

WHITEPAPER #2

# Wood – saving the climate while boasting strong building qualities

## WOOD – SAVING THE CLIMATE WHILE BOASTING STRONG BUILDING QUALITIES

Ecological building materials are on trend. And wood has a special role to play in this. As a renewable resource it is – in principle – a source that can never run out. And as it needs carbon dioxide to grow, it lowers the percentage of this greenhouse gas in the atmosphere, scoring a double in terms of protecting the climate.

### TODAY, WOOD IS MORE HIGH-TECH AND LESS RUSTIC CABIN

Who would have thought that wood would one day become the future building material number one? Until recently, almost no one. For when hearing the word timber construction, most would've thought of lonely block houses in Finland, rustic skiing and hiking cabins in the mountains or romantic farmhouses high up in the mountains. Hardly anyone would have connected the renewable resource that is wood with high-tech or large-scale structures and complex designs. However, more and more timber structures show how much high-tech goes into their construction. The new world of timber construction in the 21st century differs greatly from that of the past one. While timber construction was mainly limited to rural environments and, sometimes, city outskirts up until the 1990s, today we find it in urban surroundings as well. Besides many everyday tasks in the category of urban rehabilitation, where timber construction proves its worth in a subdued manner, many novel timber buildings draw onlookers' attention. They not only showcase the possibility of multi-storey timber structures in inner cities but also their urban development and architectural potential. The same goes for large timber structures used for cultural, sporting, trade and industrial purposes. One thing becomes more and more clear: The desire for timber structures of all kinds is growing.

*More and more timber structures show how much high-tech goes into their construction.*

### WOOD ISN'T WOOD

Let's make one thing clear: The average person is rarely aware that not all wood is the same. Not every type of wood is equally suitable for building. Coniferous woods are the classics. Spruce in particular has been used for building since time immemorial. Due to climate change and increased extreme weather situations such as storms, heavy rain and longer dry or even drought phases, forestry in the German-speaking countries, but also in France, has been working far-sightedly for decades on the conversion of the forest landscape: away from the predominance of conifers, towards more deciduous trees<sup>1)</sup>. At least that is what the current Federal Forest Inventory of the Federal Ministry of Agriculture in Germany says. The desired change aims to increase the resilience of the various tree species to climate-related changes and thus ensure the survival of the forests.

<sup>1)</sup>The Forests in Germany, Selected Results of the Third National Forest Inventory, Federal Ministry of Food and Agriculture:  
[www.bmel.de/SharedDocs/Downloads/DE/Broschueren/bundeswaldinventur3.html](http://www.bmel.de/SharedDocs/Downloads/DE/Broschueren/bundeswaldinventur3.html)  
pdf (German):  
<https://tinyurl.com/2syb5x33>  
pdf (English):  
<https://tinyurl.com/3698krbd>

### WOOD IS A POLITICAL TOOL

During its growth, wood stores the greenhouse gas carbon dioxide (CO<sub>2</sub>), produces vital oxygen, reducing the percentage of CO<sub>2</sub> in the atmosphere in the process. This is only one of the significant properties that make this natural building material so important for climate-friendly construction. Another benefit related to its processing into a building product is that this process only takes a fraction of the energy required for conventional building materials, which in turn further reduces CO<sub>2</sub> emissions.

Wood allows for an ecologically minded construction industry, helping to further the energy revolution. This maxim has long since reached the minds of many in the industry, politics and public. Thus, modern timber construction draws lots of attention due to climate-saving reasons.

These are all reasons why policy-makers have been investing lots of money in forests as a natural climate protectors and carbon sinks for a few years now and are increasingly relying on wood as a building material. 40 percent of the total energy consumption in the EU can be attributed to the construction sector. In the context of the need to build in a resource-conserving, energy-efficient and climate-friendly way, modern timber construction or timber engineering is therefore gaining enormous importance.

However, it is currently the exception rather than the rule that building owners and investors decide in favour of timber construction only because of climate protection. This is why governments rely on corresponding subsidies. The situation could change, however, if its ecological advantages were to become financially noticeable one day. The high energy and resource consumption of conventional building materials is not yet reflected in the construction price. However, if a CO<sub>2</sub> balance for buildings were to become legally binding at some point and thus have financial impact, timber could quickly become the number one building material. Although legal regulations are still lacking, experts have been thinking about this for a long time.<sup>\*)</sup>

<sup>\*)</sup> 80 associations from the building and environmental protection sector formulate requests for politicians to evaluate the entire life cycle of building materials: <https://tinyurl.com/jztuwycv>

#### NOTE

##### **BMEL supports the further development of climate-friendly timber construction:**

The Förderung des klimafreundlichen Bauens mit Holz ("Promotion of Climate-Friendly Timber Construction") Guideline of the Federal Ministry of Food and Agriculture (BMEL) came into force in mid-March 2021. Companies can now submit applications for grants to the Agency of Renewable Resources (Fachagentur Nachwachsende Rohstoffe e.V.). (FNR) with immediate effect.

Announcement of the guideline for the promotion of climate-friendly construction with wood:

<https://tinyurl.com/bhtnhrdv>

Applications can be completed here:

<https://foerderportal.bund.de/easyonline/formularbearbeitung.jsf>



## INFO

**Political goals: Wood Charter 2.0 and climate goals**

The recent development in timber construction is partly socio-politically motivated, mainly due to the German government's goal of reducing greenhouse gas emissions by 55 percent by 2030 compared to 1990. The target is 80 to 95 percent by 2050. The Ministry of Economics describes the "Wood Charter 2.0" ("Charta für Holz 2.0") presented in April 2017 as a "milestone in the Federal Government's climate protection plan", which makes "building with wood in urban and rural areas" a topic in one of six fields of action. After all, the construction sector is significantly responsible for greenhouse gas emissions and resource scarcity.

The defined fields of action also include the economic significance, which is little noticed by the public. With more than 1.1 million employees and over 180 billion Euros in turnover, the forestry & timber cluster was considered an economic heavyweight – at least until the Corona pandemic – to which around 125,000 companies contribute.

The industry is dominated by small and micro companies. All the while, German forests are converted whose current coniferous character is the result of extreme timber use in past centuries. Following the end of the Second World War, for instance, enormous areas were felled and reforested with fast-growing species such as spruce. This is still the most important basis for value creation in the forestry and timber industry today. Spruce accounts for 25 per cent of the approximately 11.4 million hectares of forested area in Germany, followed by Scots pine (23 per cent).

However, both species are vulnerable and unable to cope with climate change and the higher average temperatures and longer periods of drought connected with it. This has been clearly demonstrated by the past hot summers.

**Wood Charter 2.0**

<https://tinyurl.com/2ejb52d8>

**Wood Charter 2.0 – Status Update 2019**

<https://tinyurl.com/vu2ctt7j>

**Wood Charter 2.0 – Status Update SPECIAL 2020/2021:**

<https://tinyurl.com/n3kr7sru>

### Climate politics promote the use of wood

40 percent of the total energy consumption in the EU can be attributed to the construction sector. This is why this sector is a field of special consideration in terms of the European climate policy. The realisation that resources are limited and that wood can replace energy-intensive conventional building materials in many areas has made this renewable raw material THE symbol of sustainable building.

For example, very little energy is needed to produce wooden building components, or very little "grey energy" <sup>2)</sup> to construct a wooden building. Thus, the resulting CO<sub>2</sub> emissions are also correspondingly lower for timber buildings than for conventional buildings. A study by the German Federal Foundation for the Environment (DBU) estimates a savings potential of 30 to 70 percent. But that's not all: Wood grows back, in the process storing the greenhouse gas carbon dioxide (CO<sub>2</sub>) – scoring a double in terms of protecting the climate.

All political initiatives to promote wood / modern timber (building) construction are influenced by the fact that the Federal Government wants to achieve the required energy revolution, among others by means of incorporating this renewable resource. As early as 2004, it has put these goals into words in its "Wood Charter", taking into account sustainable forestry (not harvesting more than what grows back).

<sup>2)</sup> "Grey Energy" is energy used for production, transport and disposal of a product (or service). When adding the energy not attributable to sources of renewable energy across all production, transport and treatment processes from resource extraction to finished product, one arrives at the so-called "Grey Energy" or CO<sub>2</sub> balance for the entire life cycle of a building.

#### NOTE

The costs of avoiding CO<sub>2</sub> emissions:  
<https://tinyurl.com/axvyf7y2>

### MORE AND MORE PEOPLE WANT TO LIVE IN CITIES

The fact that the benefits of wood are becoming more and more popular, especially in cities, is primarily due to the trend "back to the city". According to the UN, some 75 percent of all people will live in cities by 2050. Two thirds of all Germans are already urban dwellers today. More and more young and old people – single people, couples and families – are recognising the advantage of short distances and existing infrastructure. But immigration and the rising demand for living space per person are also rapidly increasing demand for affordable living space in urban centres, which can hardly be met. It is therefore important to make the best possible use of the limited space available. This is where "urban densification" comes in which means, for example, adding

more storeys to existing buildings. Thus, new living space can be gained without additional land and development costs. A study by the Technical University of Darmstadt (Germany) and the Pestel Institute on the potential for adding storeys to existing buildings produced the following startling result: If the full potential were exploited in Germany, 1.1 million – older buildings included, even 1.5 million – new flats with an average floor space of 75 m<sup>2</sup> could be created (see info below).

## INFO

**The roofs of today are the building plots of tomorrow:****The study arrives at 1.1 to 1.5 million new flats by adding storeys <sup>3)</sup>**

1.1 to 1.5 million new housing units does not seem exaggerated. In the study by the TU Darmstadt and the Pestel Institute, all existing buildings were eliminated that had unfavourable prerequisites. Only blocks of flats with at least three units in regions with a high demand for housing were included. Initially, only buildings built between 1950 and '89 were taken into account, because in most cases they are structurally suitable and are located in urban districts where an increase in density is compatible. In addition, only a few of them are listed buildings. Younger apartment buildings were excluded, as they usually already make optimal use of the plot. Additionally, the study initially only considered buildings that are in the hands of a single owner. With these criteria and with the experience that on average 1.3 storeys can be added, the study arrives at a potential of 1.1 million new flats. Older buildings and those in the hands of owners' associations were shown separately at a lower percentage and result in a secondary potential of around 0.4 million units. In total, even higher numbers seem possible, as administrative and commercial buildings, on top of which new residential space could also be created, were not looked at at all.

**<sup>3)</sup> From: Wohnraumpotenziale durch Aufstockungen.**

By Karsten Ulrich Tichelmann. Katrin Groß. February 2016.

Download at:

Unabridged version:

<https://tinyurl.com/2ajd8mbk>

Abridged version:

<https://tinyurl.com/2umdhmbz>

Lecture on the Residential Space by Adding Storeys

("Wohnraum durch Aufstockung") Pestel Study:

[www.forum-holzbau.com/pdf/19\\_EBH\\_2016\\_Guenther.pdf](http://www.forum-holzbau.com/pdf/19_EBH_2016_Guenther.pdf)

NOTE

A broad alliance of more than 30 organisations is calling for a Housing Offensive 2.0 for the coming election period: <https://tinyurl.com/27sk5w9j> with position paper on the campaign Impulses for Housing Construction (“Impulse für den Wohnungsbau”) for the Bundestag elections (2021)

### LIGHT USE: WOOD ON ROOFS, RESIDUAL LAND AND VACANT LOTS

Besides protecting the climate, another aspect was recently added that puts wood in the limelight: Due to weight problems, wood is often the only material that can be used to add storeys. Most existing buildings have little in terms of load reserves and can rarely ever support additional loads built conventionally (steel, masonry, concrete). But also shorter construction times when using pre-fabricated elements that can be easily transported to difficult-to-reach areas in the context of tight inner-city spaces by means of mobile cranes, make this building method more attractive.

Buildings on residual land as well as fitting buildings in gaps between buildings or backyards also show how architecturally appealing residential buildings made of wood can be erected on derelict land in cities, which are simultaneously energy-efficient and efficient in terms of usable space.

*Building systems such as timber frame construction as well as solid timber construction made of cross laminated timber, glulam and board stack elements offer numerous possibilities for finding the right solution in each case.*

Here, making the walls as slim as possible plays a decisive role if a maximum usable area is to be achieved with a high energy standard or if the Energy Saving Directive (EnEV) is to be complied with. Building systems such as timber frame construction as well as solid timber construction made of cross laminated timber, glulam and board stack elements offer numerous possibilities for finding the right solution in each case.

Highly professional software and machine supported production makes sure that everything fits perfectly in the end. Once wall, ceiling and roof elements – if required, together with fitted windows and doors – roll off the production line, they are millimetre-precise and can be precisely joined during assembly. Thus, a carcass can be made weather-proof in no time.

### ECONOMIC EFFICIENCY THANKS TO PREDICTABILITY

Predictability of otherwise rather unpredictable factors when building with wood is a viable economic aspect for clients, for instance to avoid paying rent while building a new house. Moreover, investors love this method's brief advance financing periods and fast marketability of the finished buildings, combined with secure completion deadlines.

All that, as well as more usable space must be taken into account when assessing the economic aspects of timber construction. When comparing every square metre of finished timber construction with other building methods, timber construction usually fares very well – but only if all aspects previously mentioned are taken into account.

**Link tip:**

Wood: An old building material, reimagined:

<https://tinyurl.com/yuhu2kxh>

**PREMIUM FIRE PROTECTION AND NOISE INSULATION**

The image of timber houses was long burdened with stereotypes. They were considered highly combustible and fuelled residents' fear of fire. However, wood is classified as fire-retardant. This is because in the event of fire, the component surface chars and protects the core, functioning like a heat-insulating layer. Otherwise, load-bearing wooden components can also be clad with fire-retardant materials such as plasterboard.

In the meantime, firefighters and insurance experts actually report that the old new material has particularly favourable properties. They know from experience that wooden supports withstand a fire longer than steel ones. This means that the stability of a wooden building decreases only slowly and predictably in the event of a fire, whereas steel constructions and reinforced concrete buildings fail suddenly because of temperature-related loss of strength.

And finally, let's talk sound insulation: Today there are countless tested timber ceiling constructions with special superstructures that meet the same requirements as those in conventional construction.

**Link tips:**

Zuschnitt 80 from March 2021, Zeitschrift über Holz als Werkstoff und Werke in Holz:

[www.proholz.at/fileadmin/flippingbooks/zuschnitt80/zuschnitt\\_80.pdf](http://www.proholz.at/fileadmin/flippingbooks/zuschnitt80/zuschnitt_80.pdf)

Schallschutz im Holzbau – Grundlagenwerk:

<https://tinyurl.com/4uxp6ze2>

Schallschutz im Holzbau – Differenzierte Flankenbewertung bei der Trittschallübertragung:

<https://tinyurl.com/rncr5u6v>

Bauordnungsrechtliche Verwendbarkeit von brennbaren Baustoffen in Deutschland:

<https://tinyurl.com/7r76rswy>

*Experts agree: Wood combusts more easily, but behaves more predictably at high heat. When charred beams are still holding high loads, steel would've melted a long time ago*

### A LACK OF CONCRETE SAND SHIFTS ATTENTION TO WOOD

Not only is wood the only building material that grows back, concrete has another problem: Construction sand is getting rare: There is not enough any more<sup>4</sup>). In order to extract sand for the concrete volumes required around the world, nature is being destroyed in many places. Those who think that deserts store more than enough sand is correct – in principle. But unfortunately, this type of sand is not suited. The grains are too round, making them unsuitable for concrete production. The latter requires sharp-edged grains of sand that allow for cement and sand to bond and thus provide the necessary load bearing capacity. And such sand can mainly be found in oceans and rivers.

*According to international studies, wood has a positive effect on our health.*

In addition to the obvious ecological advantages of wood and increased climate protection and environmental awareness, global developments such as the shortage of building sand have also contributed to the fact that timber construction has been seen as a worthwhile alternative by many builders for some years now. But health-related aspects also play a role. According to international studies, wood has a positive effect on our health. Not only does an Austrian long-term study claim to have proved that wood has a calming effect on our cardiovascular system<sup>5</sup>), a study from Finland also suggests that the use of wood in hospitals furthers the healing process<sup>6</sup>). These findings have influenced the architectural style of the Maggie's Centre charity's buildings from England. Its designs follow the maxim that beautiful architecture heals. And most of its centres are built with wood<sup>7</sup>).

<sup>4</sup>) Article "Von wegen, wie Sand am Meer", Helmholtz-Gemeinschaft Deutscher Forschungszentren e.V., can be found at:

[www.helmholtz.de/erde\\_und\\_umwelt/vonwegenwiesandammeer/](http://www.helmholtz.de/erde_und_umwelt/vonwegenwiesandammeer/)

<sup>5</sup>) "Schule ohne Stress" research project, Prof. Dr. Maximilian Moser, University of Graz, Austria, download at:

<https://tinyurl.com/y6j3jp6r>

<sup>6</sup>) Study by Dr. Marjut Wallenius, Lecturer at the University of Tampere (Finland):

The use of wood in hospitals furthers the healing process:

<https://tinyurl.com/2msnaf5w>

<sup>7</sup>) [www.maggies.org/about-us/how-maggies-works/our-buildings/](http://www.maggies.org/about-us/how-maggies-works/our-buildings/)

Reading on Maggie's Centres:

<https://tinyurl.com/x2y63p5c>

[www.baulinks.de/webplugin/2020/1720.php4](http://www.baulinks.de/webplugin/2020/1720.php4)

[www.db-bauzeitung.de/db-themen/db-archiv/mit-dem-krebs-leben/](http://www.db-bauzeitung.de/db-themen/db-archiv/mit-dem-krebs-leben/)

[www.dbz.de/artikel/dbz\\_Maggie\\_s\\_Center\\_Leeds\\_UK\\_3619017.html](http://www.dbz.de/artikel/dbz_Maggie_s_Center_Leeds_UK_3619017.html)

**The Architecture of Hope, Charles Jencks und Edwin Heathcote:**

Extract: <https://tinyurl.com/chhy9k8p>

### ARCHITECTS DEMAND WOOD

The Timber Construction Work Group within the Federation of German Architects (BDA) has criticised the handling of the climate and raw materials – especially in the building industry – for years with its position paper titled Mehr Holzbau für den Klimaschutz!<sup>8)</sup> (“More Wood for Climate Protection”) BDA demands to comprehensively establish and, most of all, promote timber construction. It wants buildings to become carbon dioxide storage systems. It argues that what we need is a holistic approach towards building efforts, from planning to recycling all components – a task that is also in the hands of architects and urban planners.

<sup>8)</sup> Position paper:

<https://tinyurl.com/8vfzetxc>

### WOOD AS THE SYMBOL FOR SUSTAINABLE CONSTRUCTION

Attractive architecture that is a pleasure to spend time in is also a decisive criterion for companies when they are planning a new building. The motto is to retain employees with feel-good factors. Making their many hours at work as pleasant as possible is one of the goals. But the positive image of a wooden building also contributes to the decision to favour wood. Private individuals as well as companies afford a timber building to express their attitude towards sustainability. The building serves as a self-portrayal and a figurehead, sometimes as part of a 'corporate identity'. This is something that people are willing to pay for.

### INTERNATIONAL TREND TOWARDS TIMBER (ENGINEERING) CONSTRUCTION

Many modern timber structures showcase how societal developments, Zeitgeist and politics can influence buildings. For timber construction as a high-tech construction method to become as commonplace in the future as concrete, masonry and steel construction have been up to now, we need foresight. The fact that timber construction is becoming socially acceptable for all the reasons mentioned is now evident around the world. Major international projects such as stadiums, leisure buildings, concert halls, conference halls, airport halls and shopping malls are impressive examples. And the trend continues.

*Many modern timber structures showcase how societal developments, Zeitgeist and politics can influence buildings.*

#### Link tip:

Sternstunden des Ingenieurholzbaus

<https://tinyurl.com/a6kypzj3>

*Intelligent timber superstructures are light and extremely efficient, for wood has a low dead weight at high strength. At the same load bearing capacity, it is significantly lighter than steel, has almost the same compressive strength as concrete but contrary to concrete, can also absorb tensile forces.*



**Elephant House at Zurich Zoo,  
Zurich, Switzerland**



**Train station roof,  
Assen, the Netherlands**





**Oslo Airport,**  
Oslo, Norway



**Conference hall of the World Intellectual Property Organisation,**  
Geneva, Switzerland





**Neckartenzlingen Bridge,**  
Neckartenzlingen, Germany

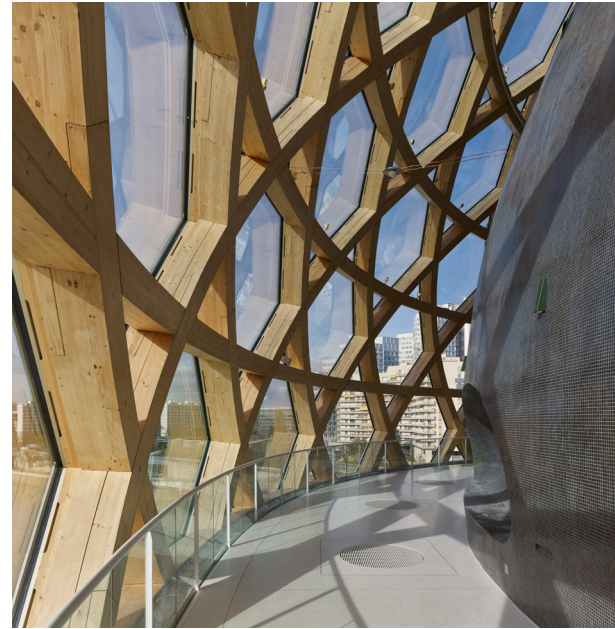


**Jincheng Plaza Transport Hub,**  
Chengdu, China





**La Seine Musicale,**  
Paris, France



**Clamart Sports Complex,**  
Paris, France

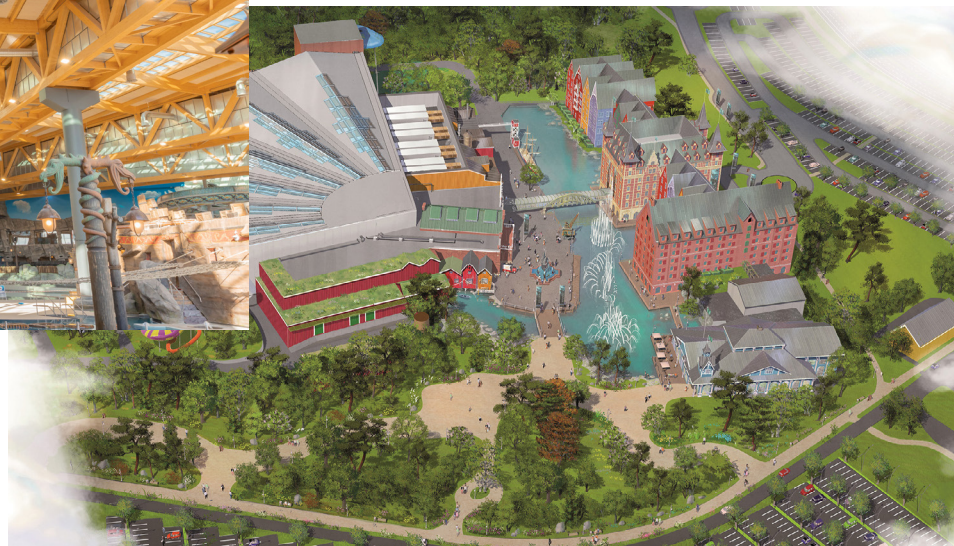




**Allianz Riviera,**  
Nice, France



**Rulantica Water Park,**  
Europa-Park Rust, Germany





### URBAN TIMBER CONSTRUCTION TAKES SHAPE IN LARGE CITIES

*Many modern timber structures showcase how societal developments, Zeitgeist and politics can influence buildings.*

In the context of climate protection, politicians – among other measures – demand a carbon-neutral building stock by 2050. Timber construction which, thanks to its carbon storage capabilities can make a significant contribution, is among the predestined building methods to reach this goal. This is why it has been promoted federally for years (also see info box on page 6). Therefore, more and more private home builders, investors and architects are interested in this renewable raw material. But the public sector is also increasingly and consciously turning to wood.

From architects and investors to the public sector: Many have developed new ideas and concepts for timber buildings in recent years, especially in an urban context. They show how the advantages of this construction method can be used specifically to create additional living space in cities and at the same time increase the resident's quality of life. There are now numerous examples of energy-efficient buildings in many urban centres that are made entirely or partially of wood.

#### Link tip:

Ecological model development of Prinz-Eugen-Park in Munich

<https://tinyurl.com/y6t6j8av>



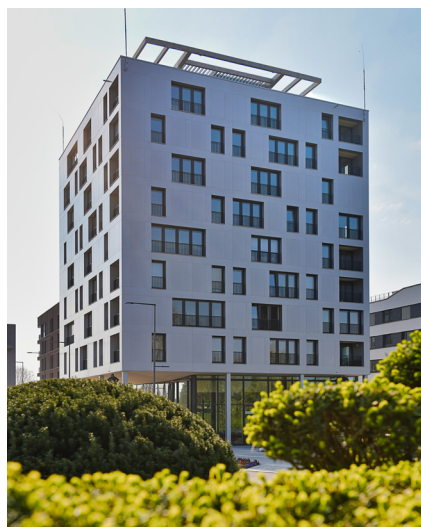
### TIMBER CONSTRUCTION ON THE RISE

The speedy development of modern timber construction in the past decades increasingly manifests in multi-storey buildings. Today, timber high-rise buildings are part of the industry's standard portfolio and are experiencing a steep increase in popularity. Timber high-rise buildings have been erected all over the world in recent years – for example in Canada, Australia, England, the US, Finland and Norway. At 85.40 m, Mjøstårnet in Norway's Brumunddal currently holds the world record. By 2022, the 25-storey Ascent building in Milwaukee (USA) is supposed to succeed it, marking a new record of 86.60 m. Meanwhile, Tokyo's urban planners are already thinking way ahead: To mark the city's 350th birthday in 2041, they intend to erect a 350-m-tall timber high-rise called W350.

There is a lot going on in the German-speaking world, too: At 34 m, Germany's tallest (hybrid) timber high-rise named Skaio in Heilbronn is now being challenged by the 65-m-high Roots building (also known as "Wildspitze") that is currently being built in Hamburg's Hafencity and scheduled for completion in 2023. This record could then be broken by the 29-storey WoHo, a 98-m-high-rise made from wood in Berlin-Kreuzberg. Switzerland also boasts a few 'highs': Not only is an 85-m-tall high-rise by the name of Tilia Tower currently being built in Lausanne, Projekt Pi in Zug is supposed to become another milestone in terms of timber high-rises by 2024 with its 27 storeys and 80 m of height. Austria has been boasting its 84-metre-high wooden high-rise, or HoHo for short, at Seestadt Aspern near Vienna (Austria) for a while now.

Construction of the 37-storey Tree House in Rotterdam (Netherlands) and of a 40-storey building for software company Atlassian in Sydney (Australia) is also scheduled to begin in 2021. Also in Australia, namely in Melbourne, the world's tallest wooden storey was added in 2020. The Adina Hotel there will receive ten additional storeys. But timber construction is not only getting higher and higher, it is also expanding sideways. For example, Germany's largest timber housing estate was completed in Munich's Prinz-Eugen-Park.

**Skaio,**  
Heilbronn, Germany





**Mjøstårnet,**  
Brumunddal, Norway



**Timber high rise Roots (also called "Wildspitze"),**  
Hamburg, Germany





**Ten-storey addition at the Adina Hotel,  
Melbourne, Australia**



**Projekt Pi,  
Zug, Switzerland**



**HoHo, Seestadt Aspern,  
Vienna, Austria**





## INFO

**Timber construction exploits usable space while achieving a high energy standard**

On top of all the other advantages of timber construction, the smaller area required for exterior wall components compared to other building systems is particularly noteworthy: With identical thermal insulation properties and dimensions, the available usable area can be up to 10 percent larger due to slimmer components.

A 32-cm-thick solid wood wall insulates better than a wall of the same thickness made of bricks and polystyrene, for example. A brick and polystyrene wall would have to be a good 50 cm thick to achieve similar thermal insulation values as a solid wood wall.

Wooden buildings have an 'inherent' energy efficiency bonus due to the thermal insulation properties of the wood itself or due to the construction, which - like timber frame construction<sup>9)</sup>- integrates thermal insulation into the wall. The warmer surfaces of solid wood walls, for example, also create a feeling of comfort compared to mineral building materials and enable a lower room temperature and thus less heating energy. Adding to this is the moisture-balancing effect of wood, which has a positive effect on the indoor climate.

<sup>9)</sup>Timber frame construction: Timber frames and full-height inserted posts with wood-based panels applied on both sides for wall and ceiling elements. The cavities can be filled with thermal insulation.

**Example of Aktiv-Stadthaus in Frankfurt a.M.**

The timber frame walls of the demonstration project Aktiv-Stadthaus in Frankfurt am Main are 33 cm thick. With façade cladding and facing shell on the inside, they end up being 47 cm thick on the north façade, and around 55 cm on the south façade with solar power modules. Façade structures and constructions on the interior side such as facing shells are also added to conventional construction methods.

**Link tip:**

Planning recommendations, page 15 and pages 30-31:

<https://tinyurl.com/7pp3mrsu>

**Aktiv-Stadthaus,**  
Frankfurt am Main, Germany



**Forest conversion adds new timber construction projects**

The conversion of forests to more deciduous trees has attracted forward-looking entrepreneurs as well as researchers and material developers, who are now increasingly testing whether and how hardwoods can complement or even replace softwoods in construction in the future.

Initial concepts and results are promising. Among them is a hardwood product made of beech wood that is highly load-bearing. To be more precise, it has three times the load-bearing capacity of softwood, playing in the same league as concrete. This kills two birds with one stone: On the one hand, one needs less wood for the same construction tasks, so that one can plan and work with much more delicate components. Secondly, beech is available in sufficient quantities and will continue to be so in the future due to the conversion of the forests that has already begun.

**Link tips:**

Structural building projects using European hardwood

<https://tinyurl.com/m5rmjcxu>

Hardwood product markets from a technical-economical and market structure perspective:

<https://tinyurl.com/5ac97hdk>

Hardwood construction – An interview with Prof. Hermann Kaufmann and Anne Niemann:

[www.youtube.com/watch?v=bnmHQMMInBk](http://www.youtube.com/watch?v=bnmHQMMInBk)

Hardwood construction – An interview with Prof. Dr. Matthias Zscheile

<https://tinyurl.com/3uj57a8m>

**Reading:**

- DER ZIMMERMANN: "Laubholz macht Brettschichtholz stark", Issue 4-2013, page 11 et seq.
- db deutsche bauzeitung: "Neue Werkstoffe, neue Optionen", Issue 3-2016, page 72 et seq.

**Massive timber engineering construction with laminated beech veneer**

The most recent example of an engineered timber industrial building is the new construction of a production hall for a screw manufacturer with an office and exhibition building in Waldenburg, Hohenlohe<sup>10)</sup>. Not only does the company rely on the high load-bearing capacity of hardwood timber construction, i.e. beech wood or laminated beech veneer, which experts also refer to as BauBuche (“BuildingBeech”), but it also sets a new standard: The new hall building has the world's largest roof structure made of BauBuche. The design by the team headed by well-known Vorarlberg (Austria) architect Hermann Kaufmann makes do with extraordinarily few supports, so that the observer is amazed at the comparatively delicate roof construction in view of the remarkable dimensions of 97 m by 114 m.

If you ask the structural planners about the slender beams and struts, the answer is that, apart from steel, this could only be realised with BauBuche, or actually only with BauBuche. Steel would have been much heavier, which would have made the foundations more expensive. The use of prestressed concrete – as in bridge construction – was also briefly discussed at the very beginning, but the idea was quickly discarded: Much too big, much too heavy and much too difficult to manufacture and transport.

<sup>10)</sup>Project description:

<https://tinyurl.com/3z2dh7w>

[www.holzbauoffensivebw.de/de/frontend/product/detail?productId=5](http://www.holzbauoffensivebw.de/de/frontend/product/detail?productId=5)

**Link tip:**

Timber construction production hall: Interview with the architects:

[www.youtube.com/watch?v=YkMMrQzBlU](https://www.youtube.com/watch?v=YkMMrQzBlU)

**Reading:**

Schraubenwerk mit Holz - Die Grenzen von Laubholz ausloten

*Hardcover, Edition Detail, April 2021, ISBN: 978-3-9555-3548-3, 39.90 Euro*

[https://shop.detail.de/ec\\_de/schraubenwerk](https://shop.detail.de/ec_de/schraubenwerk)



**SWG Production Hall,**  
Waldenburg, Germany



**USING WOOD RESPONSIBLY**

The idea that wood could once become building material number one is not entirely without its own issues. Apart from the fact that every building material has its strengths and disadvantages and must be used accordingly, excessive demand for wood could increase and accelerate the already atrocious destruction of nature as well as rampaging deforestation. This does not affect the German-speaking countries as much where the principle of sustainable forestry (only harvesting as much as what grows back) is prevalent, but in other parts of the world, this could lead to serious problems. This is why clients should make sure to only use sustainable and, if possible, domestic wood. And they should not insist on using wood but use it where it makes sense and where it can be used most efficiently.

**NOTE**

**How climate protection and bioeconomy can be combined with wood:**

Five reasons why we need wood to make bioeconomy a success

[www.youtube.com/watch?v=VdxbmM\\_9Lrk](https://www.youtube.com/watch?v=VdxbmM_9Lrk)

Five reasons why it is important to look for sustainability when purchasing wood:

[www.youtube.com/watch?v=aluAoypC6Eg](https://www.youtube.com/watch?v=aluAoypC6Eg)

### “Holz von hier” Network

[www.holz-von-hier.eu](http://www.holz-von-hier.eu)

Pfeifer Holz in Schlitz has joined the network as a certified member with its new CLT production. With locations in densely forested regions of Central Europe and its own sawmills, Pfeifer enables short transport routes and the processing and refinement of the raw material wood along the entire value chain in its own hands. In the modern CLT plant, Pfeifer obtains its wood for its prefabricated system parts exclusively from sustainably managed forests in the vicinity of the locations.

## READING RECOMMENDATIONS

### Neues Bauen mit Holz, Typen und Konstruktionen

Susanne Jacob-Freitag, Marc Wilhelm Lennartz

Hardcover, Birkhäuser Publishing, ISBN 978-3-0356-0455-9, 59.90 Euro (also available as an e-book)

### Urbaner Holzbau, Chancen und Potenziale für die Stadt

Publisher: Peter Cheret, Kurt Schwaner and Arnim Seidel

Hardcover, Dom Publishers, ISBN 978-3-86922-269-1, 78 Euro

### Holz im Hochbau, Theorie und Praxis

Anton Pech, Martin Aichholzer, Matthias Doubek, Bernd Höfferl, Karlheinz Hollinsky, Alexander Passer, Martin Teibinger, Richard Woschitz

Birkhäuser Publishing, ISBN 978-3-0356-0752-9, 69.95 Euro

### Aufstocken mit Holz, Verdichten, Sanieren, Dämmen

Markus Mooser, Marc Forestier, Mélanie Pittet-Baschung, Charles von Büren

Hardcover, Birkhäuser Publishing, ISBN 978-3-03821-506-6, 59.95 Euro

### Tall Wood Buildings. Design, Construction and Performance. Second and expanded edition

Michael Green; Jim Taggart

Hardcover, Birkhäuser Publishing, in English language, ISBN 978-3-0356-0475-7, 59.95 Euro

### Holzbau mit System

Josef Kolb

Hardcover, Birkhäuser Publishing, ISBN 978-3-0346-0553-3, 79.95 Euro

### **Holzrahmenbau**

Gerrit Horn

*Hardcover, Rudolf Müller Publishing, ISBN 978-3-87104-263-8, 129 Euro*

Information on the book: <https://tinyurl.com/hznj5t3>

### **Holzbau Atlas**

Thomas Herzog, Julius Natterer, Roland Schweitzer, Michael Volz and Wolfgang Winter

*Hardcover, Birkhäuser Publishing, ISBN 978-3-7643-6984-2, 120 Euro*

### **Atlas Mehrgeschossiger Holzbau**

Hermann Kaufmann, Stefan Krötsch, Stefan Winter

*Hardcover, Edition Detail, ISBN 978-3-95553-353-3, 130 Euro*

### **Architektur fertigen. Konstruktiver Holzelementbau**

Mario Rinke, Martin Krammer

*Triest Publishing, ISBN 978-3-03863-056-2, 60 Euro*

### **Nachhaltige Häuser, Zeitgemäß und zukunftsfähig - Die Sieger des HÄUSER-Awards**

Bettina Hintze

*Hardcover, Random House Publishing, ISBN 978-3-7913-8754-3, 59 Euro*

### **Bauen mit Laubholz**

Konrad Merz, Anne Niemann, Stefan Torno

*Hardcover, Detail Publishing, ISBN 978-3-95553-504-9, 52.90 Euro*

## **SELECTION OF USEFUL LINKS**

### **Holzforschung Austria – pro Holz Austria**

[www.holzforschung.at](http://www.holzforschung.at)

[www.proholz.at](http://www.proholz.at)

### **Online timber construction catalogue**

[www.dataholz.eu](http://www.dataholz.eu)

### **Expert consultation: Free information on the topic of timber construction**

<https://informationsdienst-holz.de/fachberatung-auskunftsservice-holzbau>

### **Technical brochures, work aids, documentation etc.**

<https://informationsdienst-holz.de/publikationen>

[www.holzbau-deutschland.de](http://www.holzbau-deutschland.de)

[www.institut-holzbau.de](http://www.institut-holzbau.de)

**Further links:**

[www.informationsvereinholz.de](http://www.informationsvereinholz.de)  
[www.informationsdienst-holz.de/forschung](http://www.informationsdienst-holz.de/forschung)  
[www.ingenieurholzbau.de](http://www.ingenieurholzbau.de)  
[www.brettsperrholz.org](http://www.brettsperrholz.org)  
[www.balkenschichtholz.org](http://www.balkenschichtholz.org)  
[www.d-h-v.de](http://www.d-h-v.de)  
[www.fertigbau.de](http://www.fertigbau.de)  
[www.holz-kann.de](http://www.holz-kann.de)  
[www.foerderpartner-holzbau.de](http://www.foerderpartner-holzbau.de)  
[www.holz-von-hier.eu](http://www.holz-von-hier.eu)  
[www.fnr.de](http://www.fnr.de)  
[www.enbausa.de](http://www.enbausa.de)

**Federal Environment Agency:**

Wie wir leben - Unser Weg in eine treibhausgasneutrale und ressourcensparende Zukunft:  
<https://tinyurl.com/5c4fbjch>

**Bavarian Association of Carpenters:**

Nachhaltiges Bauen, Ressourcenwende, Günther Hartmann

Reading:

<https://docplayer.org/51265841-Nachhaltiges-bauen-ressourcenwende.html>

Download:

<http://s256510465.online.de/stopcozwei/PDFs/WEGWEISER.pdf>

**Agency for Renewable Resources (Fachagentur Nachwachsende Rohstoffe e.V. FNR):**

Timber house concepts:

<https://tinyurl.com/5fb77mht>

**Information, publications and research reports published by the Federal Institute for Research on Building; Urban Affairs and Spatial Development:**

[www.zukunftbau.de](http://www.zukunftbau.de)

Effizienzhaus Plus – planning recommendations

<https://tinyurl.com/7pp3mrsu>

Ökologische Baustoffwahl – Aspekte zur komplexen Planungsaufgabe "Schadstoffarmes Bauen":

<https://tinyurl.com/3v68h7yj>

ÖKOBAUDAT – Basis for the building life cycle assessment:

German:

<https://tinyurl.com/mn26hthv>



English:

<https://tinyurl.com/6ayjxa9t>

WECOBIS – Webbasiertes ökologisches Baustoffinformationssystem:

<https://tinyurl.com/u36daphd>

Sustainable Building by the Federal Government:

German:

<https://tinyurl.com/5kv7u927>

English:

<https://tinyurl.com/38du2rwf>

17th Network Meeting of the Effizienzhaus Plus Initiative on 14 January 2021 at the BAU Online

<https://tinyurl.com/5fu26v7p>

**Minister for Economic Affairs, Labour and Housing Construction of the State of Baden-Wuerttemberg:**

Leichtbau im Bauwesen – Ein Praxis-Leitfaden zur Entwicklung und Anwendung ressourcen- und emissionsreduzierter Bauprodukte:

<https://tinyurl.com/pjpnvfdm>

**Federal Ministry for the Interior, Building and Community (BMI):**

Leitfaden Nachhaltiges Bauen:

<https://tinyurl.com/5a3t6ear>

<https://tinyurl.com/23y8kbdy>

Audio:

<https://tinyurl.com/24cazxbz>

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