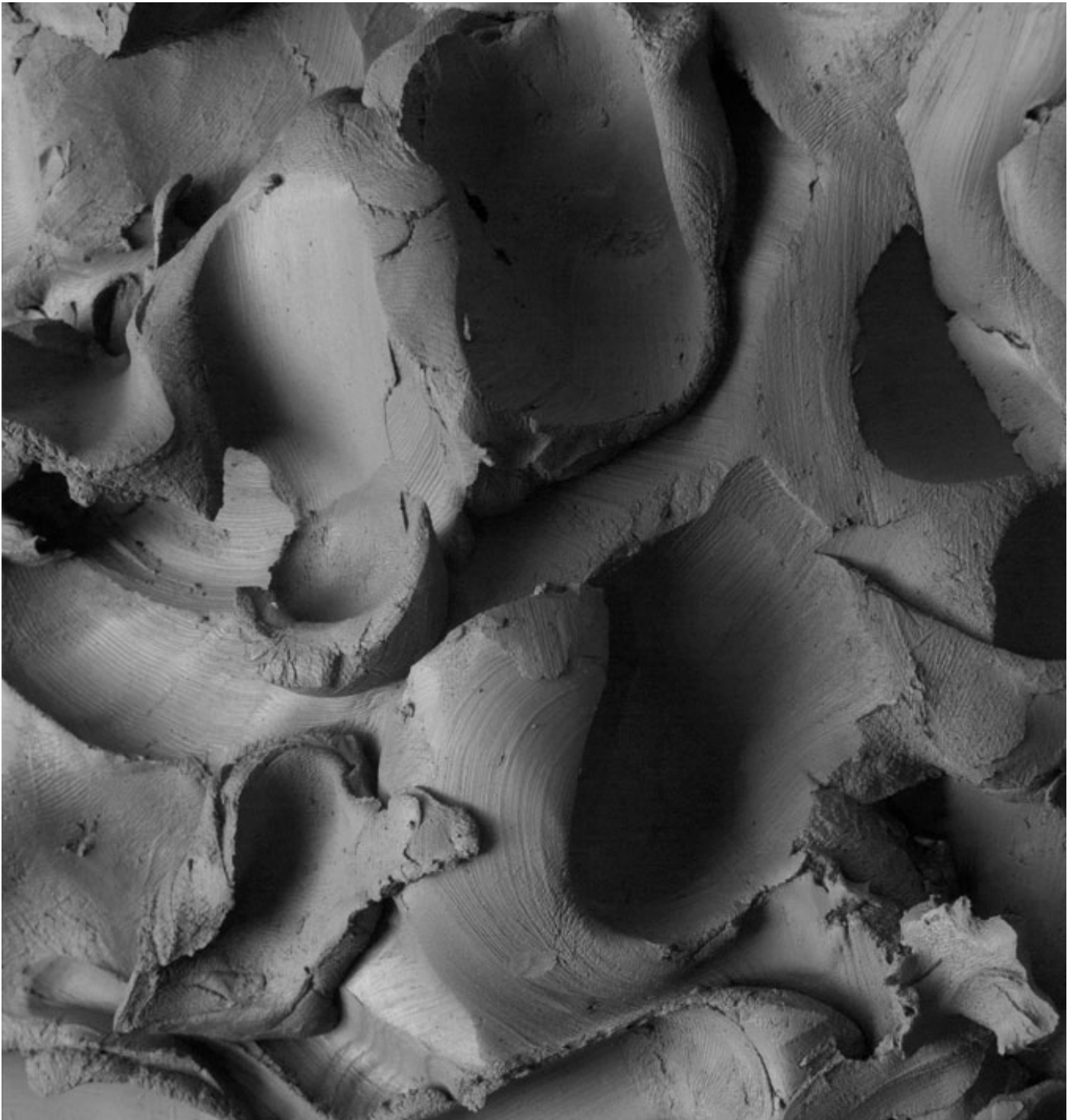


RAW EARTH

exploring the possibilities of clay
as a social and material binder





We want to thank the following:

Tutors:

APP: Joakim Skajaa

DAV: Pavlina Lucas

TTA: Kim Christensen and Andre Fontes

Helper: Sarah Streitenberger (Architecture student)

Cross Course Participants November 2021:

Thomas Flotre Bøym, Signe Stolen Nielsen, Trine Hansen, Leonie Ederer, Celia Rodriguez Lopez, William Söderlund Lundmark, Eira Tidemand-Johannessen, Vilje Valland Nesse, Karen Hilde Horvei, Julie Finstand, Gunhild Daling Korsoen, Maria Wnyue Jessen Aas, Johan Christian Ferstad Participants

Cross Course Participants February 2022:

Anna Zobel, Brage Korsnes, Rudeephon Wongtha, Maia Garrido, Katrine Mathisen, Alva Førsund, Suzzane Liengaard

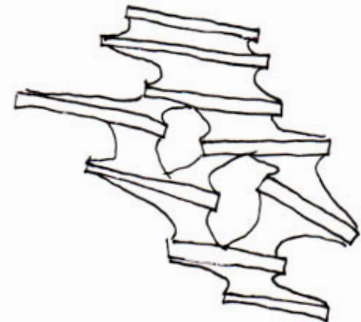
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Life of Clay

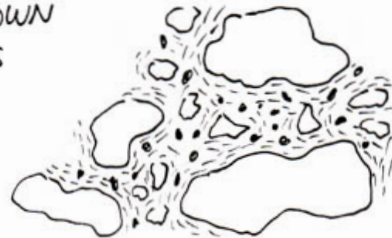
I'M THE LAST POINT IN THE PROCESS OF BREAKING DOWN,
THE SMALLEST PARTICLES.
USUALLY YOU CAN FIND ME UNDER THE ORGANIC LAYER OF SOIL.
I'M OFTEN DUG OUT WHEN PEOPLE BUILD HOUSES OR TUNNELS
IN NORWAY, THEY USED TO COLLECT ME IN BIGGER AMOUNTS
AND BURN ME INTO BRICKS.
BY BURNING ME, A LOT OF MY QUALITIES DIE WITH ME.
THEREFORE I PREFER TO STAY WHO I AM AND RAW AS I AM.
I AM ALSO DIFFERENT FROM PLACE TO PLACE,
DEPENDING ON MY ANCESTORS, ROCKS.
SOME OF MY KIND ARE MORE STICKY,
SOME ARE CAPABLE OF ABSORBING MORE WATER...

BUT GENERALLY, I BIND EARTH TOGETHER.
THIS BINDING HAPPENS DUE TO MY PARTICLE FORM,
AS THIN PLATES WHICH IN COMBINATION WITH MOISTURE,
CREATE CAPILLARY BRIDGES.
THE RIGHT AMOUNT OF WATER,
MAKES ME STICKY AND FORMABLE.



I CAN BE FORMED AND USED IN MANY DIFFERENT WAYS.
I CAN TAKE SHAPE OF PLASTER, BRICKS, BEARING WALLS, OVENS, FLOORS...
I ACT AS THERMAL MASS,
STORING ~~AND RELEASING~~ HEAT AND THEN SLOWLY GIVING IT OUT AGAIN.
IF THERE IS TOO MUCH MOISTURE IN THE ROOM,
I ABSORB IT AND THEN RELEASE IT WHEN IT GETS TOO DRY AGAIN,
KEEPING IT AT A RELATIVE LEVEL.
I ALSO ACT AS A NATURAL WIND-STOPPER OR AIR-TIGHT LAYER,
KEEPING THE WARM OR COOL AIR INSIDE THE ROOM THAT I'M SURROUNDING.

HOWEVER, I'M NOT STRONG ENOUGH ON MY OWN
I NEED SOME LARGER PARTICLES OR FIBERS
TO NOT CRACK AS EASILY.
I'M OFTEN MIXED WITH SAND,
HOWEVER I'M VERY COMPATIBLE WITH
MANY OTHER MATERIALS AND FIBERS.



I NEED PROTECTION FROM RAIN AND THEREFORE
ONE OF MY BEST FRIENDS IS WOOD.
WE HELP EACH OTHER IN DIFFERENT WAYS.
WHEN I'M NOT STRONG ENOUGH,
IT CAN HOLD A ROOF ABOVE ME.
I CAN SOMETIMES PROTECT IT FROM WATER TOO,
IF THERE IS TOO MUCH MOISTURE, I HAVE THE ABILITY
TO ABSORB MORE OF IT AND KEEP THE WOOD DRY.
I CAN ALSO PROTECT IT FROM FIRE.

WITH STONE I HAVE A DIFFERENT RELATIONSHIP
USUALLY IT PROTECTS ME MORE FROM THE GROUND MOISTURE
TOGETHER WE CAN FORM A STRONG MATERIAL.
I CAN BIND MANY SMALL STONES TOGETHER, AND FORM A SOLID WALL.
I CAN ALSO BIND LARGER STONES TOGETHER, IF, TOGETHER WITH SAND,
I'M USED AS MORTAR.

WIND

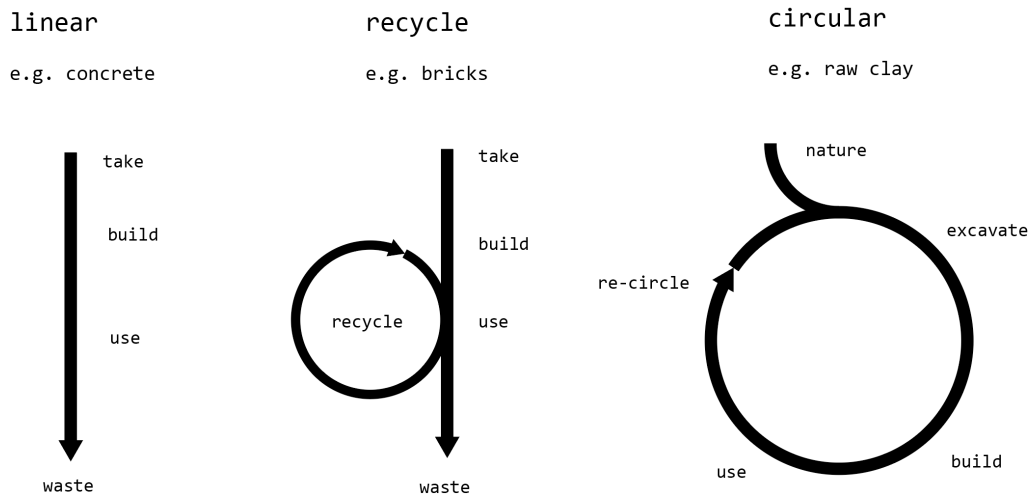
ON THE EXTERIOR, THE^Y AND THE RAIN SLOWLY WASH ME AWAY
I DON'T LAST IN MY FORM FOREVER, HOWEVER, IT'S STILL ME
I JUST TRANSFORM INTO A DIFFERENT FORM.
THE RAIN TAKES ME BACK TO WHERE I CAME FROM
I'M HAPPY WHEN I DON'T GET MIXED CHEMICALLY
IF SO, I WOULDN'T BE ABLE TO GET BACK HOME.

“It is estimated that at least 30% of the world’s population live in houses constructed of raw earth.”

Keefe

Earth Building Methods & Materials, Repair & Conservation

PROJECT DESCRIPTION



Introduction

Most of today's materials in the building industry follow a linear direction. After their extraction, they are often transformed in an irreversible manner and therefore end up as waste. In recent years some architectural offices have started focusing on recycling materials, but most often these still end up as waste after a second use. In order to create an architecture of the future, the materials we use need to move into a circular system, an architecture without waste.

Raw clay is a material which has this potential. It can be endlessly re-used or simply be put back into nature without large complications.

When used in construction, clay acts as the binder and is usually mixed with other materials such as sand, straw or other (local renewable) materials. As it is a local material, little transportation is needed. Unburned, the material has many good properties such as being endlessly reusable, it regulates humidity, is fire resistant and easily formable.

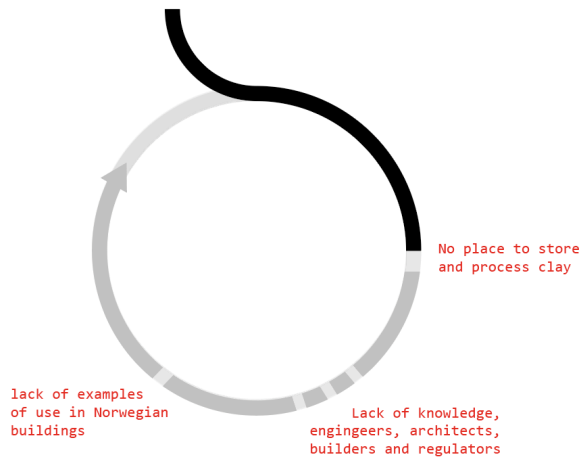


Skinnarbøl hovedgård, Kongsvinger

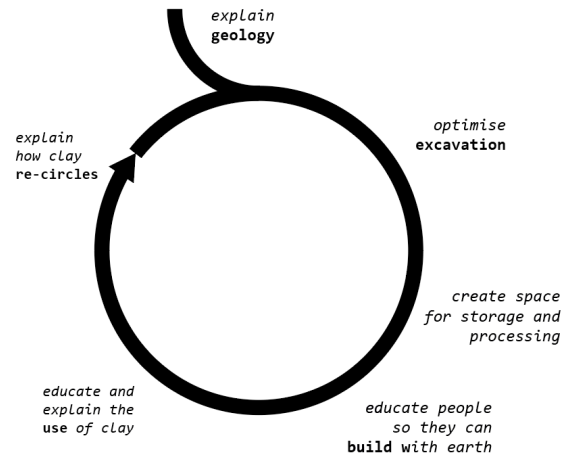
History

Norway has a long history with clay buildings, but it's hard to exactly know when one started to build with the material. The oldest and largest house which still stands today is the Skinnarbøl farmhouse in Kongsvinger built in 1813. This house was used by the Swedish royal family as a summerhouse. In recent history there are three periods of earth house construction, the first from 1860 to 1880, the interwar period, predominantly 1925 to 1935 and during rationing after the second world war from 1950 to 1956. During this last period the Norwegian government supported the building with clay by organizing workshops all over the country and giving self-builders financial support through Husbanken. They even had regulations, which improved the quality of built buildings and therefore also their lifespan.

The missing links in Norway



our project aims to



The Missing Links

In order to build, a material needs to go through several stages from taking it out of its original ecosystem to making and using the material. If we look at the steps clay needs to go through in Norway, we can understand why it has not been used in the contemporary building industry. Our project will be a center which tries to link the gaps in this chain.

The first problem is that it's challenging to get local clay to build with. While there is a lot of clay in Norway, and large amounts are excavated each year during construction work, most of this material ends up in landfills. The center solves the material accessibility problem by creating a space where clay can be stored and processed. The second issue is knowledge. Today builders and architects lack experience with the ways clay can be utilized. The center will therefore be a knowledge center teaching both professionals and amateurs about the potential of clay. The last part of the center will be to teach the larger public about clays properties, history and potential as a building material.



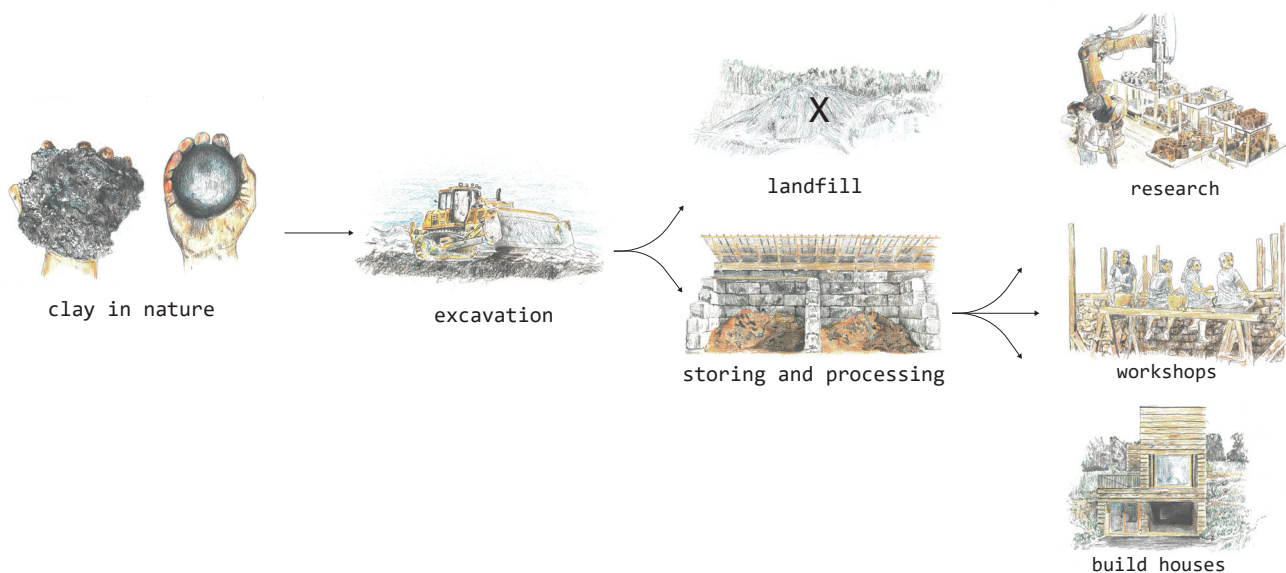
Site

We have decided on university-town Ås as the site for the clay center. Ås is known for being full of people interested in climate and sustainability which can be a good support for the livelihood of the center.

Eastern Norway is the most densely populated part of the country with a majority of construction work happening. Ås is situated strategically between the largest cities of the area, and can therefore easily be accessed by train or car by nearly half the country's population. Laying close to E6, a major highway, it's easy to transport large quantities of materials both to and from the center.

The plot is exposed to many people as it lies by a frequently used pedestrian walkway.

The clay center will be able to collaborate with nearlaying university NMBU and the institute NIBIO, which have leading researchers in relevant fields.



Method

The cycle of clay is our driver through the process. Our project identifies the missing links and responds to these. This is done through workshops, 1:1 experiments, research and designing the clay center.

Through workshops and 1:1 tests we get a hands on experience with the material and see its potential as a social and material binder.

Through the research we learn both about clays rich and surprising history in Norway and from the pioneering research elsewhere in Europe.

The clay center is a way for us to think about how to put these ideas into practice. In it's architecture we show specific examples of ways the material can be used in Norway and a strategy for re-establishing the material for use in the contemporary building industry.

TIMELINE

	January	February	March	April	May	June
Social Science Essay	X					
Cross Course workshop		X				
Study Trip		X				
Concept		X				
Site analysis		X	X			
Interview experts		X	X			
1:1 experiments		X	X		X	X
Collect clay samples	X	X	X	X	X	X
Drawing			X	X	X	X
First design phase			X			
Second design phase				X	X	
Detailed design					X	
Model making			X		X	X
Exhibition						X

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REFLECTIONS

27th of March

Before the first presentation we have mainly been working with framing our project and finding a way to incorporate all our ideas under one concept. We had many conversations about if we wanted to design a building, or let the project mainly be research driven. In the end we decided that our project should be a building, as we see that this could be a good way to show the narrative of the research. Having a specific building makes it so that we need to look at how clay works on a range of scales important for architects (for instance 1:500, 1:100, 1:50) and gives us a specific context for our 1:1 tests.. The building also gives us the opportunity to work with a program that connects the research directly with architecture and our 1:1 interests in experiments and workshops. The building will be a clay center, which incorporates the cycle of clay, where we can go deeper into each step. This program gives us a way to rethink how one can structure the building industry.

At the end of February we had a study trip to the larger Oslo-area which gave us energy, more knowledge about clay in Norway and helped us to frame the project. On the trip we talked with experts on the field of raw clay in Norway and visited houses built with different earth techniques. We found out that we wanted to have a site at Ås, as this is strategically placed between important cities and has a culture which would be supportive of alternative building methods. It felt good to get out of BAS, and travel around. It was the conversations we had in the train, car, tram, ferry and by foot during the trip that shaped our thoughts of what we wanted to do with the project. When we came back to Bergen we felt that we had a project in our head, but with little physically to show for it. We had bits and pieces of texts we had from the writing workshops and experiments from the cross course. Before the presentation, we tried to produce material that explained our thoughts. While we felt that this material was able to tell our intentions for the project, we (mainly Alvar) were a bit frustrated as it was not up to the quality we wanted.

At the presentation it was said that our concept and its sustainability was clear, and that we should move towards the spatial part. They said we could for example build a 1:1 room one could enter. However we feel that that would take a lot of time and take us away from looking at clay on different scales. So we decided to rather use time to project our cluster of buildings of the clay center and rather make 1:1 of details, parts of the buildings. We see now that we want to understand how clay works from the perspective of the architect, but still have a 1:1 understanding of the material.

To start moving towards the spatial part, we created a context model in 1:500. This became a bit hard scale to work with, but I am sure It will be helpful later and it gave us a better understanding of the context.

We then moved on to a paper sketch in 1:100 and a 1:200 drawing which made it easy to work fast and test out a lot of different ideas.. This became a helpful tool for deciding what volumes we want for each kind of processes and activities in our building and where to place them.

It will be important for us to show the movement of clay and people throughout the spaces in different scenarios, so we are thinking of maybe creating a video that could visualize this.

At the same time, we are looking at the construction methods, which is important for the next spatial step. We made some concept models in 1:25 to help us choose a construction method that fits the expressions of the different buildings with different functions we want to create.

A list of things to continue working on:

- Drawings of all the activities and machineries needed. Trying out theater in our model.
- look deeper into the various construction methods and what is possible + details
- At the same time or later thinking/choosing the construction method for the right activities. And experiment with spatial forms.

4th of May

Before the second pin-up, we concentrated on finishing the things we have started on. Mostly finalizing drawings from the research. During the pin up we saw that we like how we have structured the overall presentation - but that the drawing material still needs a lot of work to create a coherence. Many of these are in different styles and are not corresponding well with each other. Maybe we have to redo some drawings. Our tutor preferred our hand-drawings, since they are a bit more tactile and cautious like our material explorations. Some drawings also might not have to be as big as they are.

What we have been doubting most before our presentation is how to go forward, If we should draw all 3 buildings or just concentrate on material explorations. Or just go deeper into one of the buildings, e.g. The production hall. The production hall is probably the most important building, since we imagine this one to be able to be built in different places of Norway. However, its also one of the buildings that are really driven by function. Maybe not the best building to show the potential of earth.

Our feedback was, that we can probably choose any way forward as we want and it should work fine with all the work we have done until now as we have a sturdy base. However, they would suggest us to challenge ourselves by going in depth with the architecture or do an example of a house.

We have decided we want to continue designing the buildings- and try to look into these in many scales. This means making a model in 1:100 of the buildings on site, and more detailed models and drawings- probably 1:25 and even more detailed scales. We will also continue working on making the material from the presentation clearer.

20th of May 2022

Since the last presentation we have mainly been focusing on designing the buildings. During the process we found out that our program in many ways is similar to a farm, as there are parts of the program which are very rough with big machines, while there are other which are more clean and calm. This influence has gone directly into the scale of our buildings and how they create a clear "gårdstun".

Throughout the project we've imagined the buildings to be built gradually. In our project we've come up with a strategy of how to do this. In recent weeks we've been working with a video which shows how this idea can work out in practice. The first building which will be created is a production hall, which later prefabricates building material which the buildings are made from. We have started calling this building Mother Earth.

The external presentation went well and the tutors were fully onboard with the story we were telling. Most of the discussion afterwards focused on the architecture and what could be sharpened in our response. We were challenged to show in our architecture more what clay wants to do. It's an exciting challenge, and something we would like to answer through fragment-models of the building. At the moment we imagine these to be on a scale between 1:20 and 1:10. In these models we hope to show how clay can be used exterior, and in interior walls. These fragments will also show the products that the production hall creates in use. We were also encouraged to draw by hand, which we very much agree with.

With a little more than a month left, there is a lot more work to do, but we have a clear idea of what we still want to do. We believe the fragment models will help us ground the building better in reality - while also telling the mutual relationship clay has with other materials. These models will also help us with the roof, which has been a question throughout the process.

14th of June 2022

The last week we have been working on the zoom-in construction models. The scale is a bit foreign to us, as it is the first time we try to build models in 1:10. It really pushes us to think realistically. Even though we had some thoughts on construction details ongoing parallel in the process, some things could have been helpful to know in advance. But that is also a way of learning, because now we will know for next time. For example, the size of the windows and the beam over it. An expert told us that it might not be possible with a beam in wood with an extra load of rammed earth in a story above it, if the windows are as wide as 130-170cm. So we try to find other solutions and we learn a lot from it. We ended up with metal beams, which we like, but might have ended up getting further from our original concept of trying to use as much natural or biodegradable materials as possible. Next time we know, that if we want a wooden beam in a reasonable dimension, we either have smaller dimension of windows, or have time to challenge the beam in wood above. And this is also the case for the foundation.

We also found out that we really enjoy building models, and that we could imagine ourselves being 1:10 architects for 1:10 people.

Inbetween, we have also been thinking a lot about the exhibition. It is a bit challenging, because we found out we don't really want to build walls to close it off from the hall as a room, but creating an open space, which might mean we will mostly work with tables.

We would also like to make it more interactive. Have a little workshop station in the middle of our exhibition, representing the 'gårdsplass' in our project, where the different programs meet. We believe that a workshop should still be the heart of our project representing clay as a material and a social binder. We have also come up with the idea of having a workshop during the exhibition period in August.

Before the deadline we still have some drawings to make, that we are starting on now. We have a plan of several perspective-sections that could show some spatial qualities.

CV - Katarina



Katarina Kierulf

Study

2014-2015	Fosen Folkehøgskole
2016-current	Bergen School of Architecture
2019-2020	Royal Danish Academy of Fine Arts, (exchange)

Master Courses:

Fall 2019	Settlement, ecology and tectonics	Tutors: Nathan Romero Muelas, Mirjam Hallin
Spring 2020	Settlement, ecology and tectonics	Tutors: Søren Nielsen, Linn Kappel
Fall 2021	Ocean Space	Tutors: Nancy Couling, Vibekke Jensen

Work

May 2021	Workshop leader in Build Back Better in Albania
Sept 2020	Building Feldballe Friskole with Ecococon , prefab. Straw panels
Jan.- Aug 2016	boathbuilder at Nordsnork Fartøyvernsenter

CV - Alvar



Alvar Elias Ekhougen Larsen

Study

2016-current **Bergen School of Architecture**

Master Courses:

Fall 2018	Ocean Space	Tutors: Nancy Couling, Vibekke Jensen
Spring 2019	Meeting Room	Tutors: Jan Liesegang, Andrea Spreafico
Fall 2019	Masquerade	Tutors: Frederik Petersen, Anne Friis

Work

2015-2016	Custom Beach Huts	carpenter
2017-2020	Bergen School of Architecture	library assistant
2020-2021	Trylleflyten Steinerbarnehage	substitute

Other

2016-2020	SOBAS	leader (1 year) accounting (1 year), board member (2 years)
2020-2021	Trestykker	Leader for 2021 workshop

collaborative

Portfolio

Alvar Elias Ekhougen Larsen
and Katarina Kierulf



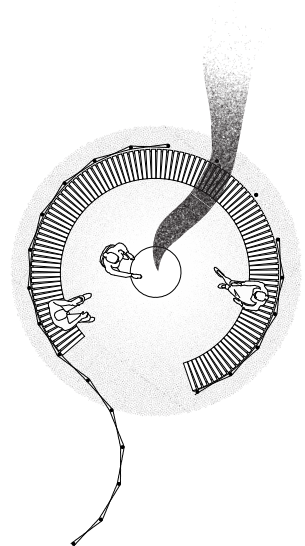
Visual Structure, *Form Contrast*, 2017, Katarina and Alvar



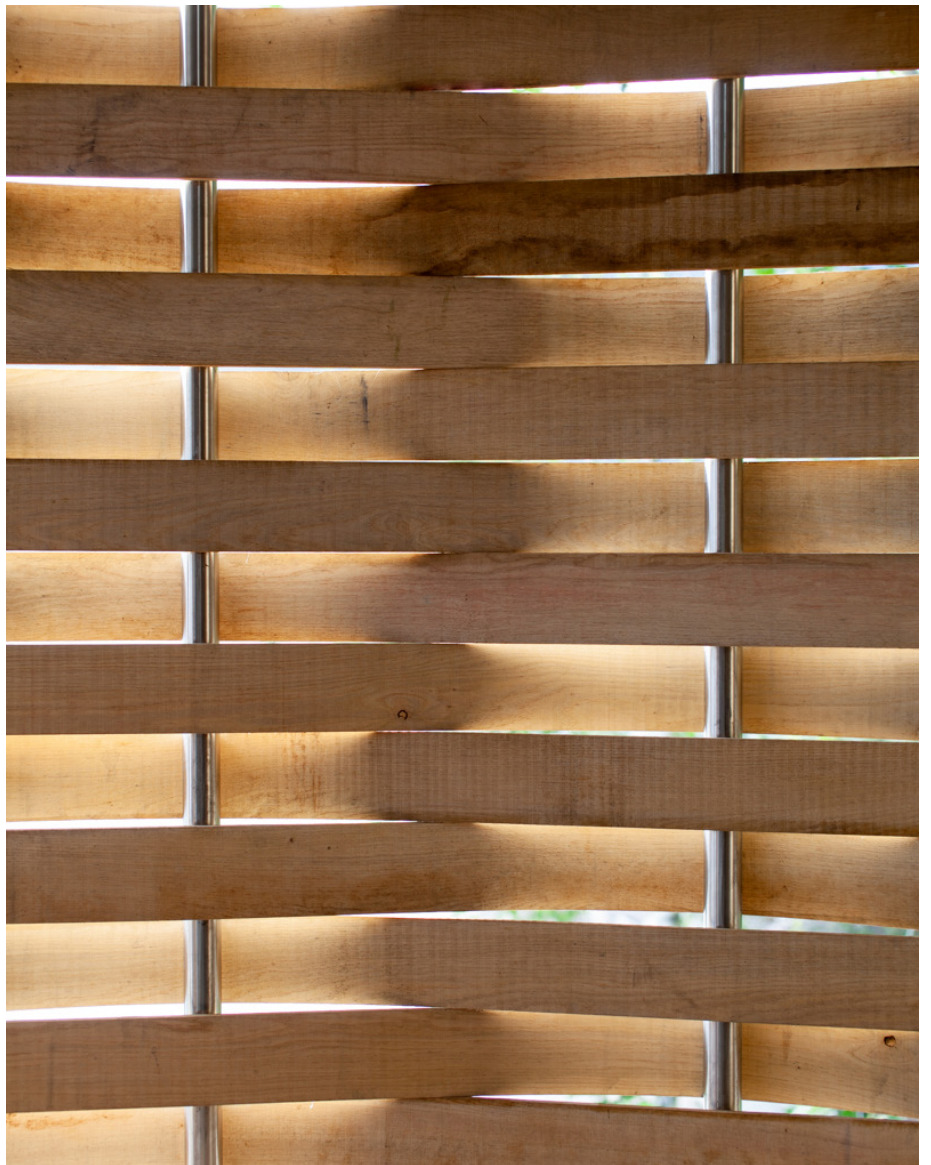
Reiret Klimakammer

*Bergen Arkitekthøgskole
January 2018 - August 2018
Tutor: Espen Folgerø*

Reiret is a protected campfire site we built at Lunde Arboretum. The construction is based on a wooden bending technique that we explored during the second year at BAS. The wood is local oak from Kvamsøy.



Leading group: Anna Vik, Alvar Elias Ekhougen Larsen, Johan Bramberg, Katarina Kierulf, Anna Stevenson
Participants: David Reynolds, Steffen Marøy Alvær, Malin Johanessen, Tina Athari, Jonas Granøien, Marthe Selvikvaag Wernø



Street Earth

*Project by Katarina Kierulf and Emma
Maya Buchanan
September 2020 - December 2021*

The project's goal was to use natural and local materials in an urban context.

The sculpture is built in the middle of Copenhagen from local clay from a construction site, stamped together with eelgrass and sand from a nearby beach. We have plastered the stamped structure with clay mixed with eelgrass, sand and horse manure from Christiania's riding school.







Build Back Better

*workshop Led by Katarina Kierulf
May 2021*

In 2021, Katarina led a 3-day workshop in Albania where she, together with local residents, designed and built a pavilion at a primary school of straw bales and clay plaster. The project was part of Build Back Better, with the aim of informing about natural and local building materials in Albania.







Trestykker 2021

*Studentled workshop
Led by Alvar and Steffen
Easter 2021 - Summer 2021*

In 2021, Alvar led Trestykker 2021 together with Steffen Alvær. A design and build workshop with arkitekT and landscape architecture students from AHO, BAS, NTNU and NMBU. At the workshop, we built three constructions where children and young people from Elvetun youth center can play and relax.

Leaders: Steffen Marøy Alvær og Alvar Elias Ekhougen Larsen **leading team:** Maren Mohn Kvernland, Narathip Phuengphai and Petter Ludvigsen
Participants: Meryam Rezzag Lebza, Inger Sevre, Julianne Hellum Hagen, Elisa Aadland, Divya Naik, Susanne Pettersen, Tonje Eilin Hasle Thomassen, Hanna Stenslet, Nadir Pamuk, Oda Vatten, Ingrid Halvorsen, Astrid Maria Ibenholt, Miriam Lee Byberg, Kristina Habbestad



**“Think gardening, not architecture.
Plant things and see how they grow.
Don’t constrain yourself by trying
to solve every detail.”**

Brian Eno