



# REPORT

## FCLT PROJECT | ADVANTAGES OF CLT

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## Advantages of CLT

CLT has a lot of advantages compared to other building materials such as brick, stone or concrete. Most of them are caused by wood as a material in general, but some can only be achieved with the special way of organizing the wooden layers.

One big benefit is the favourable impact on climate protection through the storage of CO<sub>2</sub>. Wood has a positive ecological balance and therefore can help us to save the environment and prevent climate change. Additionally, it is a renewable resource, what means that if we do not use as much as it is growing, there will not be a shortage.

Wood has a lower density than other building material, which means that it is very light and can be inserted in nearly every circumstance. However, it is a stable product with high strength, great static properties and is applicable in areas with a higher probability of earthquakes, too.

Due to its air pockets in the cellular structure, timber is a natural insulator which keeps heat and cold outside the building. The positive property that wood can balance humidity is another factor which leads to the fact that you feel very comfortable inside a house made of timber.

Towards every expectation, wood has a high fire resistance and flames only progress very slow and predictable. The layer of carbon which is created protects the rest of the material and slows down the increase of the temperature in the inner parts.

Because CLT is very compact and the elements are thin, it does not need as much space as other materials and up to 10% of more living space can be created.

The individual parts of a CLT house are pre-fabricated in a hall by the producer. When they arrive at the construction site they can be set up easily and quickly within a few days. Due to the fact that the elements are cut with a CNC-machine, the size accuracy and quality is very high. Furthermore, no water is required to build the house, what makes it much easier for the builders. The only necessary condition is good weather and no rain. Another advantage of CLT is its big variety and diversity. It can be combined with steel, glass or other materials and still keep its high strength and dimensional stability. The architectural possibilities are very high and the design can be flexible.

The wall of a typical Finnish house has the following composition:

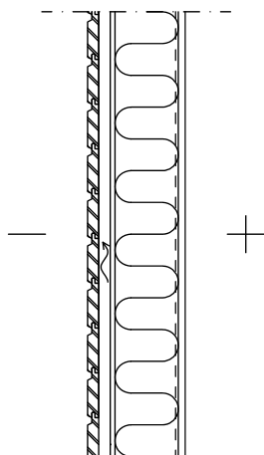


Figure 1. The wall of a typical Finnish house

On the outside are wood panels which fit perfectly together and can be painted in the colours the owner prefers. They cover the rest of the wall to give the house a good-looking face. Between this and the next layer is a space filled with air created by small wood battens. After that you can find a layer made of wood fibres and bitumen. It is responsible to make the house wind proof. The next layer is made of framing wood and about 175mm thick. The frame is filled with insulation material like fiberglass, mineral wool, cellulose, plastic or natural fibre. The following layer is made of thin plastic and prevents that no air from the outside comes through the wall into the house. But it is also responsible that no vapour has the chance to get into the house which causes a lot of problems. On the inner side, there is the wall sheet which can consist of various materials depending on what the customer prefers.

The difficulty with the plastic layer is following: When cold vapour from the outside diffuses through the wood, the wind-protection-plate and the insulation, it stops at the plastic layer, because it is vapour-proof. At this point of the wall, the temperature is much higher than outside what causes the vapour to condense. Thus, water drops stick to the plastic layer and cannot move inside the house or back to the outside of the wall. The heat from the interior of the building and the missing air to dry the water cause the wall to moulder. This is a very bad circumstance, because living in a house with mould can cause a lot of diseases and is harmful for the health of the residents. In several houses, you can already see the mouldy walls from the outside after one year.

To prevent this unhealthy way of living, a new method has been developed: The plastic layer and the inner wall sheet are replaced by a plate made of CLT with the thickness of 100mm. The cross-laminated timber is also water-proof, but not vapour-proof. Due to this, vapour can stream from the outside to the inside of the house without a barrier. This prevents the appearance of mould and a healthy living can be provided.