

An Approach towards Designing an Energy Efficient Building through Embodied Energy Assessment: A Case of Apartment Building in Composite Climate

Authors : Ambalika Ekka

Abstract : In today's world, the growing demand for urban built forms has resulted in the production and consumption of building materials i.e. embodied energy in building construction, leading to pollution and greenhouse gas (GHG) emissions. Therefore, new buildings will offer a unique opportunity to implement more energy efficient building without compromising on building performance of the building. Embodied energy of building materials forms major contribution to embodied energy in buildings. The paper results in an approach towards designing an energy efficient apartment building through embodied energy assessment. This paper discusses the trend of residential development in Rourkela, which includes three case studies of the contemporary houses, followed by architectural elements, number of storeys, predominant material use and plot sizes using primary data. It results in identification of predominant material used and other characteristics in urban area. Further, the embodied energy coefficients of various dominant building materials and alternative materials manufactured in Indian Industry is taken in consideration from secondary source i.e. literature study. The paper analyses the embodied energy by estimating materials and operational energy of proposed building followed by altering the specifications of the materials based on the building components i.e. walls, flooring, windows, insulation and roof through res build India software and comparison of different options is assessed with consideration of sustainable parameters. This paper results that autoclaved aerated concrete block only reaches the energy performance Index benchmark i.e. $69.35 \text{ kWh/m}^2 \text{ yr}$ i.e. by saving 4% of operational energy and as embodied energy has no particular index, out of all materials it has the highest EE 23206202.43 MJ.

Keywords : energy efficient, embodied energy, EPI, building materials

Conference Title : ICSB 2019 : International Conference on Sustainable Building

Conference Location : Prague, Czechia

Conference Dates : March 21-22, 2019