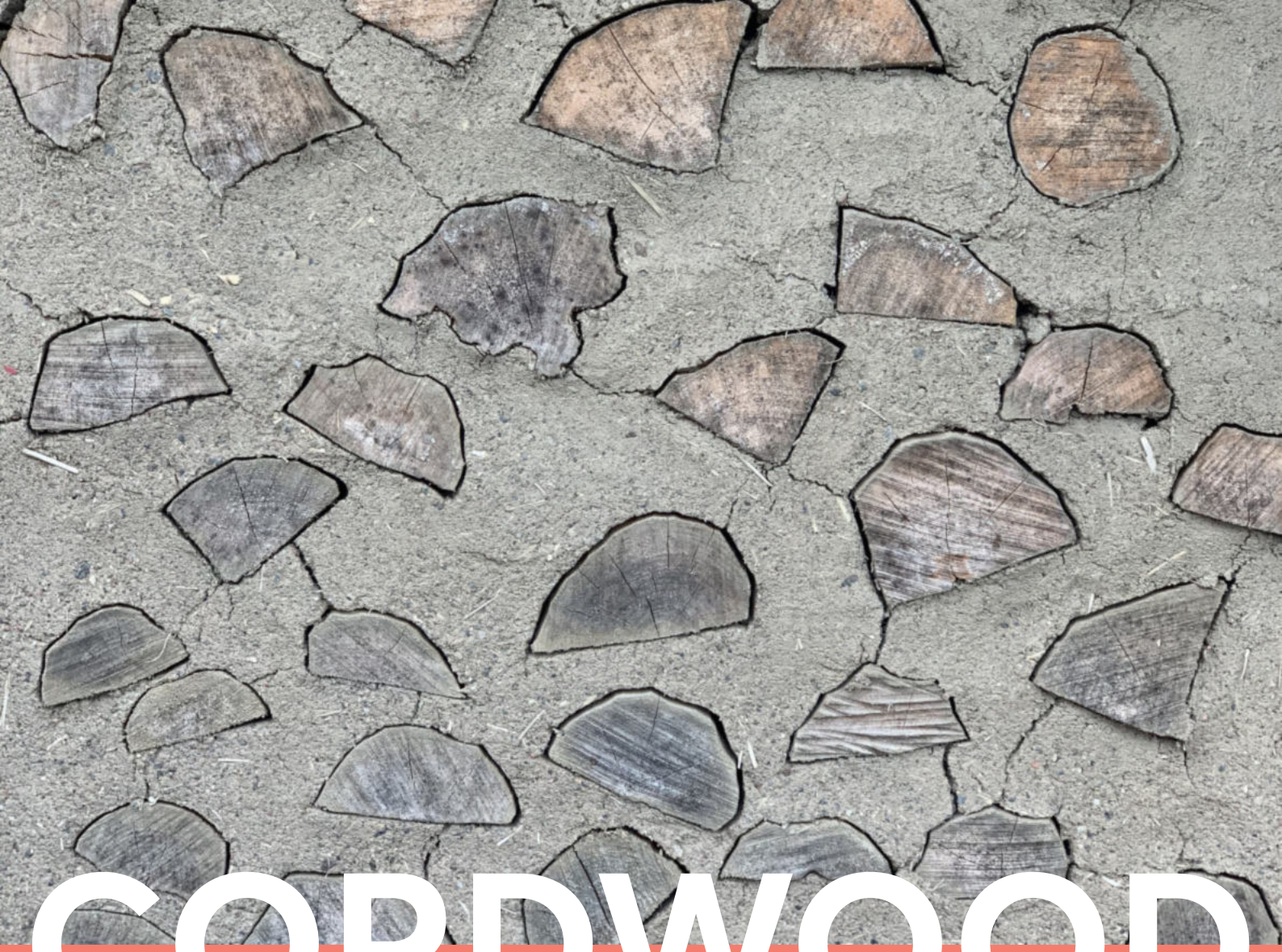

CORDWOOD

BIØN II- Follow-up report

By Architectural Environmental Strategies
Written and edited by Anna Sundman, 2021

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Building Impact Zero Network

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CONTENTS

architectural environmental strategies

TIP

CORDWOOD

Cordwood constructions are built with short pieces of debarked wood that are laid up crosswise with masonry or cob mixtures to make walls and floors. The building is a timber frame construction, with cordwood filling, using both dried logs and recycled wood to create a desired effect and facade pattern. The building technique allow for a large variety of recycled materials making it affordable and with a low environmental impact.

Architectural Environmental Strategies AES is a nonprofit organization founded in 2009, working within the field of architecture, planning and sustainable development. In 2016, AES members met with municipality members and with Eko- Odlarna i Telje, a social enterprise in ecological farming. The process to further assist them in developing their site was started.

The City Council supports a programme where farming is offered to people in long term unemployment. Participants are taught the skills and work from their individual ability.
The aim for this enterprise contributes to the community on multiple levels; providing employment and relevant activities, producing organic crops to nearby markets, activating and main-

Opposite page
1. Completed structure from 2017. The mortar and wood still drying

This page
1. Same view from 2020. The wood visibly greyer in tone.

taining unused municipal land. AES saw the possibility to strengthen the presence and permanence of Eko-Odlarna by contributing to making their visions for the site a reality. The workshop team enrolled in the LearnBION programme, Design and Build with Cordwood, got to work on site with the stakeholders, developing the proposal and building a new boutique in cordwood all in just 4 weeks. Materials where mainly excavated or reused from the site; clay, straw, timber, windows.

A main goal for us was to build agency for the farmers, in finding more ways to create inclusive practices on site in Östertälje. A way to materialise the existence, and make present structures visible. An architecture which aims to strengthen the stakeholders chance to voice their own ideas and aspirations about the places they inhabit. Strengthening the connection between people and the places they share, placemaking refers to a collaborative process by which we can shape our spaces in order to increase the shared value. With community-based participation at its centre, an effective placemaking process capitalises on local community's assets, inspiration, and potential, and it results in the creation of spaces that contribute to people's health, happiness, and well being.

1. SOCIAL LANDSCAPE AND PLACEMAKING

Re-visiting back in Östertälje, it is clear that the site is very much in use and cared for. The plantations have carried on and new structures have been added.

However the farmers have gone through large changes since the project was completed. The original founders from the social enterprise are no longer employed, and the municipal workers who initiated the project have also moved on. This handing over of the site seems to function well, with new members caring for the site. I learned that part of the change was due to the finances not being able to fund the wages, putting a dent to the social construction and the network building on site. The current users appreciate the structure and tell us they receive a lot of positive feedback from visitors.

– It helps having a building like this, one of the farmers add, it appeals to people interested in organic produce, and those are the ones we sell to.

The intentions of the building seem to have worked well. It is giving a sense of identity to the site, and could be seen to function to strengthen the organic approach found on site. It sparks an interest and has supported the business, but unfortunately not fast enough to have kept the original founders of the social enterprise.

Interview with the farmers

The building works well for our small enterprise. However it is not the most practical solution for a store perhaps, it gets a little dark despite having a lot of windows, perhaps it is due to the roof extension. But small practical things like the light is outweighed by the expression of the design, it is so fun to show off!

In the winter season, it is mostly used as storage space and it works well for it. The temperature and the climatic conditions makes it a good cold storage. It has a suitable size for the enterprise, and it is quite easy to decorate.

On site all workers like the building, it has a calm energy. Many visitors find it interesting how the building was made. Few people have heard of cordwood constructions and that raises a bit of interest and sparks conversation.

On the positive side, it is recycled and locally produced and beautiful, different. Negative that it was not really finished with the roof, for example, and that electricity was not drawn in during the work, but of course we solved that. Then the maintenance is a little more complicated than an "ordinary" house.

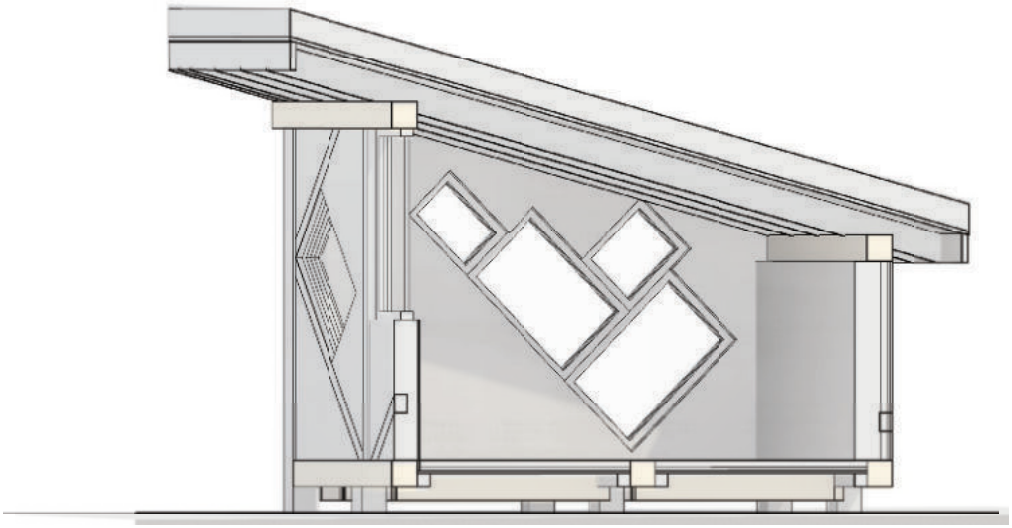

SWEBOLT
BOTNIA BOLT

The building consists largely of recycled materials and materials from the site and it is very important and fun to be able to tell the story! It also fits into our business concept, you could say it's organic just like our produce. We are really happy to have it!

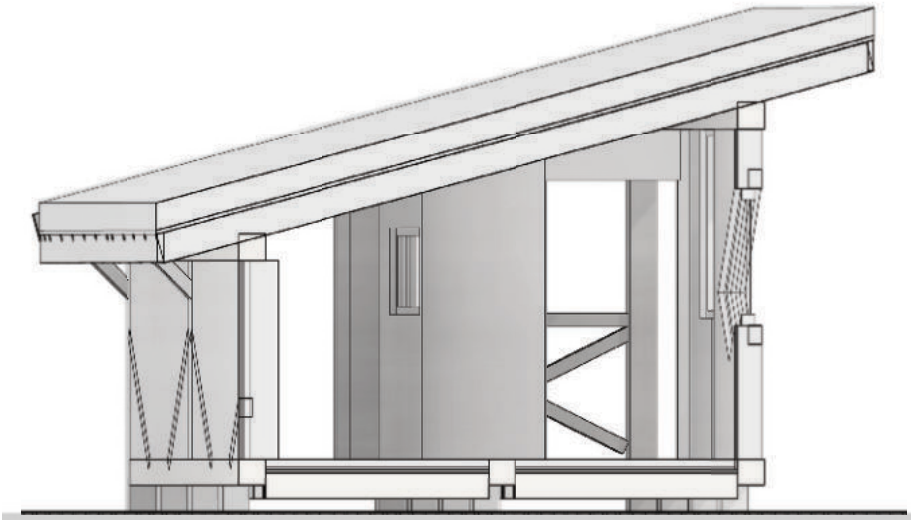
The municipal perspective

The area Östertäle is part of Södertälje municipality and we had a followup interview with Jordan Lane, municipal officer at the Urban Planning Department in Södertälje.

Looking back to 2017 when we started the project, what are your reflections on the project?
The cordwood building sure has made an imprint in the fabric of Östertälje with its unique character and "organic look". It has been a part of making visible the great social enterprises in organic production that have developed within the municipality, both Eko-Odlarna and Under tallarna are examples of this. Both have a distinct architecture, being socially driven and producing organic crops to the growing demand. The design helps draw attention and make visual this structure and is a good example for our Strategy on cultivation and local food production that Södertälje has worked a lot with the past 5 years.
At the time of the project implementation we were in the early stages of finding our way to materialise our agenda, and how to support initiatives like this building workshop. Since that time we have learnt a lot and developed several strategies that inform our work, and allowed us to become a more active partner in this type of development. For example, we have approved an "Architectural Strategy" for development guidelines in 2019. This strategic document states our mission, and identifies areas where we should engage in. Some of these areas are sustainability, innovation, circular flows, much of which you addressed in this project. So looking back, we now have a different framework



Section perspective of building
Interior view towards the eastern wall.

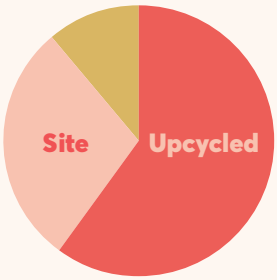


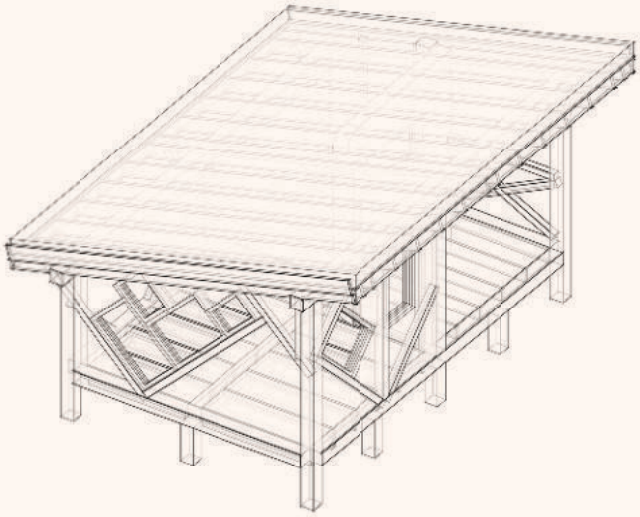
Section perspective of building
Interior view towards the north-west, showing the curved wall.

in place to better support these types of initiatives, that was just in its early face back in 2017.

What strategies would Södertälje municipality want to develop further in order to strengthen citizen-led development?
To further meet the needs of citizen-led processes I think our next step would be to further develop our internal organisation with a specific role assigned to the task. This role could be to seek and meet collaborators, connect innovation projects and the political goals that have been set. We have made a huge progress with our "municipal culture", from a more restrictive approach to a much more engaged and supportive collaborative attitude. And here we also see great results. We have had several initiatives with international perspectives connected to food production, and from these different initiatives I think we have developed a type of project learnings that we now have implemented in our strategies and policies. In the future I would like to combine these initiatives and knowledge producing innovation projects with a stronger citizen participation, and here we can really make a difference in connecting organisations, people, businesses and innovation projects.

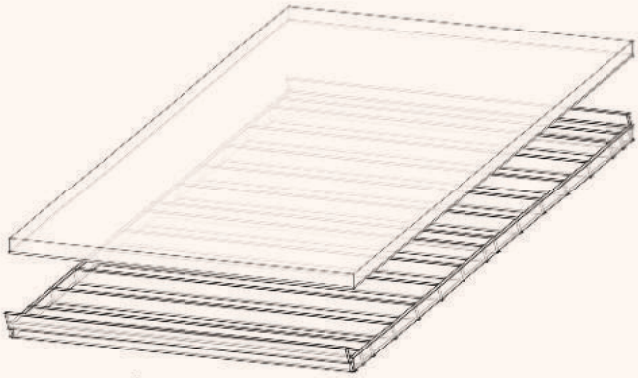
Where the materials came from?





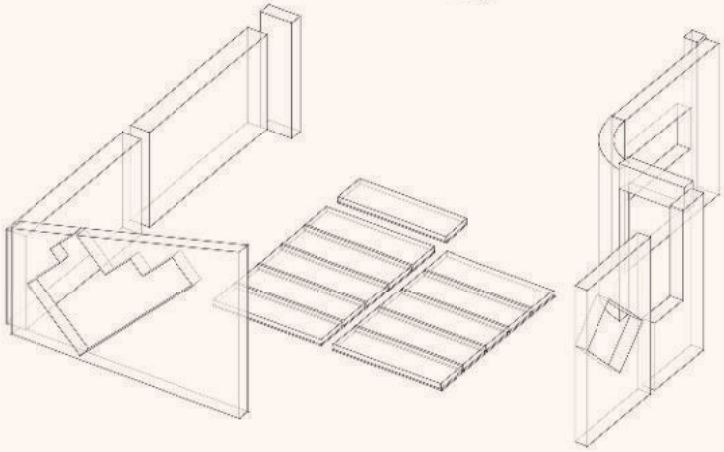
OTHER 11%

In this category we place the materials that we purchased, some new wooden beams were used for the roofstructure and then the roofmaterials, the plastic sheeting for the greenroof, braces and bolts.



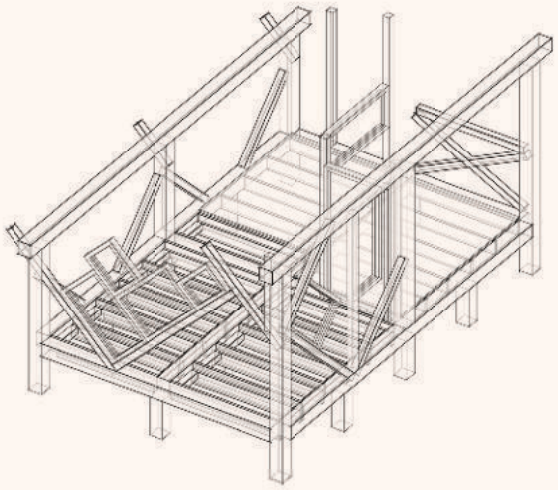
FROM SITE 29%

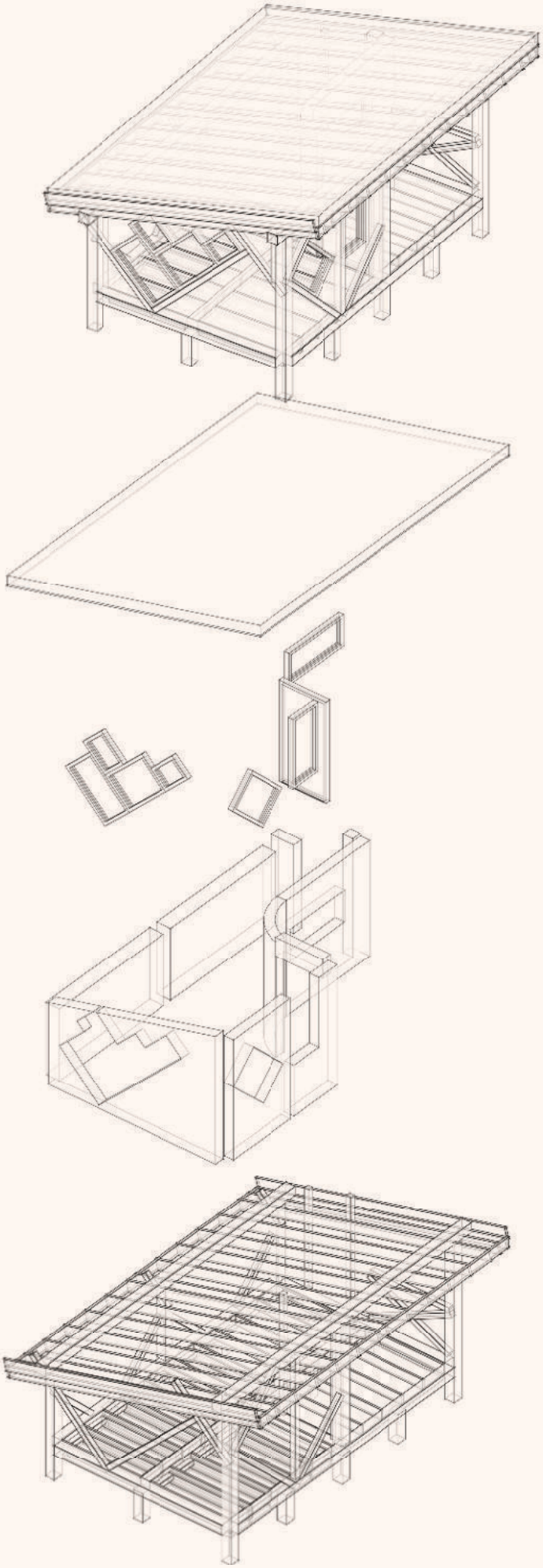
In this category we look at the materials produced on site, the wood and maninly the mortar. The mortar is made from the site from the clay, sand and straw. The 29% is based on the volume of the material used



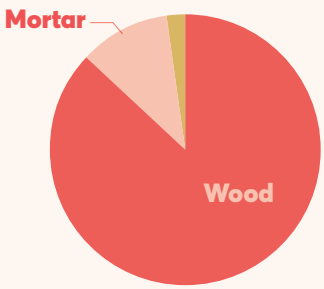
UPCYCLING 60%

The structure is mainly made from wood that has been upcycled and regains a new value. The quality of the recycled wood was great and used for the main structure. We also used donated windows that the farmers had received.





Type of material



OTHER 2%

In the category other we place other material as the roof sheets, windows, braces and bolts.

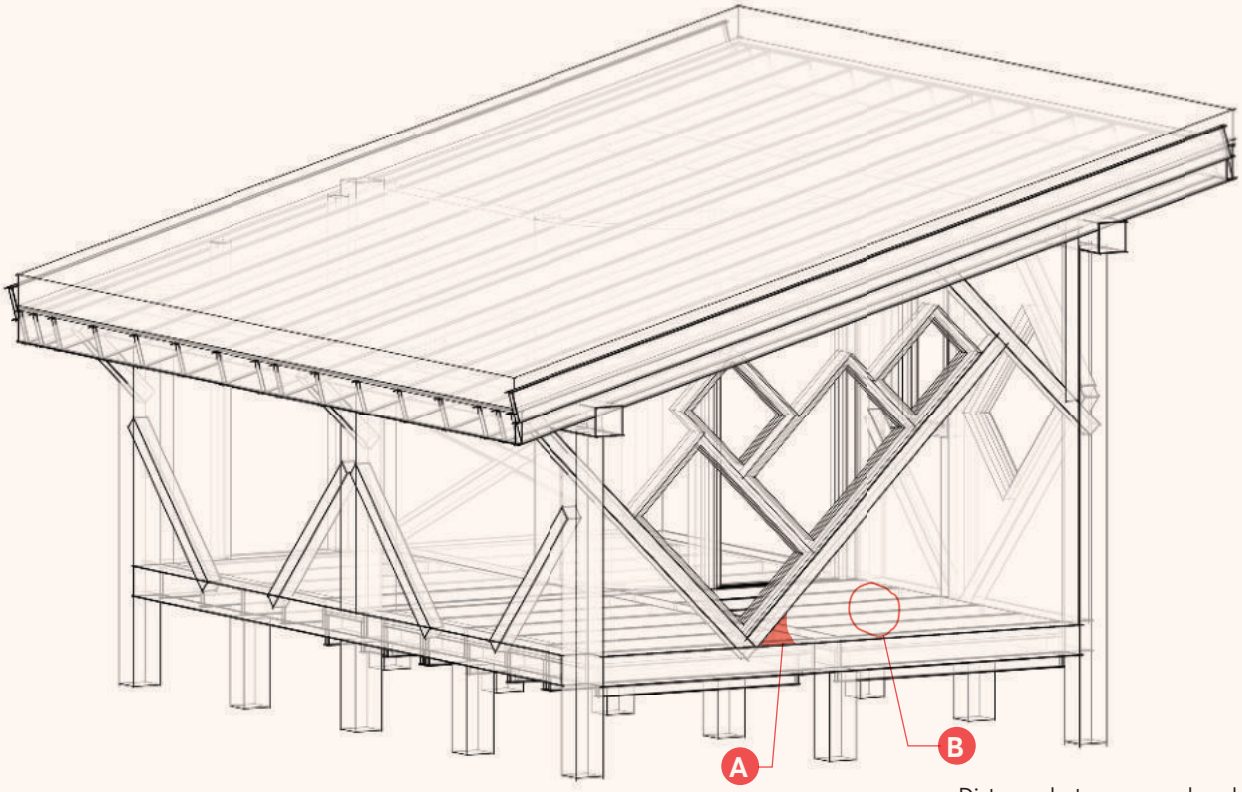
MORTAR 11%

The mortar mix of sand, clay and straw makes up a large part of the structure, 11% of the total volume.

WOOD 87%

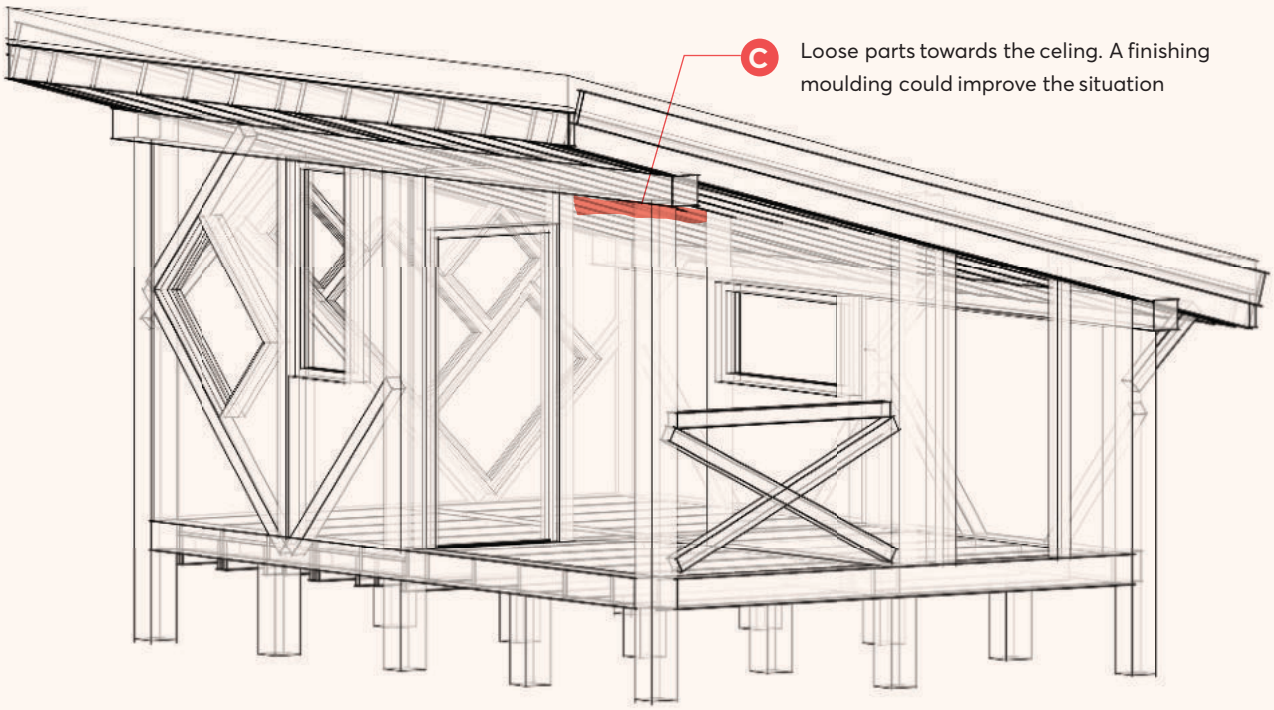
The structure is mainly made from wood, pine, birch, oak and various waste-wood, 87 % of the total volume is wooden.

Issues with the construction after 3 years in use



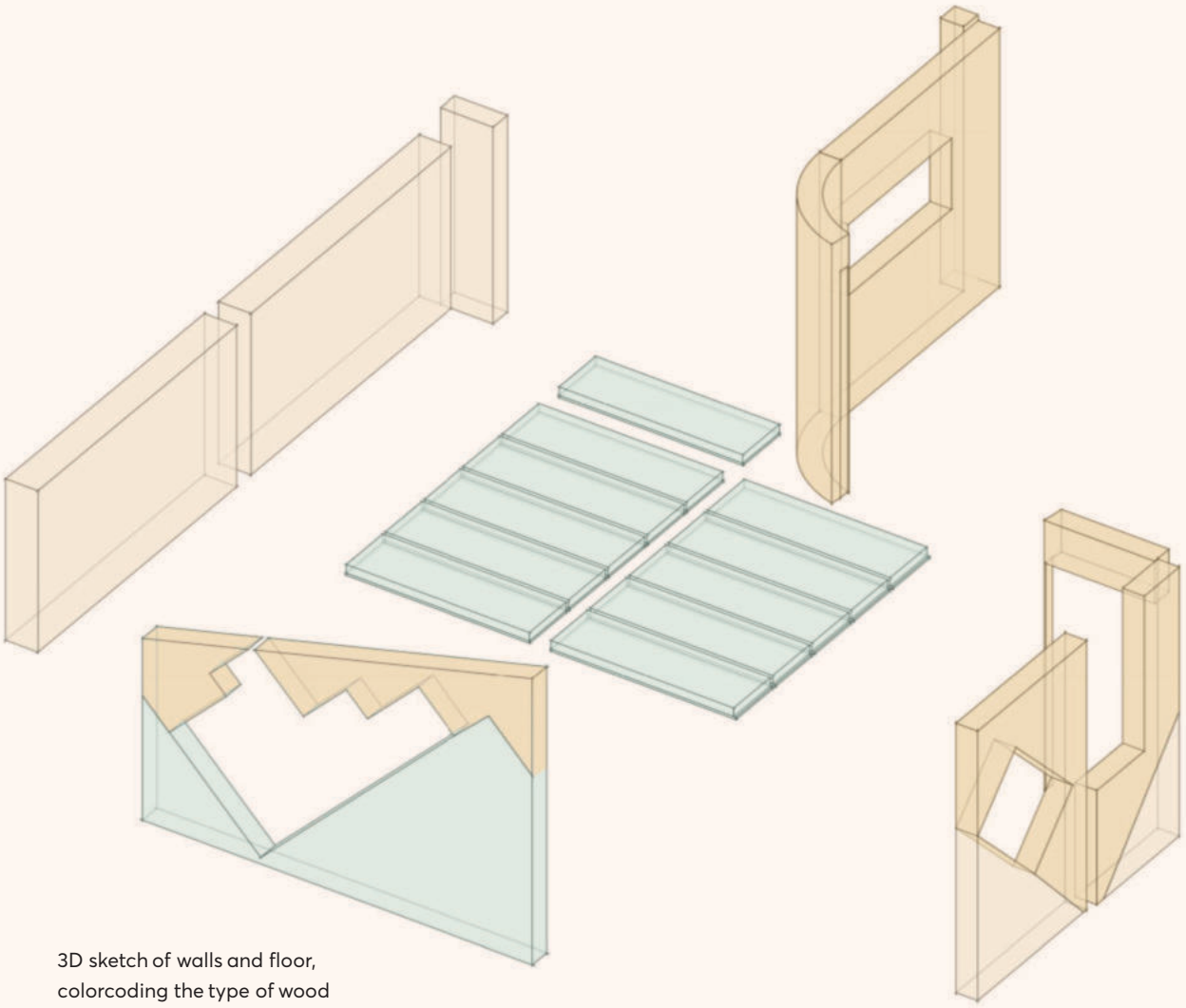
A Insect nest in the mortar. Remove and replace part.

B Distance between wood and mortar because of shrinkage. Fill in with mortar.



C Loose parts towards the celing. A finishing moulding could improve the situation

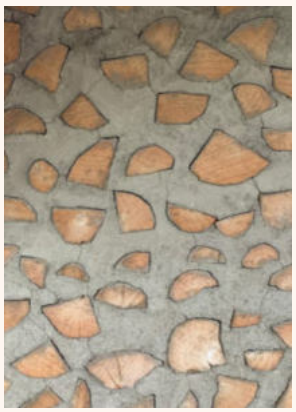
The Cordwood walls and floor - types tested



3D sketch of walls and floor, colorcoding the type of wood and mixture used for the different sections.

Reclaimed wood
The patterna making and type of wood varies. Wood makes up of roughly 90% and mortarmix 10%

Oak wood
The oak is used for walls and for the floor as it is a denser type of wood. Wood is approx 75 % and mortar mix 25%.



Birch wood
The birch walls are layed for the entire southern wall, and mixed in with the oak. Here the mix are 60% wood, 40 % mortar

2. CORDWOOD ARCHITECTURE AND THE TECHNICAL EVALUATION

The building is functioning as a boutique for selling the local organic produce from the site. Most of the sales are made outdoors in front of the building, with some extra storage and a cashier desk inside. The planning of the interior has had some additional shelves built. Lighting has been added to make it more functional, the storage for vegetables is more used as a storage of packaging at the time being, as most of the vegetables are sold outside. The farmers use the building and alter the things needed to run their enterprise, the ownership of the structure is clear and the only hesitancy that we have heard about are some technical aspects on how to make the mortar mix in order to maintain the building. The building is liked and clearly well cared for.

The load bearing corner

The load bearing corner was where we experimented with the structural possibilities for cordwood constructions. The rest of the building relies on the timber frame, but here we didn't end the corner with a wooden post, instead we made a stackwall with cordwood. However it should be noted that the stackwall does not hold the weight of the roof, just a self bearing corner. The structure is in very good shape and there are no structural problems shown on the design.

The curved wall

The curved wall was an experimental part and the most vulnerable part of the construction. The wall made from recycled pieces 20 cm thick, curves slightly, and is strongly noted from the interior as well as from the exterior. The wall is intact, however is still judged to be the most vulnerable part of the construction, as it is also in an exposed position for people to lean and bump into the wall. At the top some of the pieces have become a bit loose. More consideration on how the wall meets the top beam in a sloped position could be studied further. A moulding could be added to secure the construction. This is also possible for more exposed areas such near the door opening.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Opposite page
1. Stackwall corner, the corner looks healthy and intact. The recycled wood have

This page
1. Where the curved wall meets the roof at an angel some of the top pieces have become a bit loose. This detail could have been studied further in the experiment (C).

2. Curved wall seen from the exterior. It is intact and well protected from the sun and rain, hence the golden colour of the wood.

3. Zoomed in image of the wood, showing some of the gaps where the mortar mix has fallen out.

4. Cordwood floor. Durable but a lot of shrinkage from the oak wood.

The cordwood floor

The floor has one main problem with the shrinkage of the oak, the larger gabs making it wobble. *See the section on oak wood p.20.

The exterior wall

Overall the walls have worked well. There is a shift in colour due to the exposure of the wall, leaving the top part more protected, and the bottom more exposed to the wet weather conditions. In a ocular review, the eastern facade seems to be the facade that shows most signs of exposure, perhaps due to the roof not protecting it enough. The general wind and rain exposure would mostly hit from south-west. The roof has a larger overhang towards the south and it seems to have protected the facade sufficiently. In future designs our recommendations would still be to build larger roofs than what we have done in this experimental building. We should also mention that the building is made for seasonal use, it is not built to isolate for the winter months.

The roof

The roof was never completed according to the original plan, with a green roof. The cover and layers have been exposed to the weather and sun, but

Opposite page
1. The exterior walls, viewing the eastern and northern facade. Most of the timber has aged into a silver grey.

This page
1. The southern facade with birch wood.

still seem to be in a functioning condition. The recommendation to the farmers is to complete the roof, overseeing the protective layer and then covering with soil.

The windows and doors

A front door has been mounted after the workshop, and functions well. The storage door was never constructed and has been sealed with a board to close the structure. The recycled windows used have the same fitting as during the workshop. This means we have some small leakage, but in this seasonal used, breathable structure, this leakage has been known and deemed suitable for the purpose.

The footing and wooden structure

The footing and the wooden structure has worked as intended.

The use of different timbers

In the construction we used a variety of timber, ranging from conifer to deciduous, from recycled to newly harvested. The quality was of varying kinds.

Opposite page
1. Curved wall from the interior. The wood is recycled deciduous wood that has been treated.

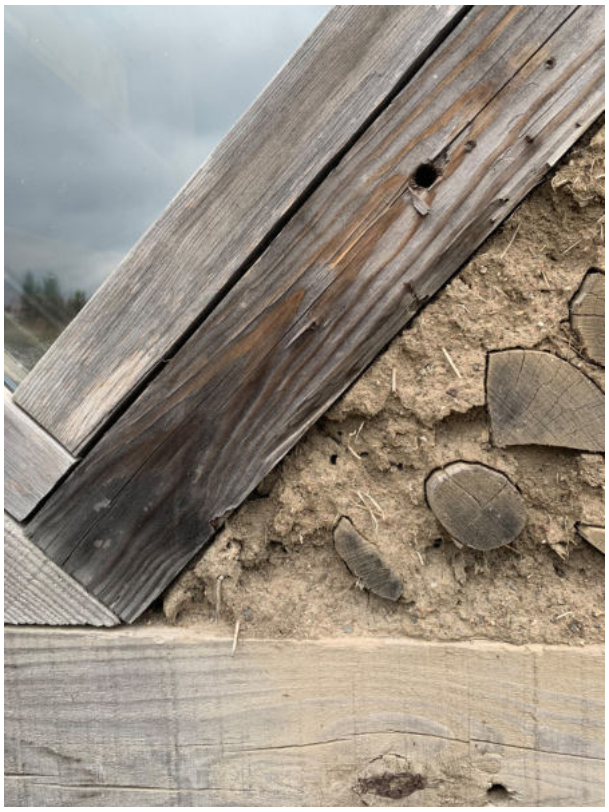
This page
1. The mortar mix is now a light grey and the wood appears darker in contrast. Especially the oak trunks used.

2. The oak wood has now dried and a gap to the mortar mix appears (B).

Deciduous- birch
The birch wood was harvested locally and had dried 1-2 years before it was used in the construction. The colour ranges from dried wood to a more aged grey tone. The wood seems to be of good quality and suitable for the purpose. The shrinkage for the birch pieces is small, leaving a gap to the mortar of 1-2mm maximum.

Deciduous - oak
The oak wood used was harvested close to the building and had at the time not dried properly. This was something we were aware of at the time of construction. We used the majority of the oak tree for the floor and for the eastern facade. The wood has now dried and there is some heavy shrinkage for these large pieces. In many cases 6-9 mm. For the floor this has meant that the pieces move when you walk across. This can be fixed by adding mortar mix and filling up the gaps. For the floor it may be worth relaying the sections entirely. The wood is of good quality and the floor has proven to be a durable solution for this situation with a pretty high "wear and tear". Besides the shrinkage, the overall impression for the oak is that it is durable and has worked well in these circumstances.

Deciduous- Recycled wood, unknown
The wood used for the northern facade was upcycled from the pallets. We are not sure of what kind of deciduous species it is, but the wood has functioned well. The recycled wood had been treated. It is a more pro-



Opposite page
1. The birch wood on the southern facade. Shallow cracks in the mortar mix.

This page
1. The mortar has been inhabited by an ants nest (A). The area should be hollowed out and then refilled.

2. The recycled wood has now turned into a silver tone. The stackwall corner.

tected side from the rain. The shrinkage has been minimal. The wood has toned into a greyer shade.

Conifer- Recycled timber treated pine
The recycled timber has had the least amount of shrinkage and has less than 1 mm as the maximum gap in the construction. The pattern has aged well, and toned into a grey shade.

The mortar

Overall the mortar mix has done the job. The building is intact overall.
The mortar mix displays some minor changes and alterations that should be attended to.
An ants nest has been built into the mortar mix on the eastern facade. The cracks have welcomed the insects to nest on one small section close to the ground. I don't think this can be reduced completely as a risk when using natural materials, but perhaps the mortar finishing layer can be overseen. Either polishing in a more oily based mortar mix to better seal the construction, or another type of finishing render for more exposed areas close to the ground. To relieve the building this section can be removed and rebuilt without altering the constructive principles.
On the southern facade there are quite a lot of cracks in the mortar, however none that severely impact the structure. None of the cracks go through the whole construction. To address this the cracks can be filled in with a new mix as the wood is now fully dried. We can from our experiment conclude that the technique is rather forgiving, despite not having dried the wood enough.

3. EDUCATIONAL AND NETWORKING APPROACH

For AES a key insight from the workshop is that a different planning is needed to sustainably run these intense workshops. The community planning should ideally be connected into a series of steps and also more rigorous follow ups, or an additional workshop, and this would need to be covered and included in the project in order to assure the task will be done. It is hard to complete a building in such a short span of time and some parts remained once the 4 weeks were up. This is something that we would want to improve in a future set up.

"It is great to see and fully understand the connection between the emergence of these social enterprises and access to land and participating in making the urban fabric. Perhaps more municipalities could work like this, allowing for more experimentation and citizen driven development on municipal land. "

From the workshop AES gained quite a number of followers to our work and generated a greater interest for a larger group. A couple of new members entered the organisation from being participants in the workshop, which has been a successful development for AES. Participants of the workshop have seen the work as relevant and used it as reference work for their cv when applying for work and admission to higher education. Participants have kept in contact through social media, and some have joined AES or partnering organisations.

As a learning approach building together is a great way of learning together. Co-creation requires a lot of flexibility and adaptation for everyone partaking in the process, here I think we have learned as an organisation that we need to communicate this more clearly and perhaps arrange more reflective talks along the project. Many participants have a great interest in the social and spatial justice field, and on this topic we would have liked to go more in depth as a group.

"I feel proud to have been a part of a real project, learning from the practice of doing and practicing what I believe. My previous experiences have just been from studying urban planning, so becoming an active part of a development was a big step. My main interests are spatial justice and how policy and politics affect socio-spatial injustices. The combination of these issues in the cordwood building workshop was something that appealed to me, and it makes me proud to have contributed to this work. "

"It is intriguing to think about the structure needed for these social practices

to develop, and the importance of the municipality to support the development. It merges a diverse group of people on the site with a very needed task, organic farming. It is great to see and fully understand the connection between the emergence of these social enterprises and access to land and participating in making the urban fabric. Perhaps more municipalities could work like this, allowing for more experimentation and citizen driven development on municipal land. "

– Participant in workshop 2017

We have also gained some more insights on the group dynamics, and how the activities outside of the building site played a large role for the participants.

"One of the strongest memories from the workshop was all the fun-times doing things together. Swimming in the lake after a long day building, cooking and eating the meals together, dancing in the shared house and then of course debarking all the thousands of logs for hours. "

– Participant in workshop 2017

4. REFLECTIONS

The main insights from the experiment cordwood building are the based around 4 key aspects:

1. Cordwood is circular
Cordwood structures have a great potential as they can make good use of waste-wood and reclaimed wood, upcycling wood into relevant constructions.

2. Cheap, quick and simple
Cost effective, and affordable structure that can be completed by communities without previous experience.

3. Building a building builds a community
Co-creation and decision making on site can generate a relevant project with great individual growth for participants.

4. It is all about the land
The support from the municipality is crucial. A place and site is needed to host all visions and allow for a social network to be assisted by the built form.

1. Cordwood - A great way to upcycle

Great design features can be made from different and uneven leftover materials, and allows for great potential in upcycling timber. In Sweden this is a material that can easily be accessed and also donated from other production chains. Just like the technique was developed from the leftovers from the sawmills, other industrialised processes could now be the source for upcycling. This means that a large portion of the building material can have a low cost and low environmental impact, in this case 60% of the building volume. Further experiments on how a life cycle approach can be adapted, and how cordwood constructions can enter the building industry as a complementary construction type.
Reclaimed wood has a significantly lower environmental impact than virgin alternatives. In this experiment building, the impact from the reclaimed wood can be seen as having no impact due to our manual work for upcycling. This is in line with the the current standard for climate declarations that is under review for a new law in Sweden, and that goes into effect in 2022. This technique has a great potential when aiming to reduce car-

bon footprint for the building sector, and this should be developed further. In comparison to other methods of utilising reclaimed wood, cordwood benefits as it is possible to make use of very small pieces. Experimenting on pattern making can make use of almost any size of wood that your site has access to. In industrialised building this method can become complementary, reducing building waste on site.

2. Auto construction and cost effective

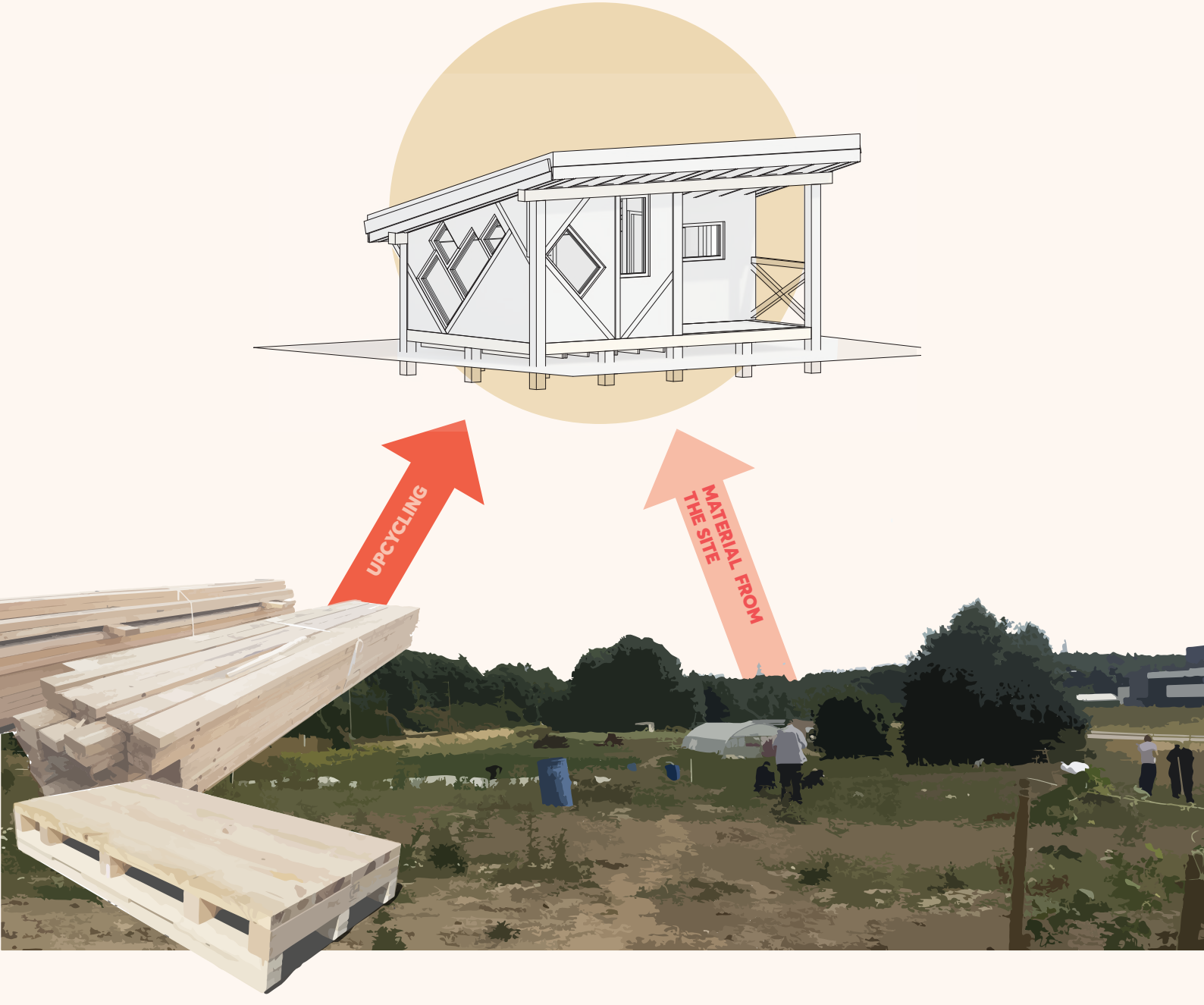
From the workshop it was clear that the construction of cordwood building is a fairly easy task to comprehend and to take on without previous experience. In this case we aimed for a timber frame construction with cordwood as a filler. This has many benefits for community building as many people can be involved in the construction.

3. Co-creation on site - finding untapped potential

Allowing participants to decide and contribute on multiple levels (design, building, documenting and planning) in the project worked well. Being a diverse international group, it took quite some time for all to adjust to the process and find their position within this new context. More time to establish this connection could be a way, but also not very realistic to be able to add in the type of project. Allowing space to grow and finding skills can be difficult, but in the workshop we clearly experienced how interest grew to responsibility and decision making. Our process developed during the project, and more process oriented tools could assist AES further in this development, as this was one of the first AES project with this member set up.
We are grateful for the experience that we call an active co-creation on site, allowing all participants to use their skill sets and experiencing the results from a communal growth.
In this particular project, all participants also lived and ate together, and this was a key element to build a strong team, and something that grew out of a practical solution.

4. Cordwood and placemaking

The ambition for the building, and placemaking strategy, was to also make an impact on urban planning. To consider the process for how communities can become makers of their community, how can they be strengthened in the know how, in the process, and in their own expression. The building wanted to be part of increasing agency and generate the next step in a stronger sense of belonging to a site. It is difficult to say whether this was achieved or not, but clearly there is a positive image of the project from the community, society, participants and municipality. Our conclusion is that it is a step of the way, and a continuous process. We also believe that the experience can also affect the outcome on multiple sites, as participants move along and bring with them the ability to realise new projects and development.


UPCYCLING
MATERIAL FROM THE SITE

BIØN - Building Impact Zero Network
A network of partners active in low impact building techniques. Our aim is to share knowledge, practices and experiences, in order to contribute to the built environment and to our communities.

BIØN – Building Impact Zero Network is a group of partners, created in 2015, active in low environmental impact building techniques with positive social impact. Our aim is to share knowledge, practices and experiences, in order to contribute to the built environment and engage our communities.

Our objectives are:
– Improve the access to quality information about low impact building techniques through our platform, and through actively participating in our local communities. We will document our work an provide open access documents through our website and multinational network.
– Increase the skills for construction workers, NEET, migrants, refugees, students, professionals and other adults interested in the topics about low impact building techniques through workshops.
– Increase awareness about low impact techniques on an environmental-, economical-, social- and cultural level.
– Develop strategies to maximise participation and generate inclusive communities, by the use of architecture as a tool. Improve the connection between formal and informal learning systems, developing or using existing accreditation systems.
– Improve standards of natural and recycled materials use in building, by integrating the building legislation of each country and discuss possibilities with stakeholders, councils and communities.

More info at: www.bi0n.eu

ERASMUS +
Erasmus+ is the European Union programme for education, training, youth and sport. It runs for seven years, from 2014 to 2022 with organisations invited to apply for funding each year to undertake creative and worthwhile activities. Erasmus+ aims to modernise education, training and youth work across Europe.

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