

# Wood as a Construction Material



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Wood has great potential as a construction material due to its robustness, light weight, eco-friendly attributes and capabilities of being prefabricated for building applications (Wimmers, 2017). Today Europe is “leading the way in tall timber projects”, found in a study by the Council on Tall Buildings and Urban Habitat (CTBUH, 2017). In this reading list, we look at the timber construction market, analysis of wooden materials, timber prefabrication possibilities, environmental advantages of wood-based buildings, and recent developments in wooden architecture.

The list contains over 40 resources mostly published within the past 5 years and aims to offer insights from various reliable sources, including associations, journals, book titles, and more.

The Library will periodically add new resources to this list. Links to the full-text are indicated. If you encounter any problem in retrieving the materials, please contact [library@sutd.edu.sg](mailto:library@sutd.edu.sg) for assistance. Please also forward us titles that you would like to share with others in this list.

## Topics

- Overview
- Market Analysis & Outlook
- Material Assessment
- Prefabrication
- Sustainability
- Wooden Architecture

## Overview

Providing a general idea of wood construction, how the system works, use of the material, possibilities and challenges

[\(2014\). New wood construction. \*Detail\*, 2014\(2\), 118-122.](#)

Also available @ Main Library **General Lending** (NA3 DET)

[Kolb, J. \(2008\). \*Systems in timber engineering : Loadbearing structures and component layers\*. Birkhäuser.](#)

[Ramage, M. H., Burrige, H., Busse-Wicher, M., Fereday, G., Reynolds, T., et al. \(2017\). The wood from the trees: The use of timber in construction. \*Renewable and Sustainable Energy Reviews\*, 68\(1\), 333-359. <https://doi.org/10.1016/j.rser.2016.09.107>](#)

[Steiger, L. \(2007\). \*Basics timber construction\*. Basel: Birkhäuser.](#)

[Wimmers, G. \(2017\). Wood: A construction material for tall buildings. \*Nature Reviews Materials\*, 2. \[doi:10.1038/natrevmats.2017.51\]\(https://doi.org/10.1038/natrevmats.2017.51\)](#)

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## Market Analysis & Outlook

Featuring the latest global audit of the timber construction market and studies on the potentials of a wood construction industry

[CTBUH. \(2017, June\). Tall timber: A global audit. \*Council on Tall Buildings and Urban Habitat\*. Retrieved 2017, November 14 from <http://www.ctbuh.org/Publications/CTBUHJournal/InNumbers/TBINTimber/tabid/7530/language/en-US/Default.aspx>](#)

[Gibson, E. \(2017, June 27\). Europe at forefront of timber construction finds CTBUH report. \*Dezeen\*. Retrieved 2017, November 14 from <https://www.dezeen.com/2017/06/27/europe-council-tall-buildings-urban-habitat-wooden-timber-news/>](#)

[Hurmekoski, E., Jonsson, R., & Nord, T. \(2015\). Context, drivers, and future potential for wood-frame multi-story construction in Europe. \*Technological Forecasting and Social Change\*, 99, 181-196. <https://doi.org/10.1016/j.techfore.2015.07.002>](#)

[Kremer, P. D., & Symmons, M. A. \(2015\). Mass timber construction as an alternative to concrete and steel in the Australia building industry: A PESTEL evaluation of the potential. \*International Wood Products Journal\*, 6\(3\), 138-147. <http://dx.doi.org.library.sutd.edu.sg:2048/10.1179/2042645315Y.0000000010>](#)

[Riala, M., & Ilola, L. \(2014\). Multi-storey timber construction and bioeconomy – Barriers and opportunities. \*Scandinavian Journal of Forest Research\*, 29\(4\), 367-377. <http://dx.doi.org.library.sutd.edu.sg:2048/10.1080/02827581.2014.926980>](#)

[Toppinen, A., Röhr, A., Pätäri, S., Lähtinen, K., & Toivonen, R. \(2017\). The future of wooden multistory construction in the forest bioeconomy – A Delphi study from Finland and Sweden. \*Journal of Forest Economics\*. <https://doi.org/10.1016/j.jfe.2017.05.001>](#)

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## Material Assessment

*Reviewing the wooden materials for building applications in terms of physical attributes, environmental impacts and energy behaviors*

[Allen, E., & Iano, J. \(2009\). Wood. In E. Allen & J. Iano \(Eds.\), \*Fundamentals of building construction : Materials and methods\* \(pp. 85-134\). Hoboken: Wiley.](#)

Also available @ Main Library **General Lending** (TH145 ALL)

[Asdrubali, F., Ferracuti, B., Lombardi, L., Guattari, C., Evangelisti, L., et al. \(2017\). A review of structural, thermo-physical, acoustical, and environmental properties of wooden materials for building applications. \*Building and Environment\*, 114, 307-332. <https://doi.org/10.1016/j.buildenv.2016.12.033>](#)

[Nässén, J., Hedenus, F., Karlsson, S., & Holmberg, J. \(2012\). Concrete vs. wood in buildings – An energy system approach. \*Building and Environment\*, 51, 361-369. <https://doi.org/10.1016/j.buildenv.2011.11.011>](#)

[Pajchrowski, G., Noskowiak, A., Lewandowska, A., & Strykowski, W. \(2014\). Wood as a building material in the light of environmental assessment of full life cycle of four buildings. \*Construction and Building Materials\*, 52, 428-436. <https://doi.org/10.1016/j.conbuildmat.2013.11.066>](#)

[Pelaz, B., Blanco, J. M., Cuadrado, J., Egiluz, Z., & Buruaga, A. \(2017\). Analysis of the influence of wood cladding on the thermal behavior of building façades: Characterization through simulation by using different tools and comparative testing validation. \*Energy and Buildings\*, 141, 349-360. <https://doi.org/10.1016/j.enbuild.2017.02.054>](#)

[Risen, C. \(2014, February 26\). Cross-laminated timber is the most advanced building material. \*Popular Science\*. Retrieved 2017, November 14 from <https://www.popsci.com/article/technology/worlds-most-advanced-building-material-wood-0>](#)

[Sathre, R., & González-García, S. \(2014\). Life cycle assessment \(LCA\) of wood-based building materials. In F. Pacheco-torgal, L. Cabeza, J. Labrincha & A. De Magalhaes \(Eds.\), \*Eco-efficient construction and building materials\* \(pp. 311-337\). Woodhead Publishing. <https://doi.org/10.1533/9780857097729.2.311>](#)

[Zhang, H. \(2011\). Wood. In H. Zhang \(Ed.\), \*Building materials in civil engineering\* \(pp. 238-252\). Elsevier Science.](#)

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## Prefabrication

*Discussing the various aspects of timber prefabrication, which saves time, is more flexible and has less impacts on the environment compared to conventional construction*

[Adekunle, T. O., & Nikolopoulou, M. \(2016\). Thermal comfort, summertime temperatures and overheating in prefabricated timber housing. \*Building and Environment\*, 103, 21-35. <https://doi.org/10.1016/j.buildenv.2016.04.001>](#)

[Griffiths, A. \(2017, October 8\). Prefabricated holiday home by Nicole Lachelle and Christian Niessen is clad in charred timber. \*Dezeen\*. Retrieved 2017, November 14 from](#)

<https://www.dezeen.com/2017/10/08/thewoodbuilding-prefabricated-wooden-holiday-home-clad-charred-timber-boards-architecture/>

[Malacarne, G., Monizza, G. P., Ratajczak, J., Krause, D., Benedetti, C., et al. \(2016\). Prefabricated timber façade for the energy refurbishment of the Italian building stock: The Ri.Fa.Re. project. \*Energy Procedia\*, 96, 788-799. <https://doi.org/10.1016/j.egypro.2016.09.141>](#)

[Marchesi, M., Kim, S., & Matt, D. T. \(2015, November\). Assessing the design innovation potential of timber prefabricated housing through axiomatic design. In \*Proceedings of the ASME 2015 International Mechanical Engineering Congress and Exposition\*. ASME. \[doi:10.1115/IMECE2015-50517\]\(https://doi.org/10.1115/IMECE2015-50517\)](#)

[Martinez, R. G., Ayucar, J. B., & Goikolea, B. A. \(2017\). Full scale experimental performance assessment of a prefabricated timber panel for the energy retrofitting of multi-rise buildings. \*Energy Procedia\*, 122, 3-8. <https://doi.org/10.1016/j.egypro.2017.07.288>](#)

[Sandberg, K., Orskaug, T., & Andersson, A. \(2016\). Prefabricated wood elements for sustainable renovation of residential building façades. \*Energy Procedia\*, 96, 756-767. <https://doi.org/10.1016/j.egypro.2016.09.138>](#)

[Serra, B., Verdejo, P., & Serra, J. \(2014\). SML sistem: New ways of timber construction. In C. Llinares-Millán, et al. \(Eds.\), \*Construction and building research\* \(pp. 165-170\). Dordrecht: Springer. \[https://doi.org/10.1007/978-94-007-7790-3\\\_22\]\(https://doi.org/10.1007/978-94-007-7790-3\_22\)](#)

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## Sustainability

*Offering insights into the sustainable use of wood in green buildings, which could benefit the eco-environment across the globe*

[Coulson, J. \(2014\). \*Sustainable use of wood in construction\*. John Wiley & Sons.](#)

[Dickson, M., & Parker, D. \(2015\). \*Sustainable timber design\*. London: Routledge.](#)

[Hein, C. \(2014\). Developing hybrid timber construction for sustainable tall buildings. \*CTBUH Journal\*, 2014\(3\), 40-45.](#)

[Hildebrandt, J., Hagemann, N., & Thrän, D. \(2017\). The contribution of wood-based construction materials for leveraging a low carbon building sector in Europe. \*Sustainable Cities and Society\*, 34, 405-418. <https://doi.org/10.1016/j.scs.2017.06.013>](#)

[Hurmekoski, E., Pykäläinen, J., & Hetemäki, L. \(2017\). Long-term targets for green building: Explorative Delphi backcasting study on wood-frame multi-story construction in Finland. \*Journal of Cleaner Production\*. <https://doi.org/10.1016/j.jclepro.2017.08.031>](#)

[Ritter, E., De Rosa, M., Falk, A., Christensen, P., & Løkke, S. \(2013\). Wood as construction material: A "common" choice for carbon management? \*Environmental Science & Technology\*, 47\(21\), 11930-11931. DOI: 10.1021/es4040039](#)

[Švajlenka, J., Kozlovská, M., & Spišáková, M. \(2017\). The benefits of modern method of construction based on wood in the context of sustainability. \*International Journal of Environmental Science and Technology\*, 14\(8\), 1591-1602. <https://doi.org/10.1007/s13762-017-1282-6>](#)

[Tollefson, J. \(2017, May 17\). The wooden skyscrapers that could help to cool the planet. \*Nature\*. Retrieved 2017, December 12 from <http://www.nature.com/news/the-wooden-skyscrapers-that-could-help-to-cool-the-planet-1.21992>](#)

[Vanhanen, H., Dahl, O., & Joensuu, S. \(2014\). Utilization of wood ash as a road construction material - Sustainable use of wood ashes. \*Sustainable Environment Research\*, 24\(6\), 457-465.](#)

[Wang, L., Toppinen, A., & Juslin, H. \(2014\). Use of wood in green building: A study of expert perspectives from the UK. \*Journal of Cleaner Production\*, 65, 350-361. <https://doi.org/10.1016/j.jclepro.2013.08.023>](#)

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## Wooden Architecture

*Presenting diverse professional views and case studies of timber architecture and design, and the technologies used in this sector*

[Dragica, A. \(2016\). A comparative analysis of architects' views on wood construction. \*Spatium\*, 2016\(36\), 100-105. <https://doi.org/10.2298/SPAT1636100A>](#)

[Glasner, B., & Ott, S. \(2013\). \*Wonder wood : A favorite material for design, architecture and art\*. Basel: Birkhäuser.](#)

[Lennartz, M. W. \(2016\). \*New architecture in wood : Forms and structures\*. Basel: Birkhäuser. Available @ Main Library \*\*General Lending\*\* \(NA4110 LEN\)](#)

[Liu, C. A. \(2011\). Wood in architecture: Rediscover the material of our time. In X. Wu & H. Xie \(Eds.\), \*Green building technologies and materials\* \(pp. 94-98\). Trans Tech Publications.](#)

[Mayo, J. \(2015\). \*Solid wood : Case studies in mass timber architecture, technology and design\*. London: Routledge.](#)

Also available @ Main Library **General Lending** (NA4110 MAY)

[Menges, A., Schwinn, T., & Krieg, O. \(2017\). \*Advancing wood architecture : A computational approach\*. London: Routledge.](#)

Also available @ Main Library **Reference / Term Loan** (NA4110.M46 ADV)

[Zachariah, N. A. \(2017, May 6\). Living with wood: Developers go big on wood architecture. \*The Straits Times\*. Retrieved 2017, November 14 from <http://www.straitstimes.com/lifestyle/home-design/living-with-wood>](#)

[Zwerger, K. \(2012\). \*Wood and wood joints : Building traditions of Europe, Japan and China\*. Birkhäuser.](#)

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