The Cloud

Resources (material, technological, human, energy…) and the availability thereof historically have always been both the limiting and the enabling factors that determined architectural expression and logic. These resources have consistently challenged architects to innovate. Recently, however, we have reached the point of a supposed resource abundance, while simultaneously realising how harmful this abundance can be. The unsustainability of the building industry and its ecological damage are being gradually discovered and exposed, but the required change in the practice does not seem to follow at the necessary pace. This time, **it is the resource abundance that's challenging the architects.**

Aim big

We must aim for a **systemic change in the industry**, primarily focussing on shortening the distribution chains (using local resources), minimising the use of non-reusable and non-recyclable composites, and developing construction methods that allow easy dismantling and reclaiming of materials for reuse. The ultimate objective is to reduce carbon release in the atmosphere during production and shipping, and at the end of the building's life cycle. It is equally important to aim for **change on a large scale** in order to have an effect on the environment. Hence, this proposal considers **alternatives on an industrial level**.

Good industry = point of leverage

Aiming for large-scale change, we must look for points in the system that are the most efficient in catalysing change. We need to **identify what materials and technologies we prefer in terms of resource availability, sustainability and effectiveness; which ones have the lowest carbon footprint during the whole life cycle?**
Currently one of the most common building materials—concrete—not only has a very high carbon footprint, but its afterlife is practically limited to downcycling it by crashing into rubble to be used in road construction. Timber, on the other hand, is a material that comes from a renewable source, if sustainably sourced, has a very low carbon footprint and, if properly maintained, offers a range of reuse options.

Good industry = good waste

Even the 'greenest' industries have inevitable leftovers and by-products, but it is much better to focus on how to make productive use of a good industry's leftovers than attempting to greenwash an inherently unsustainable industry by recycling its waste.
We have identified the CLT industry as one that offers considerable environmental benefits for large-scale construction in this region. But if we promote timber as a preferable building material, we must also take into account the increase of leftovers from the CLT industry. Thus, the project offers a new aesthetic point of view, inviting us to consider **specific typical leftover elements as new construction materials**.

Aesthetics of waste

The proposal considers different kinds of waste and leftovers from the CLT industry.
The most valuable pieces are those that remain after cutting out window and door openings in the wall plates. These materials come directly from the factory—they are perfectly structurally sound, and have the necessary certification but due to their predefined sizes are considered leftovers and mostly turned into wood chips which are then input to chipboards. In other cases, energy recovery is a typical end-of-life scenario for timber products. The size, however, is not always small: typical door cut-outs are ~1,8x1 m, whereas window openings can vary considerably, often being also much larger.
Another by-product of the CLT industry are **the edge trims: timber battens of ~3 m in length and 5x10 cm in section.** These are currently used in the packaging and transportation of CLT pieces from the factory to the construction site as distancers between the plates. The battens are joined together in the supporting grid structure of the roof that carries the waterproofing layer.
Sawdust, an inevitable by-product, already has a range of various applications, but this project proposes to use it as part of the roof covering structure that adds weight to the structure and creates a slightly sloping surface for rainwater runoff. Ultimately, **the plastic wrapping that has been used in the transportation** of the CLT structures is repurposed to make plastic bags to be filled with sawdust and used for the roofing.
Hence the project invites to look differently at the by-products of the CLT industry while encouraging to expand the use of timber in architecture.

Reuse ≠ recycling

Demolition should not be considered a significant source of building materials, as this paradigm allows for easily justifying the disposal of existing buildings, similar to how donating or recycling old clothes is sometimes mistakenly seen as a solution for the unsustainable fast fashion industry. We must aim at **using the existing built structures as long as possible**, and only when demolition becomes inevitable can we do our best to salvage and reuse some of the material. When doing this, we must **avoid putting excessive amounts of energy into post-production and recycling (downcycling) but instead use the materials that are still valuable in their actual condition**. For instance, this proposal takes advantage of the fact that lots of Estonian school and kindergarten buildings from the Soviet period are planned to be demolished and replaced with new, more contemporary, and sustainable facilities. These demolished buildings can be seen as mines of prefabricated concrete beams and blocks still in perfect condition for being used as foundation structures of new constructions.

Good demolition = disassembly

When designing new structures we must aim at construction methods that allow easy disassembly in order to enable a productive afterlife of the future buildings. Most importantly—composites must be avoided, as they can not be disassembled, and various ingredients can not be taken apart and reused. Also the connection joints and constructional logic need to be appropriate, and preferably some cataloguing of elements should be done when building.


BALTI JAAM
SHOP
SHOP
SHOP
SHOP
SHOP
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TRAM

CLT Profi

production of CLT wall elements
the Baltics are a very important player in CLT production in Europe

LEFTOVERS FROM DEMOLITION

large concrete beams or plates get salvaged from local demolition sites

typically concrete will get crushed at its end-of-life and downcycled

sawdust is rather pressed into wood pallets or, if too contaminated, is burned in special heat recovery facilities

timber leftovers get rather crushed and downcycled to chipboard or burned in special heat recovery facilities

plastic waste will be recycled

saw dust contaminated with glue from cutting
usually collected in plastic bags

LEFTOVERS FROM FACTORY

cut-outs from windows and doors
typical size = 1840x1045mm or 1405x860mm

the sawdust bags get wrapped into the leftovers of the packaging foil and form the waterproof roof layer

THE CLOUD
MATERIAL STORAGE

concrete leftovers are used as foundation and sitting elements

preparation of CLT cut-outs for use as columns

CLT battens form a prefabricatable roof structure for the pavilion

LEFTOVERS FROM CONSTRUCTION

damaged and cut packaging foil

CLT battens

use of CLT elements on construction sites in the Baltics, Scandinavia and Central Europe

finished CLT wall plate

cut-offs from straightening the edges of the CLT elements are used as battens
typical lenght = 3m

many CLT wall plates get stacked with the help of the CLT battens for easier handling with forklift

packaging foil
VeriSafe ST STRONG

wrapping of CLT elements for transportation from factory to construction site

removal of packaging foil and CLT battens on construction site


Spolia – reuse of decorative elements historic ruins as plain building material


Cheese maker - Studio Makkink & Bey (stacking unrelated objects as a new form, a new aesthetic)


Estonian construction waste found around Tartu – picture by the authors


Wrapping foil — picture by the authors


Wrapping foil on a CLT building site in Estonia — picture by the authors


Traditional house in Dogon, Mali


Traditional house in Dogon, Mali


Kaline's House (seaweed house) 1865, Northern Jutland, Læsø island, Denmark


Dust furniture – Studio Makkink & Bey


Traditional foundation of a log house in Latvia (national heritage) – picture by Juris Dambis


A Silk Lining with a Seam Undone. Fabric sculpture – Mareunrol's


Palais Granvelle Brussels demolition 1931, demolition site as material market


Rubble clearing in Berlin, 1940

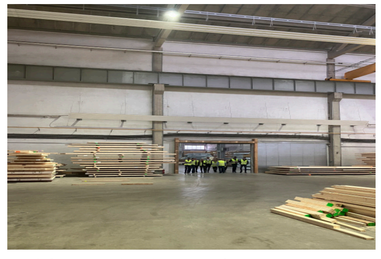

Sawdust bag – picture by the authors


Sawdust bag found at CLT company – picture by the authors


Concrete blocks – picture by the authors


Construction debris used as foundation –picture by the authors


CLT leftover used as distancers for transportation – picture by the authors

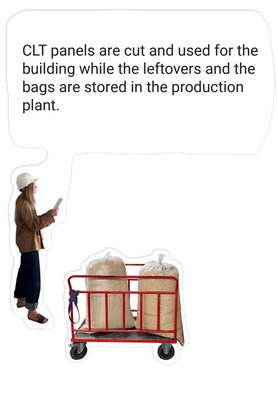

CLT leftover used as distancers for transportation – picture by the authors

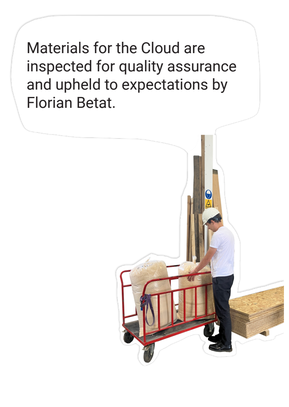

CLT leftover used as distancers for transportation – picture by the authors

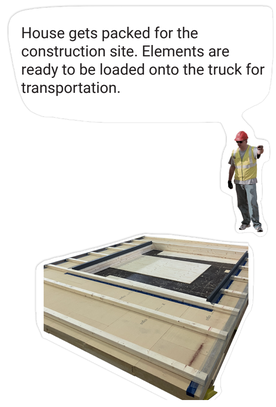

Deconstructed and reconstructed dining set – Micheline Nahra.


Waffle roof construction made out of left over wooden planks - Lendager

MINING MATERIALS FROM THE CLT CHAIN FOR THE CLOUD

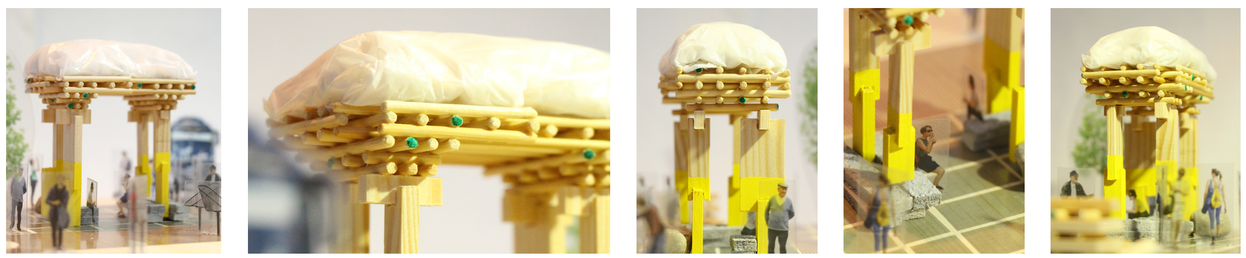




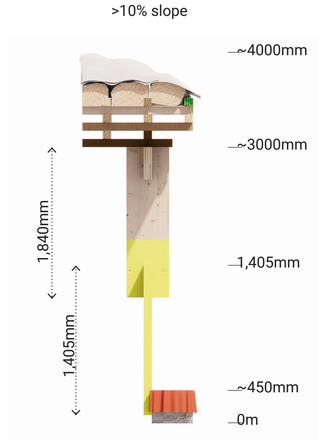



BURGER KING

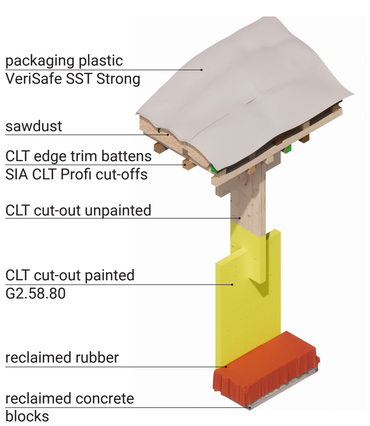
Site plan – scale 1/500



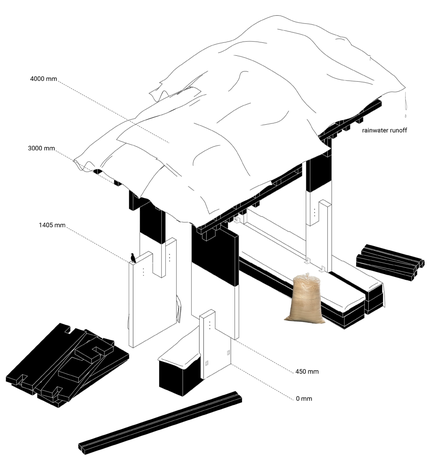
Detail views of the 1:50 model



Section cut out of the construction



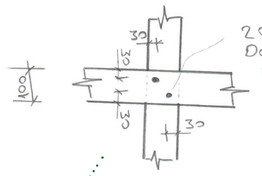
Axonometric cut out of the construction



Axonometric view of the pavilion

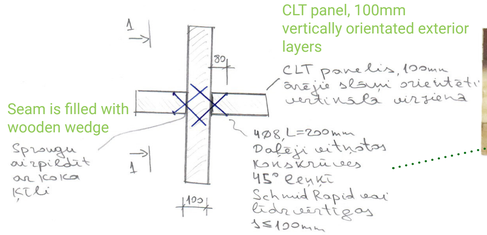
Beam 100x100mm connection:

Sija 100x100mm sajūgums



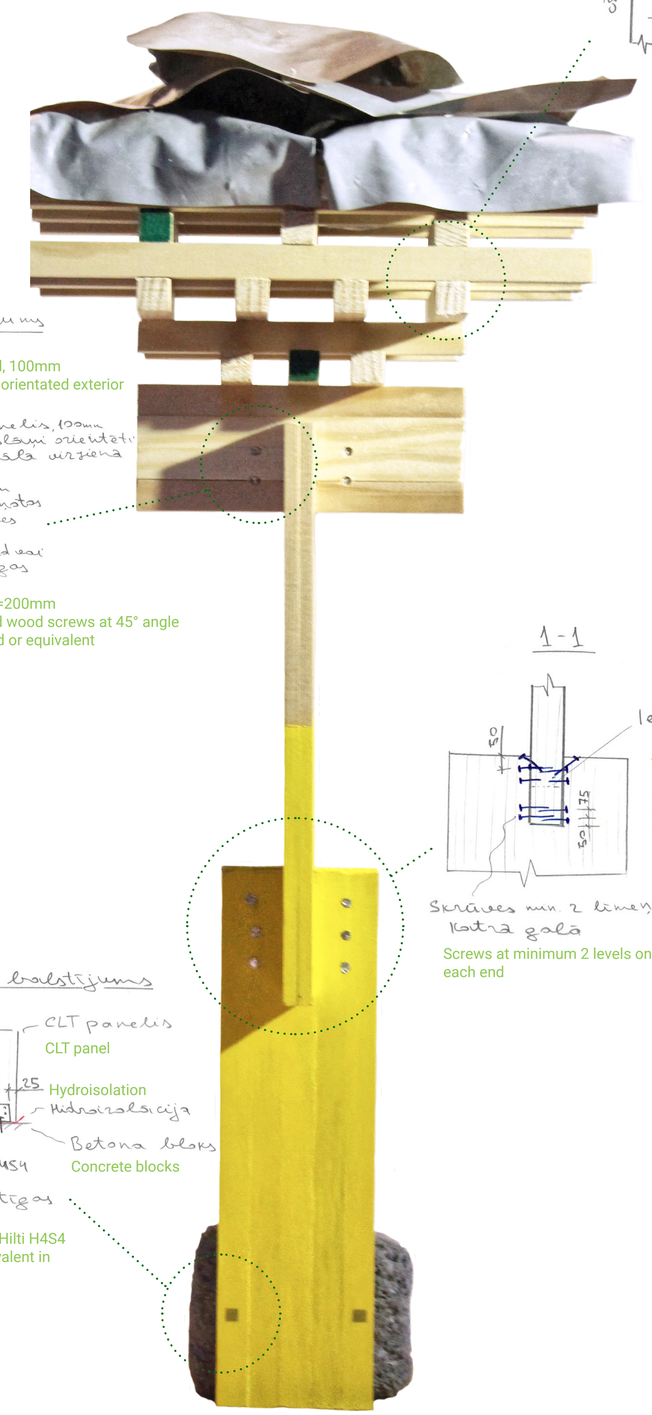
CLT panel connections

CLT paneļu savienojums



CLT panel, 100mm vertically orientated exterior layers

(4) diam.8, L=200mm
Partial thread wood screws at 45° angle
Schmid Rapid or equivalent
s ≤ 100mm



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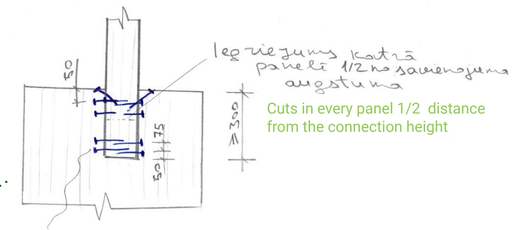
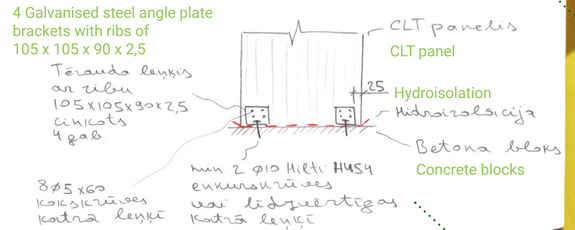


CLT panel supports:

CLT paneļu balstījums



Technical detail sketches by SIA "IG Kurbads"