StoraEnso

Lighthouse Joensuun
Joensuu, Finland

At the time of completion in 2018, this 14-storey building was Finland's tallest wooden high-rise building.

The increased need for student housing in the Joensuu area was met through efficient land use and high-rise construction. The city's zoning plan specified that the plot needed to have wood construction and a high landmark.

The ground floor has sauna facilities, a laundry room and adjacent drying room, technical facilities, and storage spaces for household and outdoor equipment.

Floors 1-13 have nine apartments each, of which two are one bedroom apartments and the remaining seven are studios. The apartments vary in size from 26 to 47.5 m2.

A competitive negotiation procedure was selected for running this exceptional project, which involved three consortia of construction companies and wood suppliers. The architect simultaneously designed separate variants of the building for each possible frame system. With these variants, we proceeded to the contract calculation phase with three different options, two based on CLT/LVL elements and one based on volumetric elements. The aim was to minimise the cost difference of a wooden apartment building to a traditional concrete building by using an efficient floor plan, optimised structures and innovative technology.

The ground floor and civil defence shelter are made of concrete, but the remaining frame structure and even the elevator shaft use solid wood. The structure is stiffened with steel rods inside the wooden structures, tensioned from top to bottom. Although the apartment building is made of wood, very few wooden surfaces are visible in the finished building. To meet fire safety requirements, most surfaces are clad with gypsum board. The facade will use stone tiles of different shades of white and grey.

Finland's tallest wooden apartment building was completed on schedule. Each individual storey took less than two weeks to build. The panel blanks arrived at the construction site, where the window and door openings and the conduits for building services were then machined under the cover of a tent. The elements were installed when the weather permitted. After installation, the completed storeys were protected by a temporary roof to maintain the dry chain.

The developer has responsibility for the architectural, building service and fire engineering design, and the contractors were responsible for designing the structures that would be implemented with their own systems. Building inspection regulations required third-party inspectors for both fire safety design and structure design. In addition, the performance of the apartment-specific ventilation had to be inspected.

The fire safety design for the building is based on functional fire design, as the standard E1 tables only cover wood buildings up to 8 storeys high. The fire protection for the structures is based on gypsum board cladding and the charring rate of the underlying wood structure. There are sprinklers throughout the building (OH1 level, twoway water supply), but functional fire design has shown that the building can withstand a design fire even if the sprinklers do not work. VTT inspected the ventilation system by modelling the building.

From an environmental perspective, a wooden apartment building is very sustainable. Trees bind carbon dioxide as they grow, and an apartment building made of wood acts as carbon storage throughout its lifecycle. Lighthouse Joensuu's wood product components store carbon in an amount equivalent to the emissions of approximately 700 passenger cars per year.

Lighthouse Joensuu will continue to promote wood construction as the Karelia University of Applied Sciences will continue acoustics research at the site. The project also measured the carbon footprint of the building. Studies to date have revealed that only about one-fifth of the carbon footprint of Lighthouse Joensuu was generated during the construction period and the remainder is operational, which is still under analysis.

Read more about this project:

Finland's tallest wooden high-rise building, Lighthouse Joensuu

LCA Report

General

Delivery year

2018

Building type

Multi Residential

Area (m²)

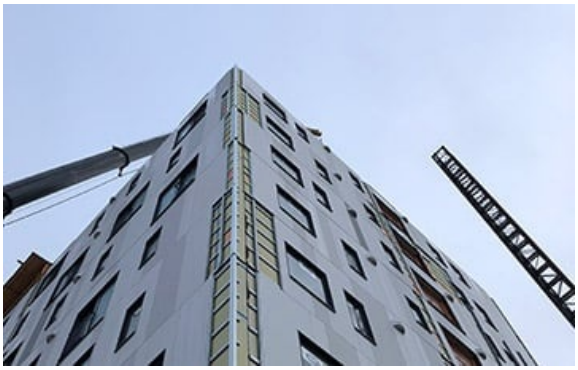
18,500

Storeys

14

Units

117



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Products

Products and Services

Sylva™ CLT Floors and Roofs, Sylva™ LVL Beams and Columns

Product quality

Non visible quality (NVI)

StoraEnso

Product volume (m³)

2,100

Product delivery duration (weeks)

29

Number of deliveries

46

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Team

Developer

Joensuun Elli

Architect

Arcadia Oy Arkkitehtitoimisto

Structural Engineer

A-Insinöörit

MEP Designer

Lämpökarelia Oy & Sähkö Saarelainen

Main contractor

E Reijonen Oy

Specialist Timber Subcontractor

E Reijonen Oy

Others

Total construction development duration (months)

20

Timber superstructure erection duration (weeks)

22