder, which harms our environment. Energy consumption from buildings has increased in the last few years; a huge amount of energy is being wasted from using unsustainable building and finishing materials, as well as from the process of heating and cooling of buildings. In addition, the construction sector in Egypt is taking a good portion of the economy; however, there is a lack of awareness of buildings environmental impacts on the built environment. Using advanced building materials and different wall systems can help in reducing heat consumption, the project's initial and long-term costs, and minimizing the environmental impacts. Red Bricks is one of the materials that are being used widely in Egypt. There are many other types of bricks such as Autoclaved Aerated Concrete (AAC); however, the use of Red Bricks is dominating the construction industry due to its affordability and availability. This research focuses on the New Egyptian Administrative Capital as a case study to investigate the potential of the influence of using different wall systems such as AAC on the project's cost and the environment. The aim of this research is to conduct a comparative analysis between the traditional and most commonly used bricks in Egypt, which is Red Bricks, and AAC wall systems. Through an economic and environmental study, the difference between the two wall systems will be justified to encourage the utilization of uncommon techniques in the construction industry to build more affordable, energy efficient and sustainable buildings. The significance of this research is to show the potential of using AAC in the construction industry and its positive influences. The study analyzes the factors associated with choosing suitable building materials for different projects according to the need and criteria of each project and its nature without harming the environment and wasting materials that could be saved or recycled. The New Egyptian Administrative Capital is considered as the country's new heart, where ideas regarding energy savings and environmental benefits are taken into consideration. Meaning that, Egypt is taking good steps to move towards more sustainable construction. According to the analysis and site visits, there is a potential in reducing the initial costs of buildings by 12.1% and saving energy by using different techniques up to 25%. Interviews with the mega structures project engineers and managers reveal that they are more open to introducing sustainable building materials that will help in saving the environment and moving towards green construction as well as to studying more effective techniques for energy conservation.

Keywords : AAC blocks, building material, environmental impact, modern construction, new Egyptian administrative capital

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