A Global Overview of Steel-Timber Hybrid High Rise Buildings

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Steel-Timber Hybrids: Setting the Scene

Antony Wood
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CTBUH Research Project

The Future Potential of Steel-Timber Hybrid Buildings

Project Start: July 2021
Project Completion: June 2023

Funding Partners:

constructsteel

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Research Objective
To capture the current state-of-the-art and full potential of steel-timber hybrid structures for high-rise buildings, globally.

The Future Potential of Steel-Timber Hybrid Buildings
Advisory Committee / Contributors

80+ members; multi-disciplinary, multi-national
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Countries

- Australia
- Belgium
- Canada
- Chile
- China
- Costa Rica
- Finland
- France
- Italy
- Luxembourg
- New Zealand
- Norway
- Singapore
- South Korea
- United Kingdom
- United States

Industries

- Real Estate Development
- Construction / Fabrication
- Architecture
- Engineering
- Suppliers (Steel & Timber)
- Consultancies (BIM, Fire, Cost, Etc.)
- Academic / Non-Profit Associations

Jeff Spiritos
Spiritos Properties LLC
Tall Timber Panel Chair
Outputs

CTBUH Technical Guide, incorporating:

• Detailed Case Studies
• Data!
• Full LCA: Scenarios
• Recommendations
Mass Timber & Timber-Hybrid Buildings

Global Audit

February 2022
Interactive Study on Mass Timber

The State of Tall Timber: A Global Audit

Explore 139 mass timber buildings of eight stories or higher, globally

Today there are 139 mass timber buildings around the world of eight stories or higher, either complete, under construction or proposed. CTBUH reviews a decade of scholarship to analyze the significant recent momentum of the mass-timber movement worldwide.

View the Study

There are 66 completed mass timber buildings globally, 8 stories or higher.
State of Tall Timber & Timber Hybrids

84 Mass Timber Projects Worldwide, 8 stories or higher

- **Completed** 79%
  - 66 buildings
- **Under Construction** 21%
  - 18 buildings

by project status

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State of Tall Timber & Timber Hybrids

84 Mass Timber Projects Worldwide, 8 stories or higher

- Residential: 64% (54 buildings)
- Office: 19% (16 buildings)
- Mixed-Use: 14% (12 buildings)
- Institutional: 3% (2 buildings)

by function
State of Tall Timber & Timber Hybrids
84 Mass Timber Projects Worldwide, 8 stories or higher

- **Europe**: 71% (60 buildings)
- **North America**: 18% (15 buildings)
- **Australia**: 10% (8 buildings)
- **Asia**: 1% (1 building)

By region
State of Tall Timber & Timber Hybrids

84 Mass Timber Projects Worldwide, 8 stories or higher

- **All-Timber**: 45% (38 buildings)
- **Concrete-Timber Hybrid**: 35% (29 buildings)
- **Concrete-Steel-Timber Hybrid**: 12% (10 buildings)
- **Steel-Timber Hybrid**: 8% (7 buildings)

by structural type
State of Tall Timber & Timber Hybrids
84 Mass Timber Projects Worldwide, 8 stories or higher

by structural type
History of the World’s Tallest Timber / Hybrids

The progression of the World’s Tallest Timber Building has been swift, from 29 meters in 2009 to 87 meters in 2022; a 300% increase.

Source: CTBUH (February 2022)
World’s 5 Tallest Timber Buildings employing Steel

Sara Kulturhus, 2021
Skellefteå, 72.8 m / 239 ft

De Karel Doorman*, 2012
Rotterdam, 70.5 m / 231 ft

55 Southbank*, 2020
Melbourne, 70.5 m / 231 ft

Hyperion*, 2021
Bordeaux, 55.0 m / 180 ft

Lighthouse Joensuu*, 2019
Joensuu, 70.5 m / 231 ft

*Note: These buildings also employ concrete in the hybrid systems
The Initial Case for Steel-Timber Hybrids

- Greater spanning strength and ductility (than timber alone)?
- Better suitability for lateral restraint systems, especially for taller buildings?
- Better Carbon / LCA implications (than concrete-timber hybrid)?
- More flexibility with layouts, and later renovations / change of use?
- Ease of assembly and lower weight (than concrete-timber hybrid)?
- Greater dimensional accuracy, steel akin to mass timber?
- The greater potential for aesthetic expression of timber / biophilic benefits?
- Other? (to be determined over the next two days!)