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PRODUCT GROUP PROFILES

Wooden Walls

compiled by

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HOLZ VON HIER: non-profit initiative with stakeholder board, advisory boards, expert panel and open partner network. HOLZ VON HIER: Climate and Environment Label / HvH Environmental Footprint.

1 / Introduction

Building with wood is commonly considered the contribution to climate protection par excellence. The reason for this is the better energy balance in production compared to other building materials such as concrete, steel or stone as well as the CO_2 storage function due to the capturing of CO_2 in the wood. However building with wood is anything but „CO_2-neutral"! Decisive for the climate balance are the degree of further processing and above all the upstream chains with the transports. This product group profile aims to raise awareness of the environmental impact of different materials or construction products and their sources.

Wood is used in private construction, in public construction and commercial construction. The combinations of wood building materials among themselves are very diverse and allow very large creative freedom in planning and construction. Timber construction is traditional and modern, inexpensive, healthy and with wood from here proof very environmentally friendly.

Wooden buildings consist of load-bearing components in different construction methods. Here are above all to call:

1. **Log houses**. Here the walls consist of single massive beams. The span ranges from traditional round logs to square timbers of different dimensions, which are connected to one another via various tongue and groove techniques, right through to complex, vendor-specific system variants, such as, for example, Lignotrend, Lignatur and others.

2. **Skeleton construction**. In this construction, which also includes the old traditional framework, a load-bearing construction of beams is built, the interstices are ‚filled out', formerly with loam-straw mixtures, today mostly with other materials or even glass.

3. **Timber frame construction**. In this construction, which is also characteristic of prefabricated house construction, the construction consists of narrow wooden stands of usually 6 * 20 cm dimension with cross bars. The stand construction is stabilized inside and outside by planking, usually from chipboard or OSB boards, sometimes in the form of skewed slats. The gaps are filled with insulating material. This construction is relatively inexpensive and also very material-saving and can therefore also be used to conserve resources.

4. **Timber panel construction**. In this construction, the walls (and usually the ceilings) consist of solid wood walls of varying thickness between 10 and 50 cm. The thickness is achieved by several layers of board, either rectified by glue or nails (board stacking walls) or arranged in alternating 90% rotated layers, which in turn have different joining techniques, such as e.g. with wooden dowels (e.g., ThomaHolz, Holz100, Nurholz and others), glue (cross laminated wood, CLT) or metal nails (e.g., solid wood wall). A major advantage of this construction method is the high degree of prefabrication and the high rigidity, which allows even large construction projects. A disadvantage is the comparatively high demand for raw materials as well as potentially higher transport load along the processing chain up to the construction site.

5. **Composite construction**. In some cases, wood is used in conjunction with other building materials. This can e.g. Wood-concrete hybrid elements that are used especially in wooden high-rise construction. However, other forms are also designs of 100% renewable resources such. Straw bale houses with stabilizing wooden frames.

Different wood construction materials are used in these different construction methods. In addition to plate materials, which are treated in their own profile, massive lumber plays in different degree of processing the central role.

The building material used or the construction method have a significant influence on the material flows along the processing chain and thus on the environmental footprint of the building materials or thus of the entire building. Basically, it can be observed that with increasing processing of the building material, special special products and with increasing complexity of the construction or construction, the transport distances increase very rapidly. However even simple building materials, such as rough lumber, can also come from far imports and conversely, special products such as Lignotrend or wood panel elements can then have a small transport load, if the manufacturer is located near the site.

The range of assortments includes:

- **Classic dry (list) timber,** which usually remains rough-cut. It is usually used in timber frame construction or trusses. This material, which is less and less common today, is the classic sawmill product and potentially has the shortest path, as it can be produced by almost any sawmill on site.

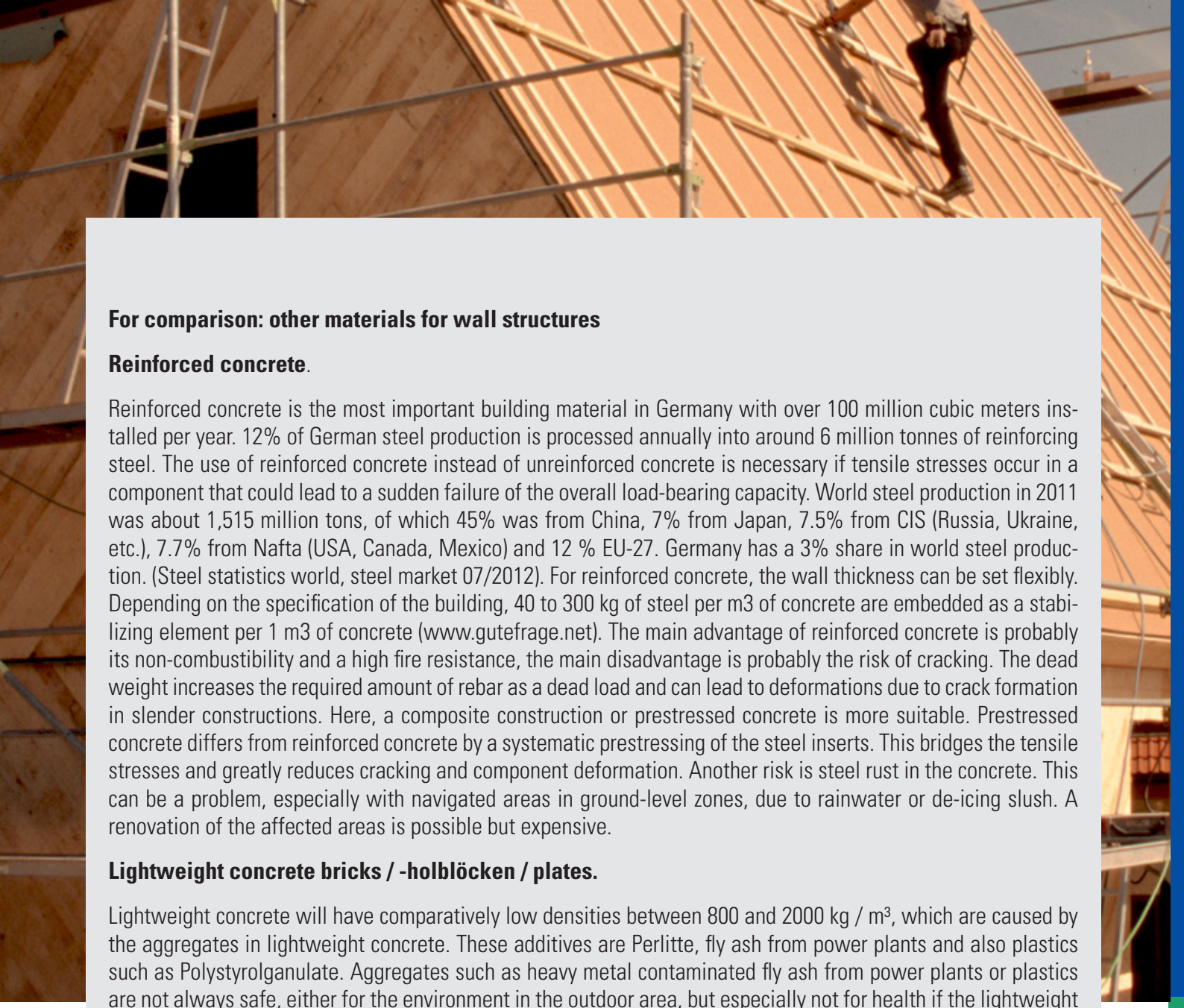
- **Planed wood**. This range consists of planed and possibly profiled boards of various dimensions. This range is used especially in the façade area. Planed timber can also be produced by most regional sawmills and therefore has a potentially (!) Very low transport rucksack. However, this is partly determined by the specific dimensions, since there are certain dimensions which are characteristically derived from abroad, e.g. from Scandinavia (‚Nordic measurements').

- **KVH**. KVH hides galvanized and dried lumber graded according to quality grades. KVH can be rough-cut and faulty when used in non-visible areas or planed and largely defect-free for the visible. However, KVH is also understood to mean ‚structural solid wood' as a product of the supervised quality association KVH with the protected brand name KVH. Each KVH has the advantage that a higher yield of the round wood is possible because defects can be easily ‚cut out' and the parts can be glued together again. A potential disadvantage is that it is produced by significantly fewer manufacturers than traditional timber and thus, as a rule, has significantly wider paths. Especially today, partly because it has become an internationally traded mass product. It is also important to note that a local manufacturer is not a guarantee for short distances of the wood, since the primary products are usually even imported today.

- **MH solid wood**. This product was developed in response to the growing trend of KVH. It can be used equally by architects as equal to KVH because it fulfills the same requirements regarding dryness, sorting, quality grades (visible, not visible) as well as dimensional stability and is subject to quality control.

- **BSH**. BSH stands for glued laminated timber, in which parallel board layers are glued together to different dimensions and the resulting beams are planed. Glued laminated timber is mainly used when large spans have to be bridged with slender cross-sections or special demands are placed on the dimensional stability, such as, for example, at conservatories

Lumber, sawn timber, KVH and BSH from local sawmills are highly ecological products, if it has been proven to be wood for short distances from sustainable forest management. This shows the label HOLZ VON HIER.



For comparison: other materials for wall structures

Reinforced concrete.

Reinforced concrete is the most important building material in Germany with over 100 million cubic meters installed per year. 12% of German steel production is processed annually into around 6 million tonnes of reinforcing steel. The use of reinforced concrete instead of unreinforced concrete is necessary if tensile stresses occur in a component that could lead to a sudden failure of the overall load-bearing capacity. World steel production in 2011 was about 1,515 million tons, of which 45% was from China, 7% from Japan, 7.5% from CIS (Russia, Ukraine, etc.), 7.7% from Nafta (USA, Canada, Mexico) and 12 % EU-27. Germany has a 3% share in world steel production. (Steel statistics world, steel market 07/2012). For reinforced concrete, the wall thickness can be set flexibly. Depending on the specification of the building, 40 to 300 kg of steel per m3 of concrete are embedded as a stabilizing element per 1 m3 of concrete (www.gutefrage.net). The main advantage of reinforced concrete is probably its non-combustibility and a high fire resistance, the main disadvantage is probably the risk of cracking. The dead weight increases the required amount of rebar as a dead load and can lead to deformations due to crack formation in slender constructions. Here, a composite construction or prestressed concrete is more suitable. Prestressed concrete differs from reinforced concrete by a systematic prestressing of the steel inserts. This bridges the tensile stresses and greatly reduces cracking and component deformation. Another risk is steel rust in the concrete. This can be a problem, especially with navigated areas in ground-level zones, due to rainwater or de-icing slush. A renovation of the affected areas is possible but expensive.

Lightweight concrete bricks / -holblöcken / plates.

Lightweight concrete will have comparatively low densities between 800 and 2000 kg / m³, which are caused by the aggregates in lightweight concrete. These additives are Perlitte, fly ash from power plants and also plastics such as Polystyrolganulate. Aggregates such as heavy metal contaminated fly ash from power plants or plastics are not always safe, either for the environment in the outdoor area, but especially not for health if the lightweight bricks are installed indoors. German and European producers must comply with the health requirements of the EU. The compressive strength is one of the most important properties of concrete, this is of course lowered in lightweight concrete. The advantage of lightweight concrete over normal concrete is, however, in comparison, low weight and lower thermal conductivity. Aerated concrete (expanded concrete with holes) is also a lightweight concrete. However, lightweight concrete has two major disadvantages, on the one hand its unfavorable behavior in moisture absorption and its low sound insulation. This is to be considered with constructional walls from this material. A protection of the wall against moisture and sound is therefore particularly necessary here.

Brick walls

Brick walls usually consist of pure bricks, bricks with mineral wool filling or bricks with pearl fillings and masonry mortar to connect and fix the stones. The gross density for pure bricks is 550-1400 kg / m3 (740 kg / m3 throughput), for bricks with mineral wool filling at around 705 kg / m3 (at 54% filling) and for bricks with pearlite filling at around 806 kg / m3 (at 47% fill), 574 kg / m3 (62% fill) and 391 kg / m3 (78% fill). For bricks and other masonry walls, the average wall thickness of 30 cm (thicknesses: 10 to> 40 cm) is generally stated in EPD, building guards and the internet. Masonry mortar has a yield of 0.6-0.65 liters / kg according to EPD-BMT-2009111-D. It takes 34-37 kg / m2 with a wall thickness of 18 cm to 48-52 kg / m2 with a wall thickness of 37 cm masonry mortar needed. That is about 6 kg / m3 to 19 kg / m3. A construction-functional unit here is usually a wall 0.3 meters thick, 1 m high and 1 m long (1 m2). Bricks exist as well as brick clinker bricks for facades.

2 / Prechains

Basic raw materials in wood walls (material)

The predominant basic material in wooden walls is always round wood from the forest. This is further processed in the sawmills to different solid wood materials (see Introduction). Further raw materials are not needed. Only aggregates such as glues are needed in very small quantities in some products. mostly melamine-urea-formaldehyde (2.2%), phenol-resorcinol (0.3%) and polyurethane (0.01%). For some wall structures (solid wood wall) Aluminuim is added for the metal pins.

In addition to the massive lumber wall structures in wooden houses partially (wood frame construction, see Introductory) also made of stiffening panel materials. These boards (OSB or chipboard) are made of wood as the main raw material. This is usually in the sawmills in the form of chopping chips or sawdust as a byproduct. However, panel materials still have 5-10% glue content.

For comparison: basic raw materials in other wall types

Reinforced concrete wall made of structural steel and construction concrete. Reinforced concrete is made of steel and construction concrete. Basic material for steel is iron ore. Basic raw materials for construction concrete are: gravel, sand, lime, clay (or bauxite), gypsum, fly ash, water and additives.

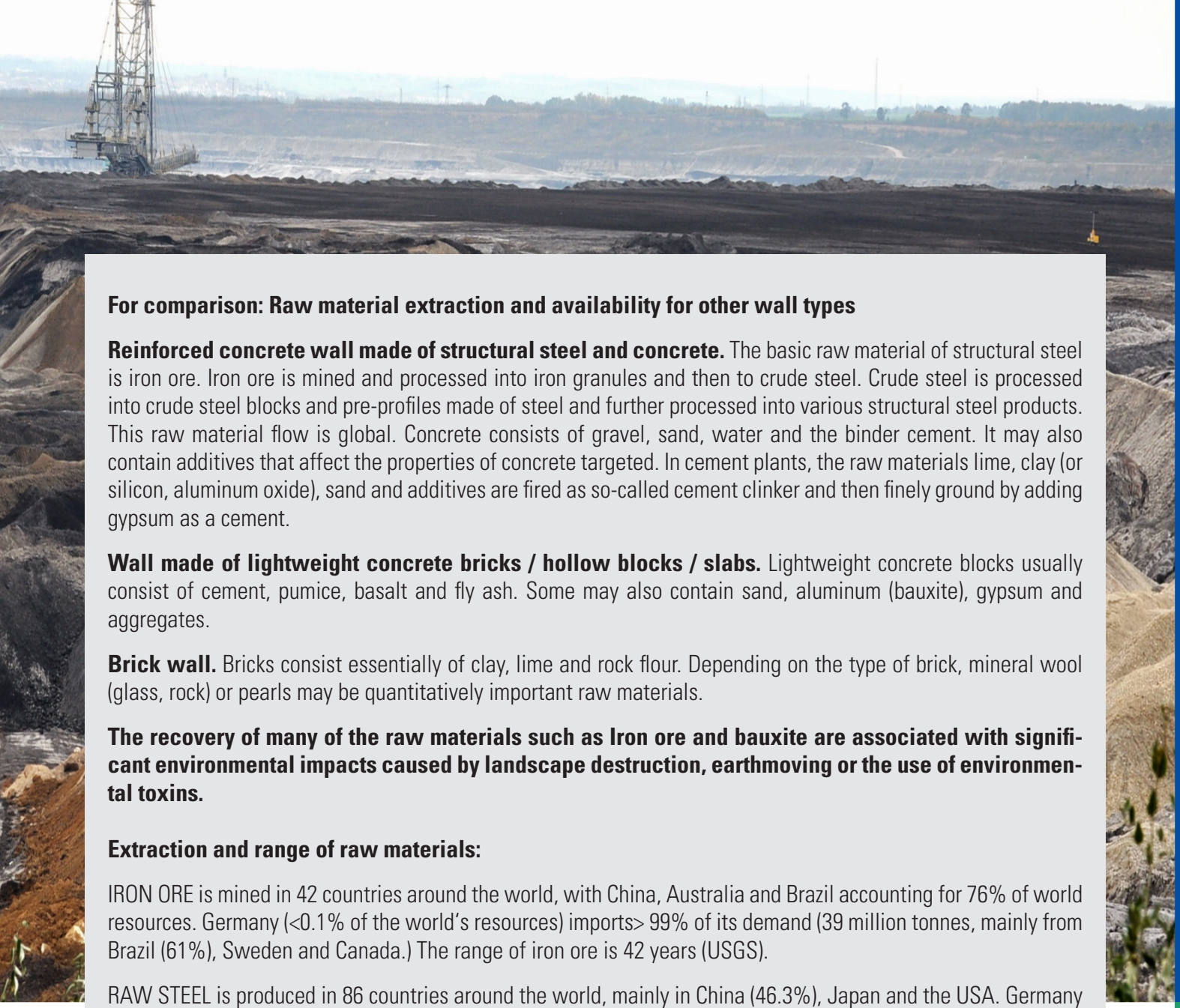
Wall made of lightweight concrete bricks / hollow blocks / slabs. (1) Lightweight concrete blocks with natural aggregates consist of: cement 8-23% pumice 11-77%, basalt 0-80% and fly ash 1%. (2) Lightweight concrete blocks with integrated thermal insulation (PUR plastic) consist of: expanded concrete 47%, sand 22.4%, cement 16.7%, limestone powder 10.1%, PUR 3.8%. (3) lightweight concrete bricks made of aerated concrete („Ytong", manufactured in Turkey) consist of: sand 55-70%, cement 15-30%, quick lime 10-20%, gypsum 2-5%, aluminum 0.05-0.15 %, Additives (eg formwork oil). (4) Lightweight concrete slabs consist of sand, lime, clay (bentonite), gypsum, fly ash (and water), additives such as pumice, basalt, bauxite and additives.

Brick wall. Bricks (pure) consist of: clay, lime, (natural) stone powder. Brick with mineral wool filling consist of: Brick share 38-49%, mineral wool share 51-62%, auxiliaries and if necessary binder. The mineral wool consists of rock (basalt etc.) or glass. Bricks with pearl fillings consist of: Brick content 22-55%, Perlite content 45-78%. In addition, there are auxiliaries for porosity (polystyrene or sawdust or paper scraps) and possibly binders (in water-based D).

Raw material extraction (A1)

The raw material wood comes from forests that are either commercial forests (the rule in Central Europe) or primeval forests (in other parts of the world). German forests have been sustainably managed for centuries, sustainable forestry is enshrined in the Forest Act. Almost all of our managed forest areas are additionally certified with sustainability labels for the forest (FSC and PEFC). This is not the case everywhere in the world, for example in Asia, Latin America and Africa only about 1-5% of the forest area is certified with such sustainability labels. For imports without such a forest label, depending on the country of origin, the risk of poaching is high. The proof of origin of the climate and environmental label HOLZ VON HERE is conform with the due diligence and an entry requirement for logs in the HOLZ VON HIER proof of material flow is that the wood originates from sustainable forestry (certified with FM certificate from FSC, PEFC or similar).

Wood is a renewable raw material and thus is available in principle permanently, provided it comes from sustainable forestry, because then no more wood is taken than grows back. Timber from poaching should not be used for climate and environmental reasons (the „outreach" depends on the occurrence in primary forest countries, especially in the tropics such as Asia, Latin America, Africa and boreal forest areas such as Siberia, Canada etc.).



For comparison: Raw material extraction and availability for other wall types

Reinforced concrete wall made of structural steel and concrete. The basic raw material of structural steel is iron ore. Iron ore is mined and processed into iron granules and then to crude steel. Crude steel is processed into crude steel blocks and pre-profiles made of steel and further processed into various structural steel products. This raw material flow is global. Concrete consists of gravel, sand, water and the binder cement. It may also contain additives that affect the properties of concrete targeted. In cement plants, the raw materials lime, clay (or silicon, aluminum oxide), sand and additives are fired as so-called cement clinker and then finely ground by adding gypsum as a cement.

Wall made of lightweight concrete bricks / hollow blocks / slabs. Lightweight concrete blocks usually consist of cement, pumice, basalt and fly ash. Some may also contain sand, aluminum (bauxite), gypsum and aggregates.

Brick wall. Bricks consist essentially of clay, lime and rock flour. Depending on the type of brick, mineral wool (glass, rock) or pearls may be quantitatively important raw materials.

The recovery of many of the raw materials such as Iron ore and bauxite are associated with significant environmental impacts caused by landscape destruction, earthmoving or the use of environmental toxins.

Extraction and range of raw materials:

IRON ORE is mined in 42 countries around the world, with China, Australia and Brazil accounting for 76% of world resources. Germany (<0.1% of the world's resources) imports> 99% of its demand (39 million tonnes, mainly from Brazil (61%), Sweden and Canada.) The range of iron ore is 42 years (USGS).

RAW STEEL is produced in 86 countries around the world, mainly in China (46.3%), Japan and the USA. Germany (2.8% of world production) also imports crude steel. By almost unlimited recycling, the range of crude steel is very long and can be poorly quantified.

GYPSUM is gained in 80 countries around the world, especially in China (55.3%), US and Iran. Germany (0.8% of world production) also imports gypsum products. The range is >> 100 years (USGS).

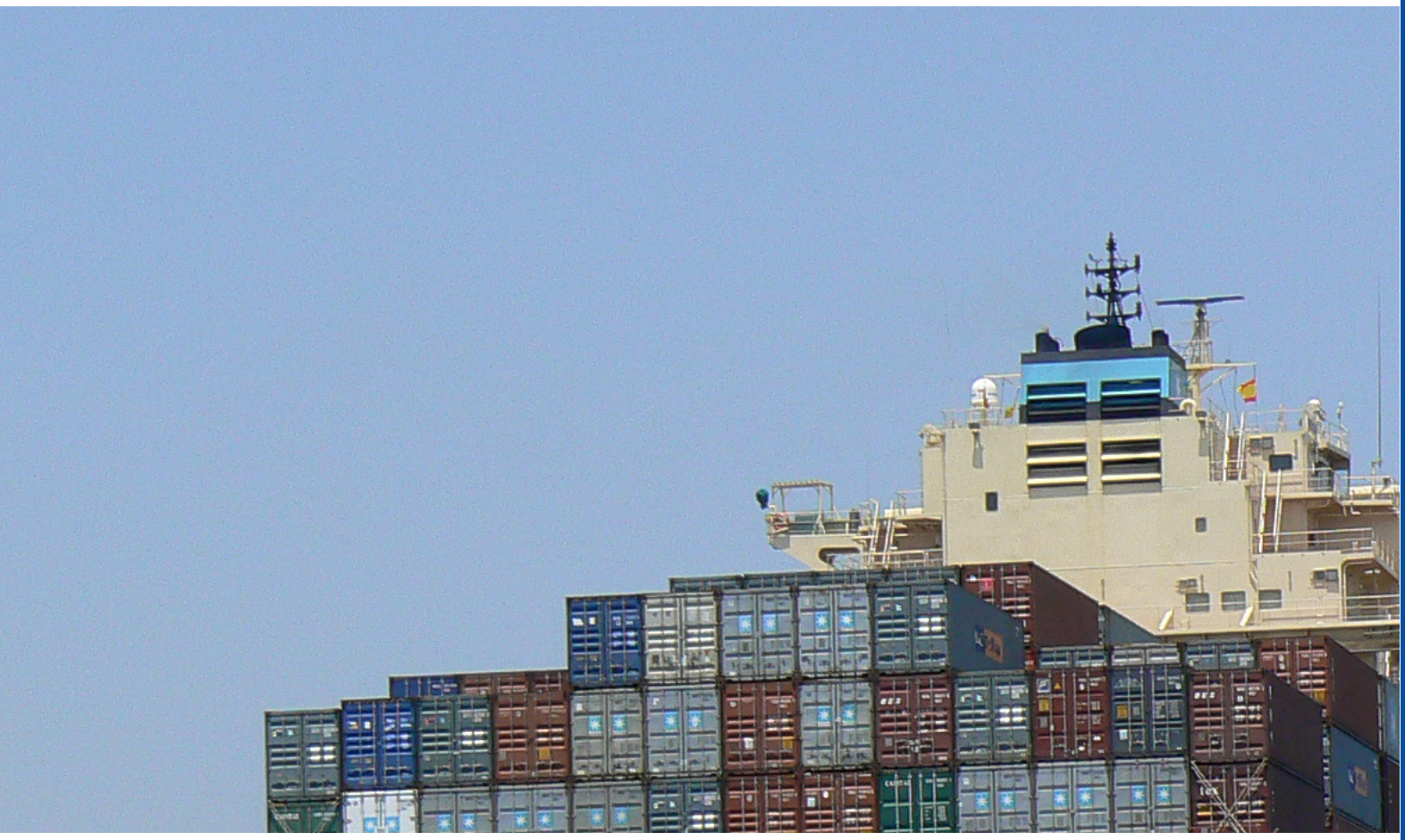
LIME is available in 46 countries around the world, especially in China (63.4%), USA and India. Germany (1.9% of world production, 6.7 million tonnes) also imports around 1.9 million tonnes of lime per year from Austria, Belgium, Poland and France. The range is >> 100 years (USGS).

SAND is commonly considered ubiquitous, but not every sand is suitable as a construction sand. The latter is now scarce in many countries and is traded worldwide.

CLAY is considered ubiquitous. The range is given as >> 100 years (USGS).

BAUXITE is found in 26 countries worldwide. Australia, China and Brazil have 61% of the world's reserves. Germany does not have its own bauxite deposits. The range of bauxite is given as 26 years (USGS 2016).

PERLITES: Perlites are mined in 15 countries of the world, the three largest producers are Greece 26.9%, Turkey 26.9%, Iran 16.8% (Germany has no own deposits). The range of Perlites is classified as 34 years (USGS).



Transports „cradle to gate“ (A2) and Transports „gate to customer“ (A4)

Transport within the processing chain.

Standard data sets from life cycle assessments (EPD) expect product independent 50 to 350 km for the upstream chains. For timber products, more than 20 years ago, scientific studies predict that transport distances of 100 to> 800 km (roundwood: 150 -> 900 km, glued wood: 300 -> 800 km, lumber: 104 to 700 km, sawn timber: 150 - 830 km, OSB: 95 to 136 km, chipboard: 98 to 200 km). However, the tendency of the transport distances is increasing, so that on average today still further ways can be assumed. Even 500 to 600 km underestimate the real transports in the material flow strongly. If one also considers the imports of Zwsichen products into Europe or into individual countries in Europe, it becomes clear that the transport with such modeled transport figures is heavily underestimated in their climate and environmental impact.

Although the raw material itself would be very regional in nature and even if the last processing step takes place in Germany, without proof of origin such as the label „HOLZ VON HIER“ in timber construction products, it can not automatically be assumed that they are derived from climate-friendly and environmentally friendly „short distances“. come from, because the market for raw materials and precursors is now also international in wood. It is possible that wood of unknown origin even comes from exploitation.

Transports to the construction site or site.

With regard to the transport to the customer or the construction site (A4) can make up a significant part of the life cycle assessment. In this respect, however, there are usually massive information deficits. This step is not systematically recorded in EPD (Environmental Product Declarations) or other life cycle assessments for methodological reasons. Since not only the raw materials are traded globally but also finished materials such. KVH, especially if the materials are not purchased from the manufacturer but through the trade, there is a high risk that the wood in the product has traveled very long distances and has thus contributed to high environmental pollution.

The eco-label HOLZ VON HIER records and documents this part of the material flow as the only eco-label.

For comparison: transports in the upstream chains other wall types.

The importance of transport for the life cycle assessment of products is today systematically underestimated. Life cycle assessments (EPD) often rely on standard data sets of 50 to 350 km for the upstream chains, regardless of product. As a result, transports are usually underestimated in their climate and environmental impact. This also applies to other wall types. Without material flow certificates, the raw materials of materials used in construction and interior construction can have covered thousands of transport kilometers. This will be demonstrated by means of circumstantial evidence.

Reinforced concrete wall made of structural steel and concrete. (1) Example IRON ORE: Germany imports 99% of its iron ore, with corresponding transports v.a. from Brazil, Canada and South Africa. (2) Example RAW STEEL: Germany produces approx. 43 million t of crude steel, consumes approx. 38 million tonnes and imports approx. 31 million tonnes, with corresponding transports, eg. from USA. (3) Example STEEL: even the various structural steel products used in Germany are manufactured here, but at the same time also imported. (4) Example LIME: Germany produces 6.7 million t of lime per year and imports about 2 million t, v.a. from Austria, Belgium, Poland and France (up to> 1,100 km). (5) Example GYPSUM: Germany produces about 2 million tonnes of gypsum per year (0.8% of world gypsum production) and could therefore essentially cover its own needs. Nevertheless, every year 0.12 million tonnes of gypsum are imported and, above all, gypsum products (for example, 0.14 million tonnes of gypsum plasterboard). (6) Example STONES: Germany even mines stones in quarries. but also about 0.72 - 1 million tons of dolomite and other stones imported to Germany. (7) Example BAUXITE: Germany does not have its own deposits and imports its needs from 2 to 2.4 million tonnes of bauxite annually (eg Australia, China, Brazil). (8) Example CONCRETE PRODUCTS themselves: Germany annually produces large quantities of Portland cement (32 million tonnes), ready-mix concrete (34 million tonnes) and aerated concrete (31 million tonnes) and about 0.7 million tonnes of lightweight concrete, concrete slabs and concrete blocks, but also imports 1.6 million t of concrete products such as lightweight concrete slabs and lightweight concrete blocks.

Wall made of lightweight concrete bricks / hollow blocks / slabs. (1) Example LIME: Germany produces 6.7 million t of lime per year and imports approx. 2 million t, v.a. from Austria, Belgium, Poland and France (up to> 1,100 km). (2) Example BAUXITE: Germany has no own deposits and imports its needs e.g. from Australia, China, Brazil. (3) Example PUR (granules): Plastic precursors such as PU granules are produced by us but also traded worldwide (for example, China accounts for around 50% of the world market). (4) Example CONCRETE PRODUCTS themselves: Germany also imports 1.6 million tonnes of concrete products per year, a. Lightweight concrete blocks and plates.

Brick wall. (1) Example LIME: Germany produces 6.7 million t of lime per year and imports approx. 2 million t, v.a. from Austria, Belgium, Poland and France (up to> 1,100 km). (2) Example PERLITE: Germany has no own deposits and imports about 0.1 million t per annum v.a. from Greece and Turkey. (3) Example PUR and MINERAL WOOL: Plastic precursors such as PU granules are produced by us but also traded worldwide (for example China 50% world market), similar applies to mineral wool.

3 / Use Phase and After use

Production (A3)

Walls made of wooden constructions today consume significantly less energy in production than other wall types (see Chapter 5). However, energy consumption and the associated emissions are dependent on production technology and partly also on the country of origin. Energy is needed as heat or as electricity. Many companies use e.g. own production waste for the production of heat e.g. to dry. Therefore, the power consumption is often of decisive importance. The power mix of a country has an influence on CO_2 emissions in production.

Use Phase (B)

Inertness of the building material. Timber materials and other building materials are inert in the use phase and do not consume energy, water or raw materials themselves as a building material. Your climate and environmental parameters are set to zero in this phase (GWP, AP, EP, ODO, POCP, PERE, PENRE, water = 0).

After use (D)

Lumber, sawn timber, KVH, BSH, as they are usually natural, can be reused or recycled. Also, the re-use of **solid wood walls** and cross laminated wood (KLH) is well possible, but not yet necessary or practice, since such walls last a very long time. For an evaluation of the practice, the time since the invention of these products is still too short.

Since **wooden houses** lasts for a long time, the question of re-use possibly only later generations. Individual parts can be easily and well replaced and renewed. Also structural changes (for example windows, doors partitions, attachments are straightforward and straightforward especially with wooden houses). The wood from wooden frame buildings is sorted and recyclable, as well as materially and energetically usable.

Wood products are generally classified according to their use in waste wood categories AI (unencumbered) to AIV (burdened) and are used materially or energetically or the waste wood exported. AI and AII waste wood are already valuable substitute fuels for oil and gas throughout Europe and are widely used in regional biomass heating (power) plants. Old wood is also used worldwide, e.g. in wood panels. Technically common ways of recycling waste wood in recycling, which are extensively used in other countries, are excluded in Germany by the German waste wood regulation. However, the regulation does not prohibit wood boards with up to 100% waste wood from being imported into Germany and used here in construction.

For comparison: other walls in the after use

Reinforced concrete wall made of structural steel and construction concrete. The main disposal route for non-separated reinforced concrete demolition today is the storage in construction waste dumps. If the reinforced concrete is not separated into structural steel and construction concrete at the end of its useful life, which is often difficult because of the costs alone, only the building rubble landfill remains. Reuse and recycling of reinforced concrete is probably also in the future as very difficult to impossible to evaluate. Grade-pure mild steel is reused directly in Germany for about 11% and about 88% of the steel scrap is theoretically available as a recycling potential for new production of structural steels. However, this can also be in China or other countries of the world where the steel scrap must first be transported. Varietal construction clay is not easy to prepare. For this purpose, the concrete would have to be crushed and sorted by grain fractions, because only so the concrete can potentially be used partially in road construction. Recycling as fresh concrete is theoretically possible only to a small extent and is not common today, even if there are single DGNB certified buildings with recycled concrete.

Wall of lightweight concrete bricks / blocks / slabs. Lightweight concrete and aerated concrete blocks are disposed of today at the construction debris dump. Only for sorted separation theoretically certain quantities would be recyclable and to be used as a surcharge for production, which will hardly ever be economical for purely financial reasons and especially with composite materials such as lightweight concrete blocks with aggregates such as polystyrene or fly ash is not possible. Small proportions could be used in part in road construction and road construction, which is also a rather theoretical possibility today. According to the manufacturer's EPD, some German manufacturers occasionally offer take-back systems, which, however, does not necessarily mean recycled content for the building material. Many take-back systems today are more of a customer service rather than an environmental measure, as this is not usually associated with a commitment to recycling rates.

Brick wall. Construction demolition of brick walls is usually disposed of in Germany today on the building rubble landfill. Brick walls are not reused or recycled in Germany today (according to EPD). For recycling and further processing, the bricks would first have to be separated from the mortar. Especially with bricks that are filled with insulating materials such as mineral wool or PUR bricks and mineral wool or PUR would have to be sorted separated, which is not the case in practice.

4 / Product features

Health aspects

Lumber itself do not contain harmful substances. Potentially harmful substances in laminated timber products such as KVH, BSH, KLH can only come from the binders or hardeners used. Some glues e.g. in particle boards may contain harmful substances like PDMI. Pay attention to emission limits, e.g. through environmental labels.

For comparison - health aspects of other walls

Reinforced concrete wall made of structural steel and construction concrete. Reinforced concrete produced in Germany complies with the legal requirements for formaldehydes, VOCs and eluates (the levels of formaldehydes, VOCs, eluates, carcinogens are not stated in the analyzed EPDs, only it is noted that the limit values according to AgBB are observed).

Wall of lightweight concrete bricks/blocks/slabs. Lightweight concrete bricks manufactured in Germany comply with the legal requirements for formaldehydes, VOCs and eluates (for formaldehydes, VOCs, eluates, carcinogens no information is given in the analyzed product EPD, it is noted „no proofs are required in the product" or „the limit values according to AgBB scheme are observed „).

Brick wall. Bricks with mineral wool, PUR or Perlite filling made in Germany comply with the legal requirements for formaldehydes, VOC and eluates (measured formaldehyde values according to EPD: 0.02-0.04 ppm, limit value: 0.05 ppm, to VOC, Eluates, carcinogens, no information is given in analyzed EPD, it is noted „limits are respected").

REACH-RISK in wood construction materials. There is hardly any risk for harmful substances in the wood construction products in German and European production. The UF glues often used here are not classified as hazardous to health and are not listed under REACH. For others look for environmental labels (s. chapter 5). However, imported glulam from other parts of the world could also contain other glues. It therefore makes sense to look at the origin or a proof of origin such as HOLZ VON HIER.

For comparison - REACH Risk

Reinforced concrete wall made of structural steel and construction concrete. Reinforced concrete could potentially contain harmful substances. In the „Metals" material area there are potentially 2 substances in the REACH regulation and 13 substances in the REACH candidate list. In the material area „concrete" (without additives!) There are potentially 5 substances in the REACH candidate list.

Wall of lightweight concrete bricks/blocks/slabs. Lightweight concrete bricks could contain potentially harmful substances. In the material field „concrete" (without additives) there are potentially 5 substances in the REACH candidate list.

Brick wall. For bricks with mineral wool and PUR filling, it is not the proportion of bricks but the fillings with mineral wool and PUR that carries a risk for REACH relevant substances. However, it should also be noted that bricks with mineral wool or PUR in the brick interior are only used for exterior walls. Health-endangering indoor emissions are unlikely here.

Safety aspects

Safety and behavior in case of fire. One should not be fooled: brick, concrete or wood, every building can burn. Decisive for the safety in case of fire is which health hazards arise and how stable the building is. Natural wood does not produce toxic gases in case of fire. In addition, the stability in wooden houses with solid load-bearing wooden beams is optimal and you have plenty of time to leave the building safely, because around the heartwood forms a protective coat of charcoal, which protects the wooden frame and long maintains the steadfastness. It can no longer penetrate into the wood oxygen and burning slows down greatly.

With solid wooden walls and solid wood walls, the risk of spontaneous combustion of e.g. Wallpaper or curtains on the other wall side is greatly lowered. Thus, a fire can not or only with difficulty spread from one room to another.

According to the project database wecobis of the Federal Ministry of Transport, Building and Urban Development and the Bavarian Chamber of Architects, natural materials such as wood and stone are optimally compatible with health, both during use and in case of fire. In case of fire, however, the usual combustion gases are produced without highly toxic substances, such as e.g. in case of burned plastic.

For comparison - Safety / Behavior in case of fire

Reinforced concrete wall made of structural steel and construction concrete. Reinforced concrete itself does not burn. Nevertheless, in the case of the steel content in the concrete, it is necessary to convert it to cover with flame-retardant materials, because without it, the stability of the steel girders can not be guaranteed in the case of fires. There are no data available on combustion gases (not even EPD). Moreover, steel has the disadvantage of suddenly losing its stability and giving way without any warning under the influence of heat.

Wall of lightweight concrete bricks/blocks/slabs. Concrete components themselves are classified as non-combustible with high fire resistance. However, a pure concrete wall without insulation and facades does not exist. If, for example, a cheap plastic insulation is applied to the wall (for example, without a proven high proportion of - usually harmful - fire protection products), this can have considerable consequences in case of fire. Due to the then very high temperatures (plastic burns dripping with high temperatures - such as oil), also in concrete walls and especially in concrete slabs, the risk of cracking and thus increasing instability may arise. Thus, even after a fire, the ability to reconstruct or re-use the building or building part can be severely impaired. In addition, extremely toxic gases are produced in the event of fire.

Brick wall. Bricks are considered to be innert in case of fire (non-flammable).

Lifetime

All wall materials, wood, bricks, concrete, reinforced concrete, etc. are given by the Federal Institute for Building, Urban Affairs and Spatial Research (BBSR) with the same life span, in the highest awarded category of >50 years. For all materials, however, it depends very much on the structural wall protection. Therefore, you should always consider wall insulation facade as a constructive unit and not evaluate independently. A wooden wall with a NaWaRo insulation and a wooden facade can easily hold several generations. There are many wooden buildings that date back to the Middle Ages.

For comparison: remarks on reinforced concrete

Steel rusting in concrete can be a problem for navigable areas in ground-level zones (such as car parks) due to rainwater or salt-containing slush. A renovation of the affected areas is possible but very expensive. Even steel embedded in concrete will or should always contain corrosion protection for public buildings.

Durability

The durability of solid wood products and wood panels is high. A wooden wall is just as hard-wearing as any other wall.

For comparison: other wall types

Reinforced concrete wall made of structural steel and construction concrete. Reinforced concrete is usually hard-wearing.

Wall of lightweight concrete bricks/blocks/slabs. Concrete is sensitive to weather (eg forestry sensitive) without the appropriate structural protection. Concrete walls, like other exterior walls, therefore require facade protection.

Brick wall. Brick walls which are plastered as usual, are durable under the influence of weather.

Maintenance

A wooden wall in itself does not need to be maintained, as it is, like any wall, protected by a facade, preferably a wooden facade.

For comparison: other wall types

Reinforced concrete wall made of structural steel and construction concrete. Reinforced concrete requires little care in technical design protection.

Wall of lightweight concrete bricks/blocks/slabs. Concrete walls must be very well insulated in any case and shielded from the weather. Like other wall types, concrete walls that are well shielded from the weather do not need any special care, but their façades already. However, it is important to pay particular attention to concrete building materials in the system wall-insulation façade that no condensation occurs. Since on concrete walls today especially thermal insulation systems and cheap plastic insulation are applied, this is particularly important. Straight concrete walls absorb moisture particularly well. This not only promotes mold growth, but it can also cause microcracks or larger cracks in the concrete in frost. Wet concrete walls have greatly reduced insulation properties. It is not worthwhile to save money on concrete walls in the long term at this point.

Brick wall. The care effort here depends on the type of plaster and the paint.

Reparability

The ease of repair or modular interchangeability of wood building materials is given in principle, however it depends on the product design or the type of attachment. Especially with wooden houses is an outstanding feature that the reparability and variability is very good. Individual parts can be easily and well exchanged.

For comparison: other wall types

Reinforced concrete wall made of structural steel and construction concrete. If cracking occurs in the concrete or corrosion of the steel in structural steel, this is only tolerable if it does not endanger the stability. The repair of the affected areas is possible but expensive. If necessary, other stabilizing measures are taken or the affected parts of the building are renewed.

Wall made of lightweight concrete blocks/ blocks/plates. If lightweight concrete components are damaged, usually only the replacement remains.

Brick wall. Brick walls should be repaired if defects such as cracks or similar are available from a specialist. Gluing on plastic cladding on clinker facades, as is often the case today, can have serious rollovers, such as condensation, with potential consequences such as mold growth and damp walls.

5 / Environmental Labels

Environmental / quality labels

HOLZ VON HIER.

The HOLZ VON HIER label particularly distinguishes climate-friendly and environmentally friendly wood products with wood from the short routes of sustainable forest management, with proof of origin and life cycle assessment data. In addition, all products produced in Germany or Europe comply with the strict statutory environmental and health requirements of the EU. HOLZ VON HIER is a climate and environmental label and therefore has not developed its own criteria for sustainable forestry, but requires evidence such as FM certificates to FSC or PEFC or similar.

FSC.

FSC-FM certification certifies sustainable forest management worldwide according to the criteria of FSC. The wood in products with an FSC-CoC certificate can exhibit long transport.

PEFC.

PEFC-FM certification certifies sustainable forest management worldwide according to the criteria of PEFC. The wood in products with a PEFC-CoC certificate can exhibit long transport.

Natureplus.

Natureplus identifies formaldehyde-free and low-emission products that go far beyond European limit values and also verify that the product does not contain any REACH-relevant substances (including substances from the REACH candidate list).

Blue Angel.

The Blue Angel designates formaldehyde-free and low-emission products that go far beyond European regulations with their threshold specifications. So far not awarded for classical construction timber and related products.

EU flower.

Not yet awarded for wood products.

EPD.

EPD are not environmental or quality labels and can not be used and evaluated as such. In addition to methodological problems such as comparability and system-immanent neglect of transports, an EPD without a comparative framework says nothing about the environmental friendliness of a product.