



Massive wood elements and modular housing technology as innovative building concept of sustainable urban planning

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Abstract

A growing need for better performing materials and developing sustainable building solutions with less environmental impact has become indispensable. Renewable resources such as wood provide a natural way to design and build innovative structural systems. The industrialized processes and cutting-edge concepts make wooden buildings a highly competitive and sustainable alternative. Using massive wood elements and housing modules constructed of engineered wood products such as CLT and LVL is an example of building innovation. With today's climate challenges and ongoing sustainability demands it is important to make urban planning and policy development as environmentally friendly as possible. Using wood as construction material is an environmentally conscious choice leading to a solution meeting the needs of population growth and urbanization.

Keywords: renewable materials; massive wood structures; innovative structural systems; sustainable building solutions; urban planning; modular design; timber; wooden multi storey buildings; structures and environment; ecological development.

1 Introduction

The built environment is responsible for 40% of primary energy use and 36% of energy related to CO₂ emissions [1]. Therefore, there is a growing need to focus on creating better performing materials and developing sustainable building solutions with less environmental impact. Renewable resources such as wood and other biomaterials provide a natural way to design and build innovative structural systems.

Wood is a reusable, renewable, sustainable and cost-competitive construction material that has scientifically proven health benefits. Wood has the lowest CO₂ emissions amongst building materials and it creates long-term carbon storage. To produce 1kg of timber, a tree consumes 1.47 kg of CO₂ and returns just over a kilo of oxygen into the

atmosphere. When trees are cut and used to make wood products, the carbon remains stored in the wood for the life of the product. It is preferable to have the carbon stored in trees and in wood products than in the atmosphere, where it contributes to climate change [2].

Using wood as a construction material is not only a climate-smart choice, but also a solution to meet the needs of population growth and urbanisation.

2 Prefabrication in developing countries

The role of prefabrication in architecture has been lauded for its potential to increase productivity and efficiency while not sacrificing quality. The values of better, faster and cheaper are applicable to developed countries whose population continues