a tiny revolution

Activating the potential of the tiny house movement

2025
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Department of Architecture and Civil Engineering
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Master's thesis 2025

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Architecture and Planning Beyond Sustainability
Building Design and Transformation for Sustainability
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Abstract

Keywords: Tiny house, Self-building, Tiny living, Mobile architecture, Sufficiency, Degrowth, Affordable housing, Experimental architecture, Education, Activism

The thesis investigates and attempts to activate the potential of self-built mobile tiny houses as a means for sustainable development through the sharing of knowledge between architects and self-builders. With the urgent need to reduce the environmental impact of the building industry, it challenges the traditional view that only professionals can provide innovative solutions for more sustainable living. Through in-depth research into the history, motivations, and characteristics of the tiny house movement, the thesis provides insights of its potential and proposes strategies to overcome the obstacles holding it back from having a greater positive influence on the architectural development towards sustainability. The thesis finds that the tiny house movement has a potential role to play as a counterforce to the negative aspects of the consumerist society, as it's experimenting with less emissive but equally attractive means of living, and that it could potentially inspire all of society to change in a more sustainable direction if allowed to grow.

In order to lower the threshold of designing and building for self-builders, a handbook is developed, containing all the theory necessary to design and construct a sustainable mobile tiny house in Sweden. Additionally the thesis proposes a design with a means of construction that better fits the requirements for an easy-to-build, low-cost, sustainable and mobile tiny house. The thesis puts the design as well as the theory to the test in a self-building course in which the handbook is used and the design is built by participating self-builders.

The thesis acknowledges and activates self-builders as able creators that could complement the work of architects, but also finds that architects and other professionals have an important role to play. While self-builders are free of convictions and able to act outside the system, architects could provide support and structure that could improve the results. Bridging the gap between professionals and amateurs as well as between theory and practice, the thesis advocates collaboration and invites everyone to take part in the quest towards more sustainable ways of building and living.

Glossary

Sustainable development:
"Development that meets the needs of the present without compromising the ability for future generations to meet their own needs" (UN, 1987)

Tiny house:
A standalone structure of less than 37 m² that is intended as a long-term residence and usually built on a trailer or otherwise moveable (Olsson, 2020)

Self-building:
The process where the user creates or constructs something independent of professionals

Sufficiency:
Aims to lower emissions by reducing overall consumption

Degrowth:
Advocates reducing consumption and prioritizing ecological balance over economic growth

How to read

Part or theme

Chapter titles

Sub-headers or comments

Italic font describing what the chapter covers

Regular font constituting the main descriptive text

Red italic font in the margins to explain figures or clarify concepts mentioned in the main text. A full list of figures on page 117.

Red boxes highlighting relevant facts that complements the main text

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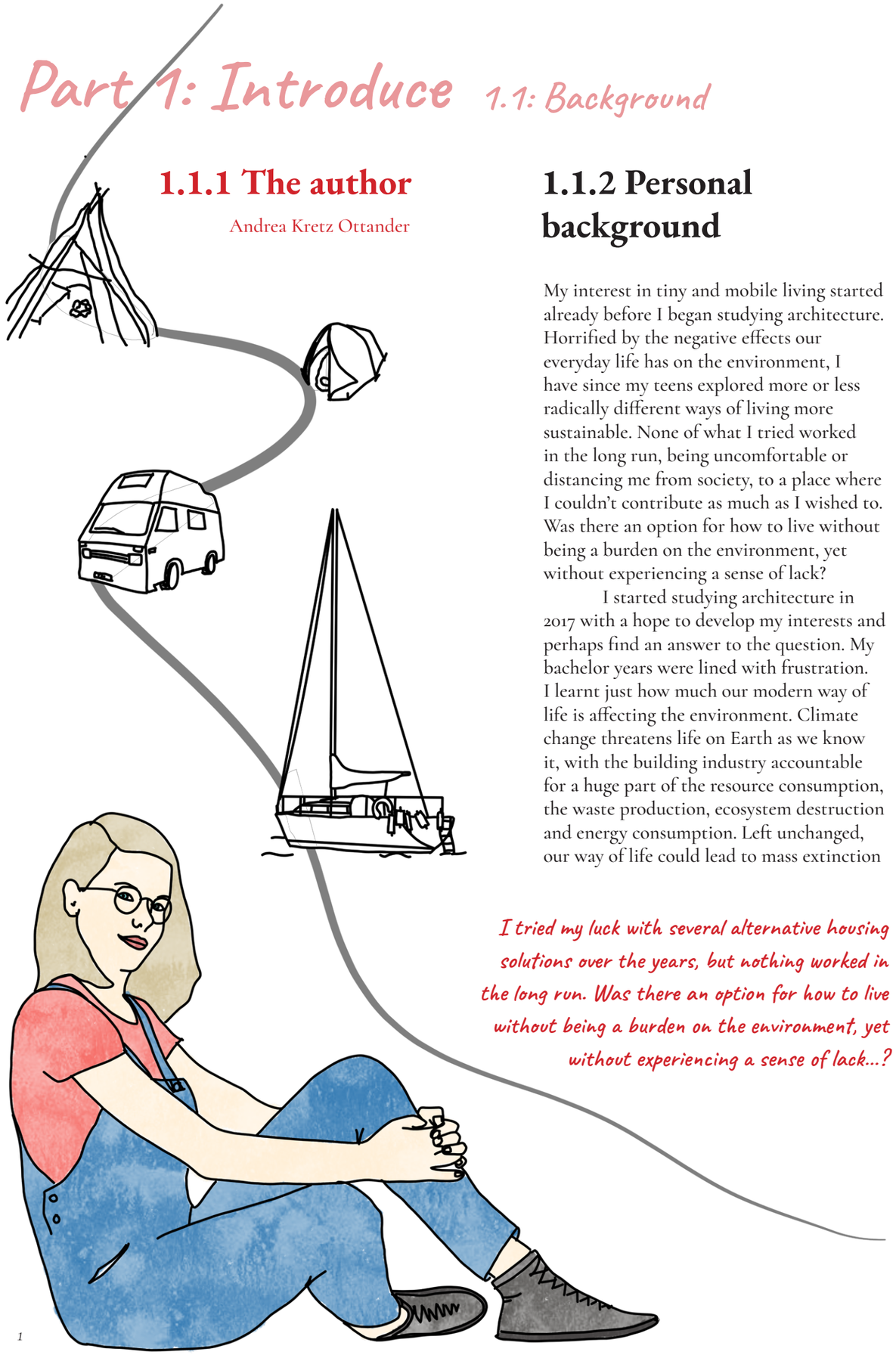
1.1.1 The author

Andrea Kretz Ottander



1.1.2 Personal background

My interest in tiny and mobile living started already before I began studying architecture. Horrified by the negative effects our everyday life has on the environment, I have since my teens explored more or less radically different ways of living more sustainable. None of what I tried worked in the long run, being uncomfortable or distancing me from society, to a place where I couldn't contribute as much as I wished to. Was there an option for how to live without being a burden on the environment, yet without experiencing a sense of lack?

I started studying architecture in 2017 with a hope to develop my interests and perhaps find an answer to the question. My bachelor years were lined with frustration. I learnt just how much our modern way of life is affecting the environment. Climate change threatens life on Earth as we know it, with the building industry accountable for a huge part of the resource consumption, the waste production, ecosystem destruction and energy consumption. Left unchanged, our way of life could lead to mass extinction

I tried my luck with several alternative housing solutions over the years, but nothing worked in the long run. Was there an option for how to live without being a burden on the environment, yet without experiencing a sense of lack...?

Figure 1: I finished building my blue tiny house in 2021 and have lived there since.

of species, extreme weather patterns and rising sea levels (UN, 2024). Yet the alternative solutions that were explored among architects were far from radical enough to make any real change to the course of development. There was talk of our responsibility as professionals to contribute to sustainability, but I couldn't see any solutions. I also learnt that the kind of ideas I wanted to explore were unknown by or even frowned upon by professionals. Tiny living and mobile architecture was practically illegal due to demands of accessibility, and self-building was unexplored and nothing any of my teachers showed any interest for. Conventional architecture, I found, was too rigidly controlled by laws and convictions, not allowing for sufficiently free creativity to find alternatives to our unsustainable way of living.

Meanwhile, the tiny house movement started getting big in Sweden. The modern self-built mobile tiny house appeared in the USA in the end of the 1990's. The trend spread through word-to mouth and social media and has today grown into a movement that is gaining in popularity all around the globe (Mangold & Zschau, 2019). It seemed to make available a life that I sought after; free, minimalistic, and sustainable - but without really having to give that much comfort up. It was a way out of the conventional way of life without having to completely turn my back on society. The tiny house somehow holds a promise of a comfortable and sustainable way of living, an attainable, beautiful and unique alternative to the mass produced and high energy consuming concrete blocks that are otherwise available. It was a possibility to take the environmental crisis in my own hands, voluntarily limiting my belongings, my use of materials, my emissions and my waste of money.

This led me to take a break in my studies in 2020 to design and build my own tiny house. After moving in, I got in contact with a community of like minded people. I found out that a tiny architectural revolution was going on, not led by architects, but by self-builders. There were many who shared my aspirations and saw the potential of the tiny house as a low-cost and environmentally friendly way to live. The wish to get to use one's creativity and intuition, and to get the skills to build without being dependent on professionals was apparent, as it had been in me. Through the hands of everyday people, a more radical change of the way we live was possible to explore.

1.1.3 Problem description

The building industry stands for 37% of CO_2-emission worldwide (UNEP, 2022). In order to address our increasingly acute environmental problems, several agreements and common goals have come into place in the last few years. One is the Paris Agreement (2015) which is a legally binding international treaty with the main objective to limit global warming well below 2°C, preferably to 1.5°C, compared to pre-industrial levels. This means greenhouse gas emissions must peak before 2025 and decline by 43% by 2030 (UNFCCC, 2024).

But change is going slow, perhaps because the ones in power to affect our means of building are professionals. No matter our attitude towards sustainability, architects and builders are all part of companies that need to strive for profit and are dependent on a continuous flow of jobs. We're in other words dependent on a "green growth" strategy rather than "degrowth". National building codes support this by prioritizing "efficiency" over "sufficiency" (See glossary p. IV), making it difficult by law to explore radical downsizing or voluntary simplicity.

In order to meet the Paris Agreement, drastic measures however need to be taken, and professionals within the field have limited possibilities to act. Free of conventions, elitism and the need to generate profit, non-professional self-builders can potentially think more freely, and the tiny house naturally limits the use of resources and the overall consumption.

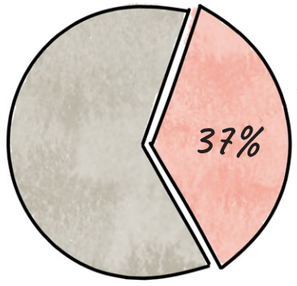


Figure 2: 37% of global CO_2-emissions are caused by the building industry, making it one of the main fields that urgently need to change (UNEP, 2023).

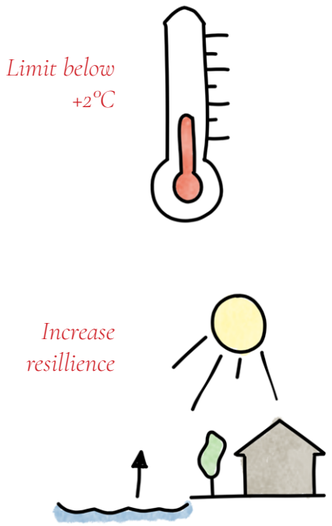
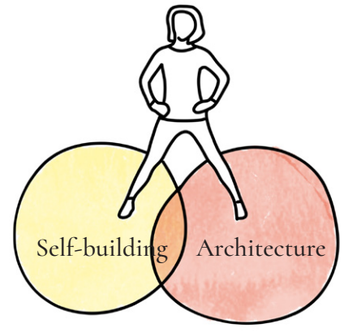


Figure 3: The Paris agreement is one of several treaties to limit global warming and to enhance our resilience to be able to handle the effects of global warming (UNFCCC, 2024).

I came back to finish my master's with the belief that the self-builders within the tiny house movement could be part of tackling the challenges of today. Given the low academic representation of the subject, I had an urge to contribute by doing a thorough examination, exploring just what potential the movement holds and how that potential can be activated. Doing the research and informing professionals about the movement could increase the positive influence the movement could have on a societal level. Clearly connected with environmental tactics such as "degrowth" and "sufficiency", the tiny house movement could explore solutions that professionals can't.

In order for self-builders to partake in the architectural development they however need the necessary knowledge to do so, knowledge that we as professionals need to share. Spending time in the tiny house community as well as going through the process of building my own tiny house has made me realise the wide set of skills that self-builders need. I took the detour of becoming an architect to understand construction and learn what rules applied. Others might have a carpenter education behind them. But none of the courses or the literature available today contains all that's necessary. Furthermore I found that the mainstream construction solutions are unfitting for lightweight, mobile housing and that the lack of knowledge makes it difficult for self-builders to experiment with new solutions. This thesis is an attempt to remedy all these aspects and make it easier to be an innovative self-builder in the future.



The thesis attempts to bridge the gap between professionals and amateurs as well as between theory and practice. With a foot in each world, I will attempt to function as a mediator between the professional field of architecture and the tiny house movement, with the hope to increase the positive influence the movement could have on a societal level. Seeing the potential as well as the limits within each field, the thesis is an attempt to open up for knowledge-sharing between two otherwise separated worlds, seeing the acute need to start cooperating. By reducing the hard boundary between professionals and amateurs, more people could contribute to the development toward sustainability within the field of architecture.

Whether you're a professional, an aspiring self-builder, or something else entirely, you are most welcome to read this thesis. My wish is for it to act as an inspiration, a reminder that change lies in our own hands, and that no matter our background, we can all make a difference.

1.2 Purpose

1.2.1 Aim

The main aim of the thesis is to understand as well as activate the potential of the tiny house movement in regards to sustainable development. The thesis addresses the urgency of finding more sustainable alternatives to conventional building and living and explores the self-built mobile tiny house as a means to lower the environmental impact of the building industry and our way of life. Given the limited academic representation of the topic, the thesis wishes to contribute to existing research with a thorough research into the history, motivations, and characteristics of the tiny house movement with the aim to provide insights of the movements' potentials. Based on the results, the thesis aims to develop as well as actively test ways to mitigate the hindrances that seem to be holding the movement back from being able to make a positive difference in the architectural development towards sustainability. The thesis aims to bridge the gap between theory and practice as well as between professionals and amateurs.

1.2.2 Research questions

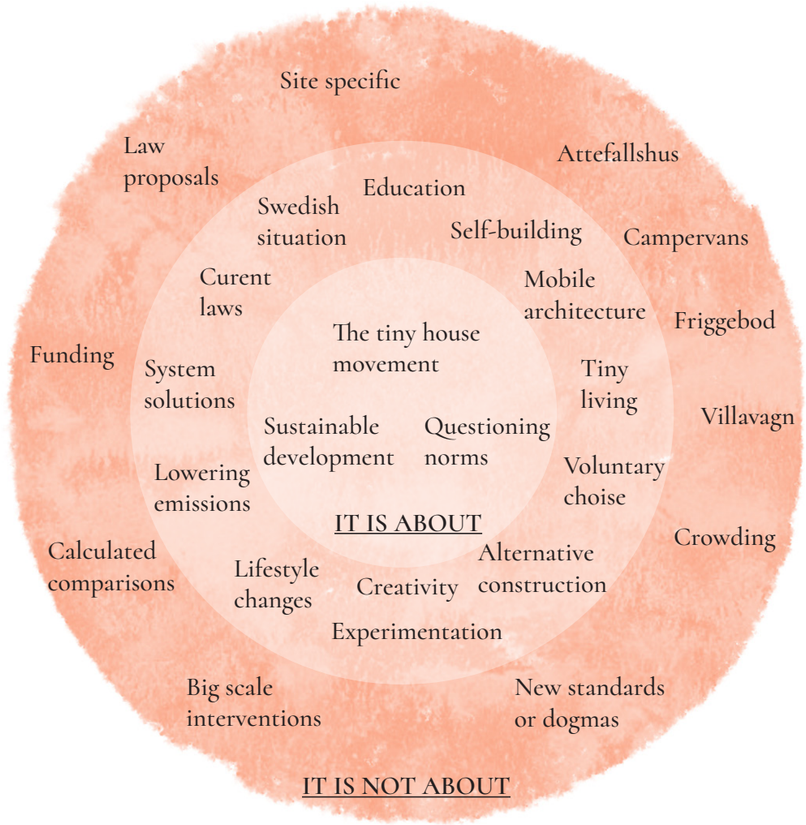
How could self-builders of mobile tiny houses contribute to sustainable development if enabled to join the field of architecture?

What is the tiny house movement, what potential does it hold in regards to sustainable development and in what ways could it best be activated?

What skills are needed to build a sustainable mobile tiny house and how can they be pedagogically communicated to self-builders?

What is a suitable design for a lightweight, easy-to-construct, low-cost, sustainable mobile tiny house?

1.2.3 Delimitations



While many are forced to do so out of poverty or necessity, the thesis will focus on the voluntary choice of living in small, self-built houses.

The discourse will start in a global context (as of relevance to the investigations), but will narrow down to the present situation in Sweden.

The Swedish attefallshus, friggebod and villavagn will not be a focus of the investigation as they are not per say part of the same idea- and value based movement.

The design developed within the scope of the thesis is not intended as a new living- or construction norm, but only as an experiment and as an inspiration for others to experiment themselves. The design is made to fit a Swedish climate and a Swedish legal system, but due to the mobility of tiny houses the proposed design will not be site specific.

1.3 Methods

Literature studies

Literature studies are conducted mainly to deepen the knowledge about the tiny house movement and its potential. As I wanted to deeply explore and understand the movement, and specifically suitable literature on the subject has been difficult to come by, a wide range of sources were needed. Research made on the tiny house and similar movements has been found using the search engine EBSCO for academic papers using phrases such as “tiny house”, “tiny home”, “THOW”, “mobile architecture”, “self-building”, “minimalism”, “sustainability” and “sufficiency”. Many of the sources covering self-building were recommended from a researcher within the field. Historical and contemporary books on architecture and sustainability from my own bookshelf as well as from the library have been used. Web research has complemented the findings, especially for insights into the environmental impact of building and living as well as specific examples of projects and initiatives. Popular books on tiny houses have provided inspiration and general knowledge. Furthermore I’ve studied all relevant laws for tiny houses in Sweden, meaning for example BBR (BFS 2014:3), PBL (SFS 2010:900) (laws regulation design and construction of buildings) and parts of the webpage of Trafikverket (presenting laws on vehicles). In order to more deeply analyse why the movement is appearing now and in what ways it could be relevant for sustainable development, the theories of two contemporary philosophers, Hartmut Rosa and Jonna Bornemark, were derived from each of their books and used in the analysis. Most reading was done in fall 2023 and spring 2024, why research released later than that has not been taken into account.

Web research has been used to find examples of how the tiny house movement is active in Sweden today. The thesis refers to several Instagram-accounts and newspaper articles on the subject, found by searching for “tinyhouse” on Instagram and on Google. Several of the examples mentioned are also people I’ve met before. Information derived from the web-pages of construction warehouses have been used in the price- and weight budget calculations and for the acquisition of materials. Bauhaus.se has been the first hand choice as they account for both price and weight of their products. Furthermore, second-hand material has been found using web-search on platforms such as Marketplace, Blocket and Tradera.

Ethnographic and reflective studies

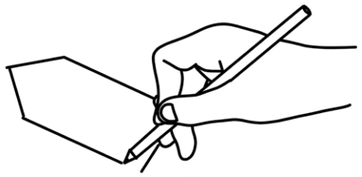
Ethnographic studies
Ethnographic studies is a qualitative research method where the researcher immerses him/her-self in the area of research in order to understand the culture (O’Reilly, 2011). My starting point in this thesis is based on my long time exploring alternative ways of living and of being part of the tiny house movement. My wish to explore these questions stems from my prior belief in the unactivated potential of the tiny house movement. I’m also motivated by myself having experienced the difficulties in acquiring all the relevant information when building my house, and how conventional means of construction were unfitting for mobile and downsized houses. Being previously engaged in the movement inevitably affects the outcome of my observations.

Participatory observation
Participatory observation is a method often used in Ethnographic studies and means the researcher interacts directly with the subjects of research while trying to remain an objective observer (O’Reilly, 2011). It has been a relevant method to complement the prior ethnographic experience as well as the academic studies. The participatory observation has been in the form of attending two local self-building courses with the aim to gain a deepened understanding of the motivation and struggles of the Swedish branch of the movement, as well as to get an understanding of how self-building is taught and practiced.

The courses were chosen based on relevance and availability; They both run during the time interval suitable for the thesis (spring+summer 2024). They were economically available with a low price for participating. They were locally available due to their close proximity to Gothenburg or being online. A difference in course structure was sought after (on-site/online) to provide insights into different ways of teaching. An on-site self-building course at Egnahemsfabriken running at the right time interval was not chosen due to the higher price (9500 SEK) and location further away from Gothenburg. Another course running for the architecture students at Chalmers university was not chosen due to it taking place late fall semester 2024, which would be too late for the research. Further reasons for choosing to participate in the course by Bobini was my earlier membership in the organisation and the possibility to cooperate with them for the remainder of the thesis Information of my ongoing research has always been made on the first meeting and consent given. I acknowledge that the choice of courses affected the outcome of the research.

Field notes
The participatory research has been conducted by taking notes during the courses and writing a diary which can be accessed in Appendix 5(a-c). Notes were initially taken on everything of interest; conversations, means of construction, reactions and reflections. When it was not possible to take notes while a conversation was going on, they were written down shortly after. After each attended lecture/meeting, the notes were shortened and rewritten. The finished diary contains a mixture of direct observations and thoughts and reflections. In it, emphasis is put on the structure of the courses as well as the participants’ experiences and ongoing evaluations.

Reflective practice
Being a reflective practitioner refers to regularly critically examining one’s own actions for continuous improvement and learning (Schön, 2013). I conduct the research in a reflective manner by referring to “I” as a subject and continuously openly analyze my research and my course of action.



Research by design

Research by design is a method involving creating and testing prototypes or solutions to generate new knowledge through design processes (Verbeke, 2021). The design developed in the thesis is meant as inspiration to dare to question building norms and to develop solutions betting fitting for a tiny house.

Iterative design
The design has been developed using the method iterative design, meaning a process of continuously testing, evaluating and redoing in order to improve a design or a concept (Verbeke, 2021). Focus has been on fulfilling the criteria for a sustainable tiny house and finding a balance between low weight, low price and how easy it is to build.

Consultation
To help aid in the development of the design, such as dimensioning and aesthetics, consultation has been used continuously during the iterative design process. The teachers of the self-building courses, the architecture tutors of Chalmers and the staff of the wood workshop at Chalmers have all been given input.

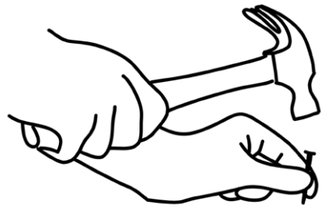
Sketching/Model making
In order to develop the design in an iterative manner, the methods sketching and model making have been used. Starting with 2D hand sketches, I later moved into into wooden models in scale 1:10 and finally digital modeling using SketchUp. Model making has provided insight into the feasibility of the means of construction.

Constructing/testing
In order to go from theory to reality, small-scale tests were performed in a workshop environment. Small parts of the construction scale 1:1 were built using different tools to see what worked best and if the construction was strong enough.

Action research

Action research is a research approach that seeks to both explore and address an issue simultaneously (Ulvik et al., 2017). In other words it involves conducting research while also taking proactive steps to resolve the problem. In this case, it is done by developing a handbook as well as holding a self-building course.

Handbook
As one of the aims in the thesis is to convey knowledge, the method handbook will be used for the theoretical parts. It has been developed to convey the necessary information in an easy-to-read manner. The information in the handbook has been gathered mainly through literature studies, but also consultation and ethnographic experience.



Course
As the aim of the thesis is to enable self-builders to build their own tiny houses, on-site learning is necessary for teaching construction. For this sake, a course is chosen as an effective tool. The course was developed according to parameters set up by the research and provided an opportunity to test the previously made assumptions. I took the role of both teacher and observer, making notes and conducting a field diary to gather my insights. During the course, the handbook was used as a basis for the theory and the design was built to practice construction. Building the design provided direct insight into what solutions worked and not, and the process became part of the iterative design process.

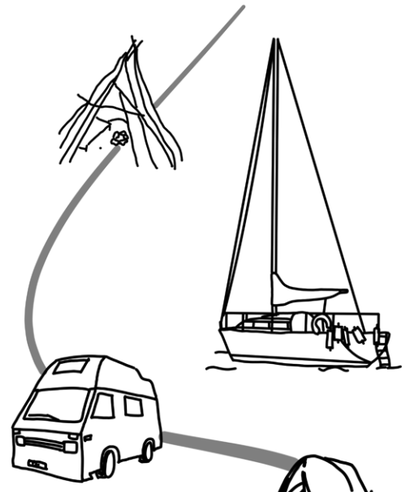
Ethic considerations

Throughout the project, the participants have been informed of the ongoing research and have given their consent to anonymous data being collected and used in the research in accordance with ethical research principles (Vetenskapsrådet, 2002).

In the case of the two courses attended as well as of the final course developed and held by me within the framework of the thesis, the research has been overt, meaning other participants as well as the teachers have been informed of the ongoing research. They have given their consent to anonymous data being used for research, and have also been informed of the possibility of not participating (but none raised a concern). The research has been conducted by the author taking notes during the courses, although always leaving out name and other personal information to ensure confidentiality.

Personal information such as name and address have been collected in the online application form of the author's course as per routine of the school and as of relevance for the application process (See page 61). Everyone applying was informed of the course being part of a research project and gave their consent though the digital application form to their anonymous data being used for research. More information about the research was given during the introduction of the course, as well as information about the right to withdraw their consent. An evaluation form with anonymous replies was used to evaluate the course. Videos and recordings of online lectures were used for documentation. For publication of photos clearly depicting faces of participants the author has been given specific consent before publication. The participants were informed as to where the research would be published and were invited to read the finished thesis upon completion.

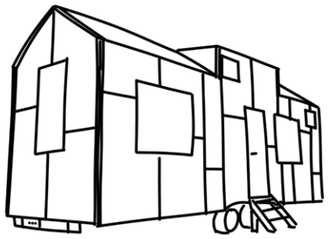
Research notes are kept securely by the author, as is the case with photos and recordings from the course. Apart from notes being used and photos being published in the thesis, a video consisting of recordings from my self-building course was created and shown at the examination and exhibition at Chalmers university (appendix 6b).



2012- Experimenting with different tiny mobile living solutions.

2014-2015 Traveling across Europe and Asia, among other things living among nomads in Kyrgyzstan and engaging in self-building in India.

2020- Building my own tiny house and moving in.



2017 Starting my Bachelor's degree in Architecture at Chalmers:
Attending AFT106 summer course on planning for small-scale wooden houses.
Attending AKA083 writing course that I used to learn about weight- price and GWP of different materials and plan my own house.

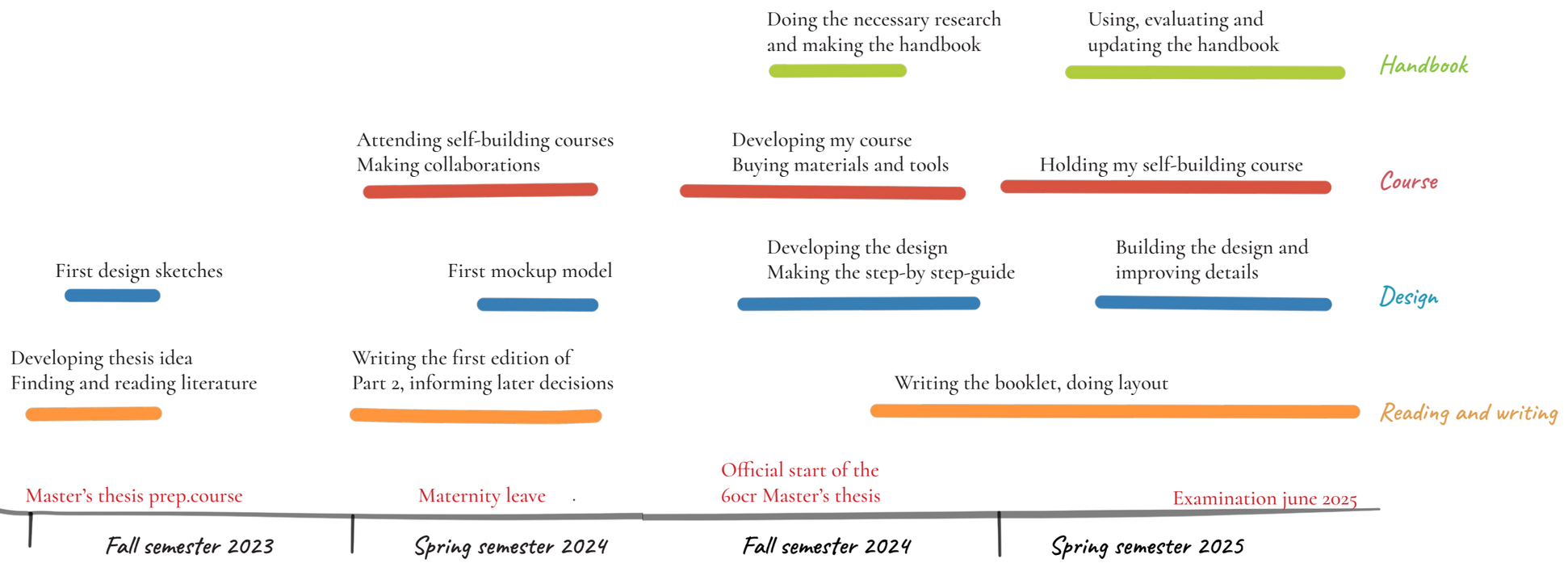
2021 Joining self-building organisation Bobini as a board member.

2022 Starting my master's degree in architecture at Chalmers:
Attending ARK174 (Local context) and developing a concept for a tiny house village. Gains increased insight into the Swedish legal system in relation to tiny houses.

1.4 Timeframe

The work of this 60cr master's thesis officially started in August 2024, but years of experience and other courses dedicated to the subject meant I had a good basic understanding of many of the topics related to the field, such as detail planning of wooden construction, general knowledge of the weight, price and environmental impact of different building materials, good insight into the legislative situation in Sweden, hands-on knowledge of building, and many years experience of tiny living. I also utilized my time during the master's thesis prep course in fall 2023 to develop my idea and collect and read most of the literature that has been used in my study. I spent any extra time that I had during my maternity leave in spring 2024 to attend self-building courses and write on the booklet.

As I officially started my master's thesis in fall 2024, I had already gotten a head start and could begin preparing for my course. The preparations (including finishing the design, creating the handbook, developing the course, attending to the application process and finding reused materials) took most of the term. During spring 2025, I held the self-building course, which also meant continuous work with improving the design and the handbook. I spent any time not occupied by the course on writing the reminder of the thesis. During the official time of the master's thesis, I've worked on average 6 hours per day 5 days a week.



Part 2

Understanding the tiny house movement

In order to activate the potential of the tiny house movement, it is necessary to understand it. Part 2 addresses the research questions "What is the tiny house movement, what potential does it hold in regards to sustainable development and in what ways could it best be activated?" and "What skills are needed to build a sustainable mobile tiny house and how can they be pedagogically communicated to self-builders?".

Part 2 presents a thorough research into the three concepts connected to the tiny house movement, namely self-building, tiny living *and* mobile architecture*, from a historical as well as contemporary perspective, in order to deeply understand the tiny house is and its potential. A theoretical framework is developed by analyzing the movement through the lens of two contemporary philosophers and by reviewing research into who the self-builders involved in the movement are and what they want to achieve. Finally it presents the local scene in terms of projects and courses. The outcome of the chapter is an understanding of what the movement needs to develop and criteria for how this could best be done. It informs the choices made in the remainder of the thesis, and also functions as a reference for evaluating the outcome in the end.*

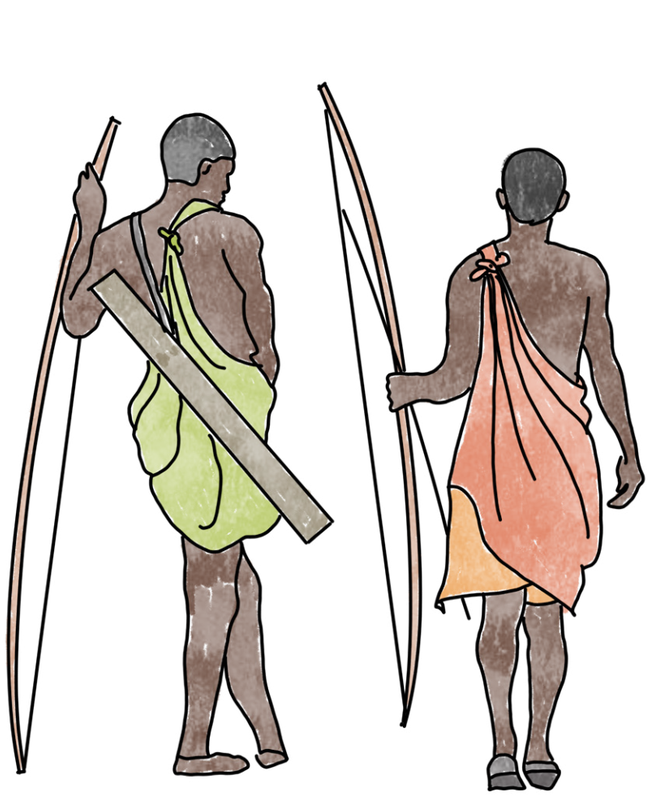
A short summary of Part 2 can be found on page 51.

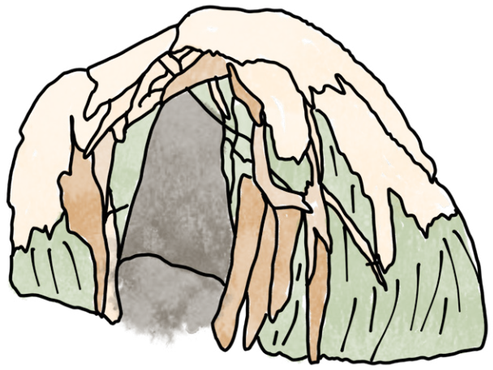
2.1 Understanding the history of self-building, mobile architecture and tiny living

Although a modern phenomenon with aesthetics and characteristics unique to our time, the tiny house has roots that stretch as far back as humanity, as it can be said to be a combination of self-building, mobile architecture *and* tiny living*. The modern conventional means of building and living has moved far away from these historically dominating concepts, while the environmental impact of our way of life has skyrocketed.*

Part 2 starts with a historical review of our architectural development, with a focus on self-building, tiny living, mobile architecture and sustainability, with the aim of understanding the root and characteristics of these concepts, and in what ways they could again prove relevant.

The timeline shows key events, while the text explains key changes in thought-patterns, habits or politics that affect the development of architecture and its effect on the environment.





We have no way of knowing what our early architecture looked like. Perhaps something like the huts made by the Hadza people of Tanzania, one of the very last hunter-gatherer tribes left on Earth (Marlowe, 2010)

300 000 B.C - 1000 A.D

300 000 years ago, human kind started out as nomads (Scerri et al., 2018). As hunter-gatherers we traveled around and lived in natural, momentary or moveable structures. The nomadic lifestyle meant that all material possessions were kept at a minimum, including the size of your home. The Stone age lasts until about 11 000 B.C, meaning about 95% of our time on Earth (Hedenus et al., 2018). Small, self-built and mobile living solutions has in other words been the dominant form of habitation in the history of humankind. In Sweden, findings suggest that our nomadic habitation was between 6,5 and 21 m² (Ragnesten, 2008; Ottander, 2021).

It wasn't until the introduction of agriculture that our needs changed, from high mobility and lightweight constructions to stable shelters with high storage capacity (Hedenus et al., 2018). Smaller self-sufficient societies dominated the bronze and iron age (Bedoire, 2015). Mesopotamia is one of the first examples of human activity having a significant negative effect on its surroundings, turning the most fertile land on Earth into a sandy desert. But the overall environmental effects of humans was still small due to low world population and simple tools (Hedenus et al., 2018).

35 000 B.C
Oldest dated cave paintings[Fizzio et al., 2018]

9500 B.C
Oldest settlement in Sweden[Ragnesten, 2008]

7000 B.C
Peak activity of oldest city, Çatalhöyük in Mesopotamia, with houses of 11-71 m² [Hodder, 2015]

4000 B.C
The teepee was a moveable structure of about 10-30 m2 used by native americans[Laubin & Laubin, 1989]

3100 B.C
Skara Brae in Scotland consists of about 10 houses of 35 m² each[Hedges, 1984]

3000 B.C
The yurt is a moveable structure used in central Asia [de Barros Damgaard et al., 2018]

~0 - 1000 A.D
The Viking longhouse became the dominant form of habitation in Sweden [Karlsson et al., 2011]

Homo Sapiens develops

Homo sapiens migrates from Africa

Neolithic revolution

300 000 B.C

~70 000 B.C

35 000 B.C

11 000 B.C

2025 A.D

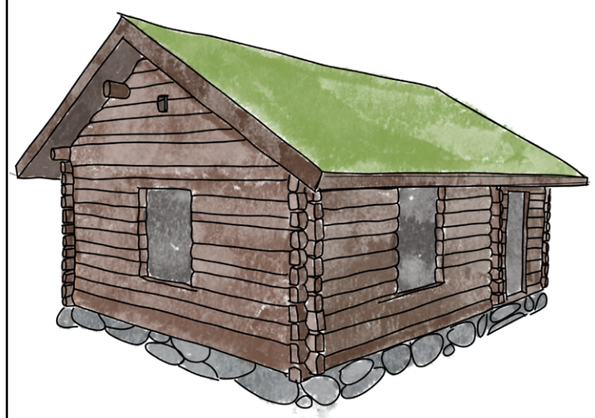
1000 A.D - 1900 A.D

When Sweden became Christian around 1000 A.D (Bedoire, 2015), the housing norm changed again. With influences from south Europe came the notion of supreme rulers, and the first kings and priests appeared in Sweden. Society is divided into a ruling class, a religious class and a working class (Bedoire, 2015). Architecturally, this meant the capacity for some to build for more than to cover the basic needs, increasing the sizes of buildings. Castles, mansions and churches demanded more organized construction, which meant specialized workforce such as architects to make plans and specialized builders to construct (Bedoire, 2015). This development can be argued to be the first step away from self-building.

For the vast majority of people however, no architects or building companies existed to help out with the construction of housing (Volny, 1976). The wooden hut, timbered or cross timbered, appeared in Sweden around 1200 A.D and continued to be the main form of dwelling in the countryside until the industrialization (Bedoire, 2015). The Swedish huts were moveable in the sense that they were relatively easy to demolish and reassemble. The placement of houses was not seen as permanent as it is today. If a family moved, the common thing was also to disassemble and number the logs of the house, and simply bring their house with them (Volny, 1976).

"Be fruitful and multiply, and fill the Earth, and subdue it; and rule over the fish of the sea and over the birds in the sky and over every thing that moves on the Earth"
(Genesis)

1237 A.D Mora Hut (Bedoire, 2015)
The timbered hut became the dominant form of habitation. They ranged from 20-50 m² for a family, were self-built and relatively easy to move (Volny, 1976).



"Cogito, ergo sum" (I think, therefore I am)

Dalby kyrka 1060 (Bedoire, 2015)
The first churches are built in Sweden

1164 A.D.
The official christening of Sweden (Bedoire, 2015)

1200 A.D. Kalmar slott (Bedoire, 2015)
The first castles are built in Sweden

1596-1650 René Descartes (Hedenus et al., 2018)

1630 Lövstabruk (Bedoire, 2015)
First of many cities for workers that were built around the growing industries

1718 Sweden's first government (Bedoire, 2015)

1700-1753 Carl Hårleman (Bedoire, 2015)
National architect who creates blueprints of houses

1760-1834 Jaques-Louis-Louis Durand aimed to structure and standardize architecture (Jormakka et al., 2013)

During the 18th and 19th century Sweden introduces standardized timber dimensions and fire regulations (Bedoire, 2015)

Hannes Mayer, director of the Bauhaus school 1928-1930 claims that architecture has nothing to do with inspiration or intuition, but should be based only on scientifically measurable data (Jormakka et al., 2013)

1000 A.D | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 | 1700 | 1800 | 1900 | 2025 A.D

300 000 B.C

1000 A.D - 2500 A.D

Christianity introduced the notion that nature is something separate from humans, which should be dominated and used for our needs (Hedenus et al., 2018). During the Enlightenment the church lost power in favor of a more scientific way of thinking, but one that continues to build on duality. Philosophers such as Descartes (1596-1650) made a worldview popular in which the material and the immaterial are separated, claiming that humans possessing souls may use soulless matter such as nature to fulfil our needs (Hedenus et al., 2018). These conceptual schemes in combination with new technologies result in increasing environmental problems. Through colonization, resources from far away could fuel an increasing economic growth regardless of local availability (Hedenus et al., 2018). Progressivism picked up speed, with the idea that technology, science and economic growth could and should improve human welfare (Hedenus et al., 2018). With more effectively used resources, the human population starts to increase, which further puts a strain on the environment (Hedenus et al., 2018).

Centralized power and a scientific mindset means a favor for general strategies instead of local and unique solutions (Bedoire, 2015). More guidelines and regulations regarding building appear, such as standardization of timber dimensions and fire regulations. In the 18'th century Sweden got its first government with any real power over the monarchy (Bedoire, 2015). In the spirit of the Enlightenment, one of the political wishes were to find guidelines for logic and functional buildings in a unified style for all of Sweden. Blueprints for housing and over-intendants controlling the outcome are some early examples of how politics and architects start to affect the housing of common people (Bedoire, 2015). The growing industries appearing around mines or rivers attracted poor farmers with a secure income and housing provided by the employers, meaning self-building decreased (Bedoire, 2015).

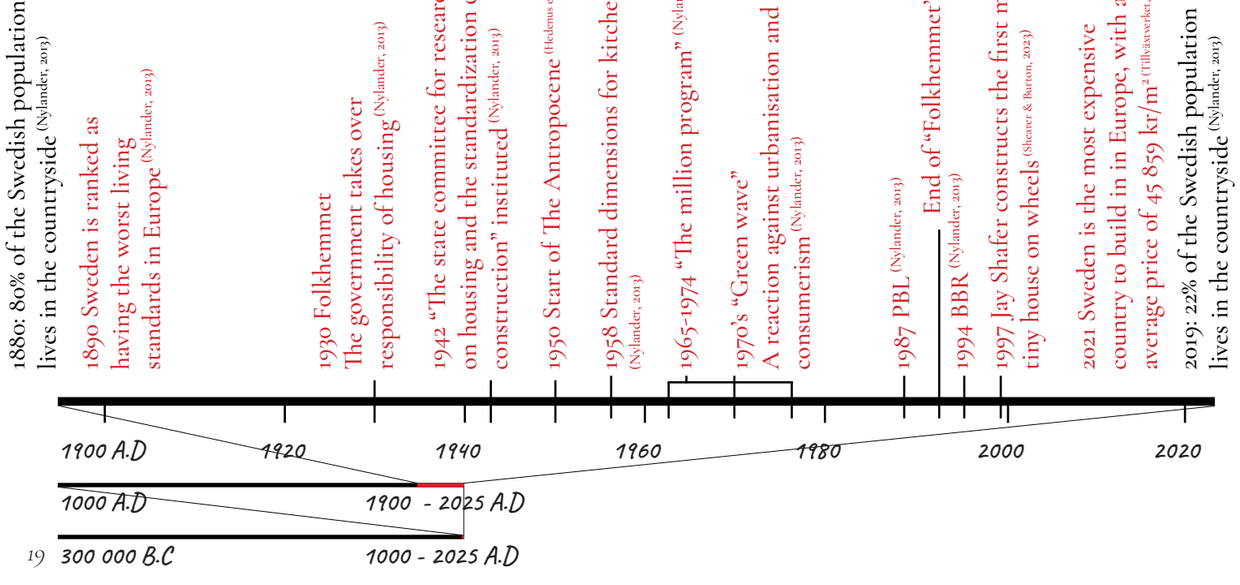
1900 A.D - now

It was not until the beginning of the 20th century that our ways changed drastically into the building stock and the modern way of life that we see today. The century is filled with a multitude of different ideologies, all in different ways working for a better life for humans, but generally with little regard to the effects on the environment.

With the rapid development of industries people were attracted to move to the cities for jobs (Nylander, 2013). The able self-builders from the countryside were met with lack of building materials, poverty and insufficient sanitary solutions, resulting in very low housing standards (Nylander, 2013). The social democrats gained power in Sweden in the beginning of the century, working to increase the welfare for the working class (Ekstam, 2013). With a scientific approach to "good housing", government committees attempted to formulate general building codes based on well-researched standards that would work for "everyone" (Nylander, 2013). This has continued to develop to the laws that are regulating design and construction today. Housing was to be produced as other objects in an industrialized spirit, where quantity and price were considered more urgently important than quality (Nylander, 2013). With the help of big-scale, top-down incentives and a rational approach in the form of prefabricated concrete elements, crowding was successfully eradicated in the 70's and sanitation and equipment radically improved (Nylander, 2013). Still, many complaints were raised against the housing that emerged as the tactics implemented were largely not regarding vernacular building traditions, aesthetics, availability of local materials or social dimensions of building and living (Nylander, 2013).

"The entire population shall be provided with healthy, spacious, well-planned, and appropriately equipped housing of good quality at reasonable costs."
(1967 Housing Policy Proposition)

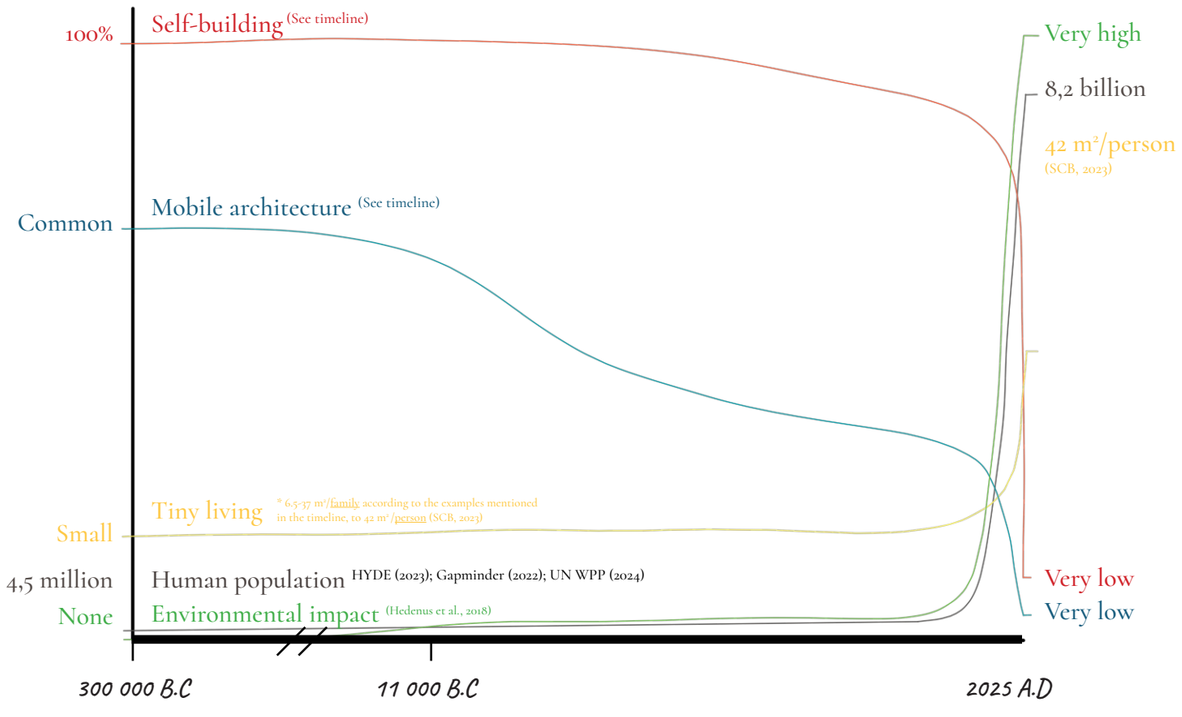
"The Architecture Rebellion revolts against what a growing number of citizens see as bad architecture and against the escalating ugliness of our cities"
(Arkitektupproret, 2024)



The development towards a homogeneous international style with little involvement of the residents has continued since. Standardization, professionalization, strict building codes and directed politics leads to self-building being nearly eradicated during the 20th century. Instead, a few big companies now perform the majority of construction in Sweden (Byggföretagen, 2022). The government stepped back and handed over the responsibility of housing to the market in the beginning of the 90's, which meant a general increase in quality to ensure maximum profit, as well as a continuously increasing size of housing (Nylander, 2013). A combination of high minimum standards and a market driven housing production with lack of competition has led to Sweden now being the most expensive country to build in in Europe (Nylander, 2013) with a price per square meter at 45 859 kr (Tillväxtverket, 2020).

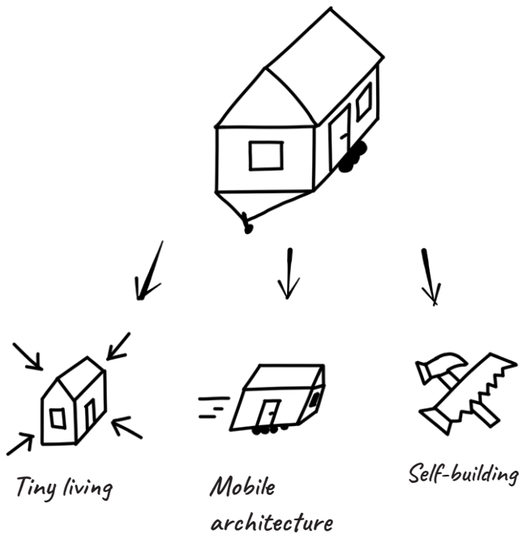
The increased population, production, consumption and transportations leads to a dramatically increased strain on the environment. Humans are now affecting the Earth on a geological scale, which merits defining a new geological epoch; the Anthropocene (Hedenus et al., 2018). More and more people are realizing that we need to find more sustainable ways of living. Countermovements to the general trend could be seen during the "green wave" in the 1970's (Nylander, 2013), and more recent phenomena such as voluntary simplicity or the tiny house movement (Shearer & Burton, 2023). In the upcoming years, human kind must radically change their ways of living in order to limit the negative effect on the planet.

Figure 4: Thre graph shows general trends in regards to the development of the aspects investigated in the timeline.



2.2 What is a self-built, mobile tiny house?

Having explored the deep historical background of self-built mobile tiny houses, it is now necessary to understand the way it is practiced in our days. The modern tiny house movement is closely linked to other contemporary movements and architectural phenomena but has its own characteristics and potentials. It is once again relevant to divide the self-built mobile tiny house into its three components, Tiny living, Mobile Architecture *and* Self-building*. By examining the driving forces as well as the pro's and con's of each of the three aspects, a deepened understanding of the potential and driving forces of the movement can be understood. As the historical background informs us, the tiny house movement started with Jay Shafer's first tiny house in 1997 and started to grow popular in the USA and the rest of the western world in the upcoming years (Shearer & Burton, 2023).*



2.2.1 Tiny living

Modern movements of voluntary tiny living question the ongoing development towards bigger housing and increasing material consumption. It comes in different shapes and forms, such as tiny houses, japanese micro apartments, or moving out into small huts in nature. The reasons for "going tiny" differs, but contrary to crowding caused by poverty or lack of resources, the tiny living-movement today is a voluntary and even attractive choice based on sufficiency, putting the private economy, the environment, social connections and experiences before material wealth (Mangold & Zschau, 2019).

Considering the historically low living standards, it is not strange that the 20th century started with a wish for bigger and better housing. Eradicating involuntary crowding has raised the wellbeing and health of big parts of the population. It's however interesting to note that the start of the development wasn't actually voluntary for all, and that living bigger was something the population needed to be taught by purposeful propaganda (Ekstam, 2013). The political quest in Sweden for better housing, "folkhemmet", was intentionally embossed by top-down exemplary and standard-setting initiatives. There was the initial assumption that everyone wanted bigger housing, but the studies conducted at the time showed that a big part of the population living in small dwellings did so by choice (i.e they could afford bigger housing but choose not to move) (Ekstam, 2013). While the involuntary crowded people were easy to make agree on rehousing, those who choose "voluntary crowding" were intentionally affected by political initiatives such as study circles promoting bigger housing and influencing visits from authorities explaining about its advantages (Ekstam, 2013).

Looking at the development of housing norms in Sweden, what started as a top-down agenda soon became a bottom-up wish. While the first housing norm in the 1940's was argued for by a wish to increase the health and nativity of the population, the second and third housing norm were implemented with arguments based on what the population wants or "have the right" to have (Ekstam, 2013). The majority of the population thereby seem to experience that bigger material wealth is worth the costs. It's however difficult to know whether it is responding to the actual wishes and needs of the population, when the population is not involved in the process of building.

"Gradually accustom people to living practically, educating them to a, from their own perspective, correct housing demand. Consumption actually needs to be guided in the consumers' own interest. People must be accustomed to brushing their teeth and eating tomatoes before they come to appreciate that type of consumption, and the same applies to reasonably arranged housing."
Alva and Gunnar Myrdal (1932), Nylander, 2013, p.158
Translated by the author.

The popularity of modern tiny living movements makes us question if the present day living norm is actually what we really need, as opposed to what we've learnt we want. Perhaps at least part of the population values space and high standards less than what is assumed, and more and more people see that big houses come with a price, both for the resident and for the environment.

As Ekstam (2013) asks, what happens when there is no longer a top-down political incentive to affect the wishes of the population? But to assume that all top-down influence has stopped is perhaps to stretch it, as we are now instead constantly bombarded with market "propaganda" in the forms of advertisements that proclaim that buying the next thing will make us happy (Hausen, 2019). Hausen (2019) gives a theory of how people become inclined in materialistic values, such as the widespread contemporary western culture that centers importance on acquiring money and possessions that convey status; We all have basic needs that need to be met, such as to feel safe, autonomous, competent and connected to others. If one of those aspects are hindered, we seek to get fulfilled by something else. A lacking self-worth can in this way be compensated for by something of materialistic value, such as status-bringing objects. Exposure to social models encouraging consumption makes us use consumption as the first hand tool to compensate for insecurities of other aspects of our well being (Hausen, 2019).

While it has long been assumed that more material wealth means more happiness, the downsides of high consumption has been overseen. Research has consistently shown that primarily striving for materialistic values and goals has negative effects on wellbeing (Hook et al., 2023). It can be put as the thriving for "more" instead of striving for what's "more meaningful". People using the materialistic tactic for happiness incline to conflict rather than trust, to obtaining rewards rather than enjoying the way, and generally show less gratitude and care less about environmental issues (Hausen, 2019).

Even if an architect or a habitant would like to explore radical tiny living, they are hindered by the legal system. The minimum size of modern housing is defined by building codes, which are set high to make housing available for those that demand the most space (PBL SFS 2010:900). This has enabled disabled people to more seamlessly partake in society. It has however increased the minimum dimensions to a relatively high level, meaning it is no longer possible to legally live on very little space. The intention to ensure high living standards has in this way led to an effective illegalization of radical downsizing and voluntary simplicity.

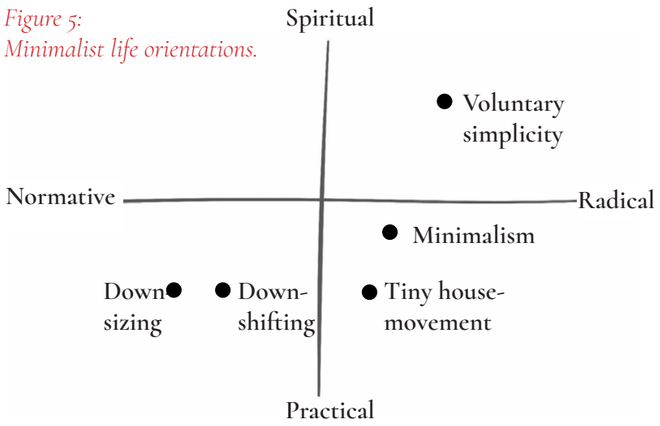
Voluntary simplicity: VS is a philosophy that advocates moderation, sufficiency, restraint, localism and mindfulness. The reasons vary from environmental concern, personal growth, a wish to live in nature or to minimize consumption. VS'ers can take drastic action such as quitting their job and moving out into nature (Mangold & Zschau, 2019).

Downshifting: Downshifters are people who want to spend less, work less and find more time to find personal fulfillment. Downshifting is a less revolutionary branch of VS and minimalism, where you as comparison don't quit your job, but simply work a bit less (Mangold & Zschau, 2019).

Minimalism: Minimalism can be described as a focused intention to eliminate stress by reducing consumption, material possession and clutter and instead seek "true happiness". It has less of the spiritual aspects that can be found in VS and it doesn't necessarily lower the amount of activity or living space (Mangold & Zschau, 2019).

Downsizing: Downsizing is to get rid of unnecessary stuff and to live on less space. The reasons can vary from a wish for a simpler and decluttered life to saving money or lowering one's emissions (Mangold & Zschau, 2019).

Figure 5: Minimalist life orientations.



So what really makes us happy? Today, most people have heard about minimalism, voluntary simplicity and downsizing through the many popular TV-shows, blogs and instagram accounts that advertise the lifestyles. The wish to declutter and simplify is made popular by TV-series such as "Living big in a tiny house", "Marie Kondo", "Tiny house nation" or "Minimalism"(the documentary). The different minimalist life practices can be seen as questioning the notion that happiness can be bought, and therefore start a quest of anti-consumerism - reducing the unnecessary excess of space, goods and consumption and instead directing ones focus to things that feels more meaningful, such as relationships, experiences, spirituality or nature.

One way to interpret the emergence of the popular countertrends is as a wish to redefine needs and wants put upon us by someone else in an attempt to correct a misalignment of values and goals. The present living norm can be seen as having been created by political forces in society - whether it be a socialistic quest for "the right to high standards" (Ekstam, 2013) or the capitalistic idea that a higher income and increased consumption leads to happiness. While higher material wealth increases happiness for those who's basic material needs aren't met (Hook et al., 2023), the general striving for material goals in western culture has put the focus of life on excess consumption. Having enough but wanting more can lead to discomfort, whether it be out of lack of financial means to buy more or due to the amount of time spent on making money. Voluntarily striving for less can in that way lead to higher wellbeing as one lives more in line with one's means (Hook et al., 2023). This indicates that the reason for the sense of happiness is not the smallness of living space but in the release of economic stress (Malik & Ishaq, 2023). It also points to the fact that for minimalist life practices to be a successful road to happiness, it needs to be a voluntary choice (Hook et al., 2023). Being forced to live tiny while wanting more space would create the same kind of discomfort as is arguably the cause of distress connected to having material goals. Fulfilling needs and creating a sense of "enough" is therefore important for tiny living to increase happiness and be a sustainable road forward.

Apart from personal well-being, the ongoing climate crisis is a reason for the increasing popularity of questioning the materialistic norm. Sufficiency and efficiency are the two tactics used to lower emissions caused by our modern life. Sufficiency-based sustainable housing aims to respect the boundaries set by nature while meeting the needs of the users (Bohnenberger, 2021). Sufficiency aims to move from "owning green" to "having less". The most direct way this is done is by reducing the amount of living space. A way to do this without feeling loss can be to substitute the need for privately owned housing with shared functions such as community guest rooms, shared washing rooms or a shared sauna (Bohnenberger, 2021). In other words, in order for sufficiency to work, it needs to be efficient, well planned and not lack functions. Sufficiency can however still result in rebound effects, such as using the money saved on airplane tickets for traveling.

Efficiency as a tactic for sustainability aims at lowering the amount of CO_2 released per unit (Hedenus et al., 2018). For example, a more efficient car can drive further on the same amount of gas and an efficient heating system can heat the same area using less electricity. The tactic revolves around not having to change our habits, but instead continue the same lifestyle while emitting less (Hedenus et al., 2018). Efficiency is definitely one important factor in lowering our emissions, but there is high risk of rebound effects that limit the saved emissions (Bierwirth & Thomas, 2015). For example, if our car emits less, we feel like we can drive further, and with an efficient heating system we can heat a bigger house, because "it's so efficient!". It's a sustainability tactic that makes us think we don't have to worry about how far we drive or how many houses we own (Hedenus et al., 2018). The best working tactic is of course a combination of the two, a downsized home with an efficient system.

The current laws on housing aimed at reducing the CO_2-emissions are based on efficiency (Bierwirth & Thomas, 2015; Appendix 1; the handbook). That means there are rules dictating minimal insulation value and maximum heat losses in the finished building, but no rules dictating maximum living space. In practice, this means that it is legal to build as huge as you would like, as long as the finished house is efficiently heated. In reality however, a family living in a less insulated 30 m² house could be emitting less CO_2 per person than a person living in a standard insulated house of 300 m². Still, the law would favor the big house and render the small house illegal (if it's not fulfilling the minimum insulation values). A sufficiency approach would measure emissions per person instead of emissions per m² (Bohnenberger, 2021). This would take into consideration the size of the dwelling and the amount of people living in it. It would be more effective in terms of reducing emissions, but it would to a higher degree affect the everyday life choices and freedom of people.

Small size dwellings render additional difficulties to live up to standards and laws. In the U.S. the law dictates that at least one room in a residential house needs to be bigger than 120 square feet (11.15 m²) (Shearer & Burton, 2023). In Australia, compact living struggles to comply with codes because of low ceiling height and steep stairs (Shearer & Burton, 2023). In Sweden, the arguably biggest hindrance for tiny living is the demand for wheelchair accessibility (PBL 8:1 § SFS 2010:900). The required minimal dimensions means that it is impossible to fit all functions on less than 21 m² for permanent housing (Boverket, 2018) (For a full list of minimal dimensions, see Appendix 1: The handbook, chapter "Hus på plats") The specified dimensions for separated activities also make it difficult to apply "clever design" and combined functions.

2.2.2 Mobile architecture

Mobile architecture is on the rise, offering an alternative to the brick-and-mortar-bound existences of stationary living. Having been the norm for nomadic peoples, it is now reemerging in new ways. Modern mobile architecture goes hand in hand with a wish for greater freedom - from building permission and laws, from acquisition of land, from mortgage and from being bound to one place (Shearer & Burton, 2023).

As the history shows, mobile architecture has offered a flexible living situation that could adhere to different needs throughout time. It makes it possible for its habitants to move whenever needed, which was a necessity for hunter-gatherers and nomadic peoples in order to follow animal migration patterns. Although the architecture left behind from historic times is dominated by remains of stationary houses, it only means that those are the ones still standing. The reason for the absence of moveable or momentary structures is that it had minimal lasting impact on the areas habited, since it uses few resources and since it doesn't need foundation work.

Presently, cities are growing and consuming agricultural land - a process which forever makes the land unyielding (Jordbruksverket, 2021). According to several adjudgements in recent times, the Swedish government is becoming more restrictive in granting permission to build on fertile land (Länsstyrelsen, 2023). Moveable houses provide an opportunity for temporary exploitation that preserves the land's fertility. Instead of forever claiming an area, mobile architecture burrows. Likewise, placing moveable structure within an urban setting could be a way to temporarily densify cities (Shearer et al., 2018). Living in mobile structures also allows a settlement to move in case of natural disasters or war.

Figure 6: A caravan traditionally used by the Romani in early 20'th century.

Freedom from acquiring land also means financial freedom. Mobile houses can provide a home without the cost of the land it stands on (Shearer & Burton, 2023). Freedom from mortgage releases financial stress and could free up time for working less and engage in more meaningful activities (Mangold & Zschau, 2019). Building or buying a tiny house is however not an option available for everyone. Many banks do not give loans for mobile houses, meaning it might only be possible to acquire for those with saved up capital (Shearer et al., 2018).

Nowadays, mobile living solutions have increased in popularity with the rise of digitalism and with increased possibilities of working from home (Hely, 2023). The reason for wanting a mobile living situation today is often to be able to move for work, studies, or to be open to chase new experiences (Hely, 2023; Roke, 2017; Mangold & Zschau, 2019). There are examples from within the western culture that have evolved parallel to conventional housing. Many of them, such as caravans, campervans and sailing boats, are sometimes used as vacation homes, but have provided long-term housing for people more prone to living on the road (or water).

Since Jay Shafer's first tiny house built 1997, the small house on wheels has gained popularity as a tiny and mobile alternative to conventional housing (Shearer & Burton, 2023). It especially boomed in the U.S. as an available solution when many families lost their homes to the bank after the financial crisis in the 2010's (Marshall, 2019).

Canal boats are another type of mobile housing on the rise, and are to be seen in many harbor cities around Europe such as Amsterdam and London (Roke, 2017).

Figure 7: Jay Shafer in front of the first modern tiny house on wheels.

Figure 8: Boats are common mobile living solution used around the world.

The moveability of mobile architecture makes it relevant in providing temporary shelter in case of natural disasters, to battle homelessness or as emergency housing for immigrants (Mangold & Zschau, 2019; Stenberg & Harling, 2022).

An issue with moveable structures is that there are few legislative guidelines (Shearer et al., 2018). The structures "fall between the paragraphs" as it is regarded as a vehicle when in motion and a house when standing still (Shearer & Burton, 2023) (For Swedish law, see appendix 1: The handbook, chapter "Hus på väg" and "Hus på plats"). This makes building- and parking permits difficult, and likewise registration of addresses for constantly moving citizens. The laws regarding vehicles limit the dimensions and weight, while the codes regarding housing are difficult to meet on such limited space (Boverket, 2018). The limitations can result in thin structures, without enough insulation to live up to the energy efficiency demands of housing. Mobile structures also often have alternative ways of dealing with water, sewage and electricity that might not be in line with local codes (Shearer & Burton, 2023).

Due to the incompatibility of the many conflicting regulations, those choosing to live in mobile structures risk having to live under the radar and be ready to move if noticed by authorities. However, many of those joining the movement of mobile architecture are attracted to the "ultimate freedom" that a mobile housing solution offers, and naturally question laws, regulation and expectations (Shearer & Burton, 2023). It is therefore not so much the "risk" of having to move if noticed, but the freedom in having the possibility to do so. By placing itself in between concepts and paragraphs, it can dwell in a gray zone where almost no laws apply. It is a place where new concepts and solutions can be tried, which of course both poses a risk and a possibility to the development of architecture.

2.2.3 Self-building

In the highly industrialized and standardized modern time, housing has become a product that is delivered to us by professionals with the resident removed from the equation. It is easy to forget that humans for the majority of our existence have built our own shelters, intuitively designed according to our unique needs. Building and housing could be more than a practical means for shelter and comfort. Modern movements explore self-building as a way to express creativity, build community and gain economic and environmental benefits.

An investigation was made among rural self-builders in the 1920's in order to examine how self-building was made the traditional way (Volny, 1976). The Swedish timber hut was built without drawings or plans by the residents themselves, with help from neighbors and family. Sometimes "timmermän" (timber-men), people with a bit more experience in building, were part of the team. Women provided food and drinks, and gathered moss for filling the gaps between logs together with the children. Everyone involved learnt to build by participating and watching.

As history informs us, self-building was almost eradicated during the 20'th century. The last organized self-building movement in Sweden was "Egnahemsrörelsen" (Own home movement) where future residents could get beneficial loans if they conducted the construction of their houses by themselves (Volny, 1976). Self-build still existed in the slums outside the cities, but this was an attempt to raise the quality and organization of it. It started as a liberal political incentive in order to be "politically calming and strengthening of the will to work and for the love of the nation", while adding that it "won't solve the housing crisis, but provide more with the opportunity to get a house" (Lundgren, 1981). It started in Stockholm in 1926 (Egnahemsbyrån, SmåA), followed by Gothenburg 1934 (Göteborgs Egnahem) (Volny, 1976). Contrary to traditional forms of self-build, in this case the municipality allocated land, architects had done drawings, ready-made building material was provided and carpenters gave instructions for each step of the construction (Lundgren, 1981). It allowed for more economically vulnerable groups to move from crowded apartments and get into the housing market. It was a popular initiative with about 12 000 houses in Stockholm and 3300 houses in Gothenburg. In 1965 the possibility of self-building through Göteborgs Egnahem ended, even though there were still 4300 people standing in que for a plot (Lundgren, 1981).

Figure 9: Self-builders from "Egnahemsrörelsen" building their own houses.

Surveys made on self-builders from Egnahemsrörelsen show that 97% found self-building a good way to build (Volny, 1976). The most common reason for building was the economic benefit and the possibility to create something yourself. The appreciation of having learnt so much is often mentioned, and many even say it was the biggest self-realization project of their lives. Building your own home brings about a satisfaction and appreciation that is difficult to compete with with ready-made houses. Appreciated is also the community and strong friendship between the neighbors that was created during the building phase. The biggest downsides are mentioned to be the time pressure and the small possibilities to affect the design (Volny, 1976).

Aside from organized self-building, the practice has often been connected with anti-authoriarian and anarchistic ideological positions (Caputo et al., 2019). The post-industrial development of housing policies put governments in power to determine the use, function and look of the built environment, and generalized codes made the housing stock very homogenous (Caputo et al., 2019). After decades of mass-production, the need for personalisation appears to be a strong driver for self-build projects (Caputo et al., 2019). But to build according to personal choice often means disregarding building codes. The movement's inability or refusal to follow laws and standards can be said to be its weakness as well as its strength. When codes become too rigid in a time that demands change, self-builders can take on the task of thinking outside the box and test new solutions. This can mean the residents take direct responsibility for their built environment, structurally, environmentally as well as socially.

The issue arises if the self-builders can't or won't take that responsibility. The codes, square as they might sometimes be, are made to ensure quality, safety and useability. Badly planned housing can result in less usage and thereby be a waste of resources. Badly constructed housing can result in dangers to the residents and others. Too low insulation value means a waste of energy for heating. The two extremes of either completely excluding the future resident from building, or to completely disregard codes and build according to personal wishes, must be balanced in order to be the most beneficial. This could be done by more generic codes that meet the self-builder half-way, allowing for more creative and intuitive freedom while ensuring safety (Caputo et al., 2019).

Figure 10: An example of where generic codes have been tried out is Homeruskwartier. The project is a large experimental area in the city of Almere, Netherlands. A city mapped out 720 individual plots divided into 15 quarters, each with their own name hinting at their characteristics such as "I build sustainable" or "I build canal houses". In the area "I build free" only 5 rules applied; the dwelling must be self-build, must be built within the plot on the street line, must not exceed 14m in height and must allow for parking within the plot (Caputo et al., 2019). Simplified rules and cheap land attracted self-builders and created a very diverse and alternative city.

Figure 11: Another example of organized self-building is Walters Way in London, with 13 self-built houses, finished 1986 (Lundquist, 2017). The architect Walter Segal developed a system of construction suitable for self builders in that it was low-cost, flexible and easy to build. He released a pattern book and list of structural components determined by availability, afford-ability and minimum waste. About 200 buildings were built according to Segals' principles (Lundquist, 2017).

Self-building is a way to naturally balance the use of resources. The historical self-builder took what materials were locally available. This means the effect on the surroundings was apparent and no more than what was needed was used (Volny, 1976). The modern day division of construction on a range of professionals means no one really takes responsibility for the whole chain of events (The Story of Stuff Project, 2009). As long as there is economic capital available, any amount of resources can be imported without an apparent effect on the direct environment (Hedenus et al., 2018). Self-building however informs the user of what resources are being used and in what quantities. The increased insight enables a heightened sense of responsibility to make sustainable choices, such as choosing "greener" materials in limited amounts (Caputo et al., 2019). A house that is allowed to grow forth in an ongoing dialogue with its future users, is also more likely to fulfill the users needs without excess space (Caputo et al., 2019). It is also arguably easier to use reused materials in self-building projects as their uniqueness goes well with smaller projects that allow for individual expression (Andersson & Nilsson, 2020; Stenberg & Bryngelsson, 2022).

Economically, a lot could be gained from building yourself. The cost of professional workforce in a construction project is sometimes a bigger part of the budget than the materials themselves. While some parts of construction, such as electricity and plumbing, must be done by professionals for safety reasons, the carpentry work can be simple and intuitive enough to be made by amateurs (Volny, 1976). The possible low price of self-building projects makes it an interesting alternative to those who cannot afford a standard house (Lundquist, 2017).

Figure 12:
In the area Svartlamon in Trondheim, the municipality in collaboration with the local housing foundation carried out a project where 5 row houses were built by their future habitants (Lundquist, 2017). Two architecture students developed a frame system and communicated the building process through a book showcasing the process step-by-step. The self-builders could personalize the layout, and each of the houses of course gained a very unique aesthetic due to the diversity of reused materials (Stenberg & Bryngelsson, 2022). The price for each dwelling ended at about half a million NOK, or 8600 NOK/m². The reason for the low price, which is about 20% of the normal square meter-price, is the 3000 hours of building spent per family, and the usage of reused materials (Stenberg & Bryngelsson, 2022).

Figure 13:
The project Quinta Monroy (2004) by studio Elemental makes use of the building-capacity of the inhabitants to be able to offer housing for half the price (Lundquist, 2017). The row houses, located in Chile, originally only contained basic functions such as toilets, kitchen and stairs. Half of the houses were then built by the inhabitants themselves, resulting in a much lower prize as well as in unique designs.

resillience */rɪˈzɪlɪəns/* *noun* — **the ability to adapt, recover, and thrive in the face of adversity or challenges.*

Excluding professionals from the process could even increase the quality. Surveys from self-builders from the Egnahemsrörelsen suggests a big reason for the participants to choose self-building was so that they could better ensure the quality (Volny, 1976). A professional company builds to sell, works effectively and often knows how to hide mistakes. There is a general idea in the professional field that amateurs would be sloppy and imprecise, but reality is often the opposite. The inexperienced self-builder is often very concerned about quality, works slowly and builds their house with care (Volny, 1976). After all, they are creating their future home.

Self-building is also an important tool for social sustainability. Building creates confidence, a sense of self-worth and forsters skills. This can inspire the participants to contribute to society, which can help counteract criminality and create jobs (Vall & Lindstrand, 2018; Lundquist, 2017). Self-building is also a way for citizens to be able to complement insufficient production of housing by the market (Caputo et al., 2019).

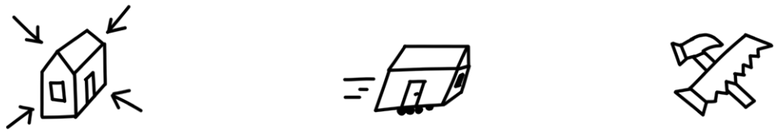
Allowing for users to organize projects while reducing state intervention could more directly meet local needs, as opposed to top-down initiated speculative housing projects (Caputo et al., 2019). Building together instead of passively achieving housing builds solidarity, fosters a sense of meaningfulness and can make the residents more engaged in their community (Stenberg & Harling, 2022).

Active and skilled citizens also help build resilience. A resilient society does not only have one "monoculture" of solutions, as it then becomes threatened in case of drastic changes caused by for example natural disasters, war or material shortage (Hopkins, 2014). When people are trained in self-organized cooperation and know how to build houses, society is more likely to "bounce back" after a crisis. Likewise, self building can allow for experimentation and out-of-the-box solutions not explored by standardized construction companies. Being creative with ways of living and ways of building helps develop a set of alternative solutions ready to be applied if a crisis hits.

Above all, self-building brings back creativity and local engagement in a society where the place you live has been degraded to an anonymous object built to fulfill general physical needs (Volny, 1976). There is talk of the right to good housing, but politicians have defined it primarily as minimum dimensions and energy efficiency. The "soullessness" and compromised aesthetics of modern housing wouldn't be possible without the removal of the end user from the process. The self-built house has characteristics unique to the person building it - it tells a story and creates a sense of belonging, appreciation and love (Lundgren, 1981; Volny, 1976). In a way we seem to have forgotten that societies are built of real people, not of matter, and that individual expression, artistic exploration and an intimate relationship with your surroundings are important components in creating happy and engaged citizens (Lundquist, 2017).

Figure 14:
In the government-initiated project in Meland, Norway in 2008, youth with a history of criminality or addiction were invited to build their own house (Lundquist, 2017). The municipality allocated cheap land and unemployed carpenter students provided tutorials. The hope was for the participants to be provided with a way to change their way of life for the better. Attempts were made to calculate the social benefit of the project. Based on the fact that a person in active criminality costs society about 19 000 NOK per day, and 5 such people completely stopped their criminal activity for the 5 years the research covered, means a societal saving of 200 million NOK (Hansen et al., 2009). The gains for the participants in terms of a place to live, increased sense of self-worth and useful skills are of course immeasurable.

2.2.4 The combination: the self-built mobile tiny house



Why?

Why tiny?
- Low use of resources
- Low price
- Questions consumerism
- Quicker to build

Why mobile?
- Freedom
- Avoid building permit
- Avoid mortgage
- Doesn't ruin the land
- Possibility as infill
- Emergency housing
- "No laws" - freedom for experimentation

Why self-build?
- Low price
- Self-realization
- Develops skills
- Builds resilience
- Potential higher quality
- Unique designs
- Personalization
- Artistic freedom
- Fulfilling personal needs
- Builds community
- Sense of meaningfulness
- Sense of responsibility
- Reused materials

Why not?

Disadvantages
- Difficulty living up to code
- Not accessible for all
- Limited storage
- Difficulty housing big families, pets, hobbies
- Limited insulation

Disadvantages
- Limited dimensions
- Restricted weight
- Restricted construction
- Bad thermal performance
- Grey zone in law

Disadvantages
- Not living up to code
- Potential lower quality
- Difficult to control
- Need economic and social resources to build
- Not possible for sick or disabled people

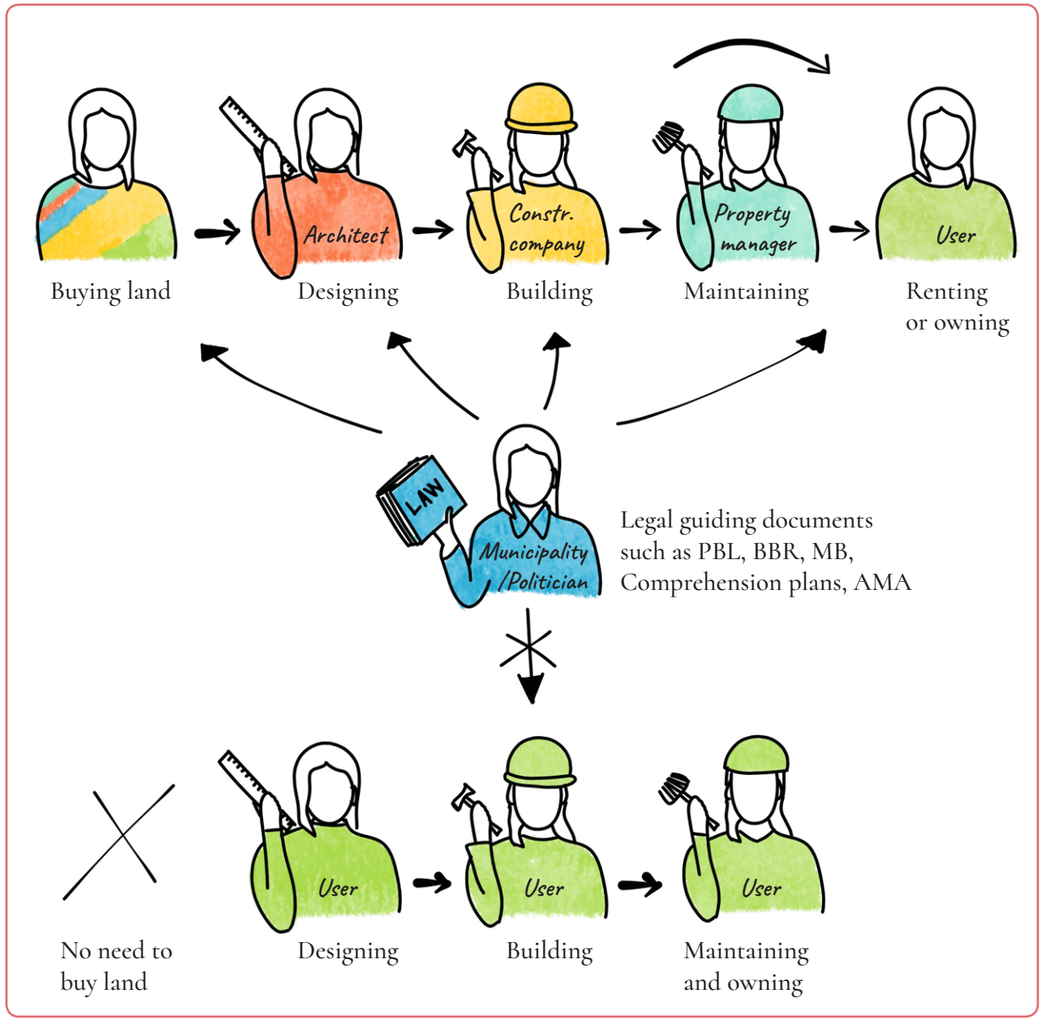
The combination

<u>The self-built mobile tiny house</u>
The self-built mobile tiny house combines the strengths and counteracts the weaknesses of the three themes.

Mobile and tiny naturally goes hand in hand because of the dimensional restrictions of vehicles. Building it yourself lowers the price and increases the personalisation and sense of responsibility. This can encourage the use of reused materials and other sustainable solutions, and can radically lower the price. It however requires design- and building skills and more invested time. The mobility offers freedom from building permits that self-built tiny houses struggle to comply with, and opens up the housing market for those not owning land. The possibility to build in one place and move to another enables co-building sites for sharing of skills and community.

All three themes question consumerism, and can aid in redefining our quality of life in more sustainable ways, which could inspire others to a life more in line with the Earths' resources. The self-built mobile tiny house offers the most freedom both during the design, build and living phase and can provide a sense of meaningfulness, self-realization and happiness for its dweller.

Figure 15:
Illustration showing how conventional means of house-production differs from self-building of mobile tiny houses.



Self-building of mobile tiny houses puts the user in power at every step of the process. This provides an opportunity to explore alternative ways of building and living. The conventional procedure for creating houses is divided into several actors, with the end user often not more than a passive consumer of a finished product. The wide division of actors means no one has insight or influence over the whole chain of events. For the building industry to radically lower its environmental impact, all actors must act simultaneously, or they will hinder each other.

Building a mobile tiny house is thereby a way to break free from a system that is very slow to change. As self-builders take matters of sustainability into their own hands, they might provide new solutions and act as inspiration for more sustainable ways of living. Disregarding laws and well-tried out means of construction is however undeniably a risk. It demands a high sense of responsibility from the self-builders, or it can prove to be dangerous or useless, and it puts the owner at risk of being prosecuted. For it to be successful, self-builders must be knowledgeable in both design, construction and laws regarding safety.

2.3 Why is the tiny house-movement emerging now?

This chapter aims to understand the reasons for the increasing popularity of the modern tiny house on wheels. With the help of two contemporary philosophers, the reasons for adopting the tiny house lifestyle is analyzed and put into perspective. To start the examination, the critical theories of Jonna Bornemark, doctor of philosophy, and Hartmut Rosa, professor of sociology will be presented and related to the field of architecture. Their theories are thereafter mirrored against academic studies exploring the driving forces behind the tiny house movement to see whether or not they could be explained by the societal development presented by Bornemark and Rosa.

2.2.1 Jonna Bornemark

Jonna Bornemark (1973-) is a doctor of philosophy active at The center for practical knowledge at Södertörns högskola. In her book "Det omätbaras renässans - en uppgörelse med pedanteras världherravälde" ("The renaissance of the immeasurable: a settlement with the reign of the pedants") (2019) she reflects our present way of thinking against that of pre-Enlightenment philosophers, in order to give perspective on our modern society.

According to Bornemark (2019), we categorize and understand our world with the help of our reasoning mind. It's a necessary process to make sense of the flow of sensory input we're exposed to, and is a prerequisite to live as a human in this world. But Bornemark argues that our reasoning mind can be divided into two parts, Ratio and Intellectus (concepts borrowed from Cusanus (1401-1464)), and that our modern world is too dominated by Ratio. Ratio is our minds ability to separate, generalize, calculate and measure. Ratio can't grasp the fluidity or organic nature of things, but puts everything in separate boxes. But ratio cannot understand or define <u>what</u> these categories are, and that's where Intellectus comes in. Intellectus is the part of our mind that sees things more deeply. It has the ability to add value and meaning to the categories that Ratio has prepared. Intellectus reflects upon what those objects really are - their meaning, value and uniqueness. It helps us decide what is important and what is not of value. It can analyze and redefine concepts and is in a continually developing conversation with the world.

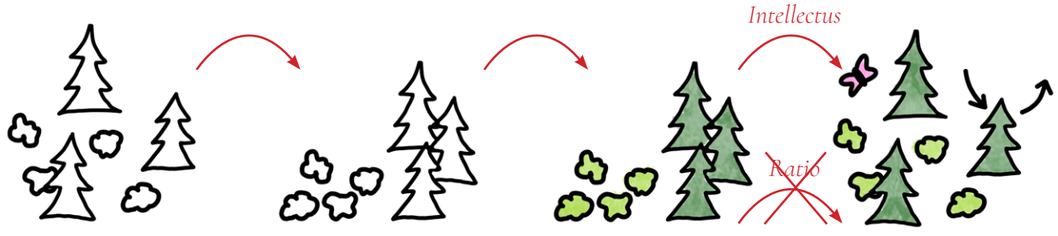
Ratio: The strictly rational and measuring side of our human consciousness.

Intellectus: The reflective side of human consciousness that adds value and meaning to concepts

For example, in order to know how many trees are in a forest, we first need to make a distinction between bushes and trees, we then need to understand the concept and value of a "tree", and we finally need to count them. The mind is first exposed to the chaos of impressions through the senses. Ratio then separates and categorizes objects and concepts from each other into quantifiable distinctions (high and low objects). These distinctions are however empty of value until Intellectus adds value to them (trees and bushes). Intellectus reflects upon what those objects really are - their meaning, uniqueness and useability ("trees are living organisms that are tall and could be used for timber. Bushes are not useful"). It helps us decide what is important and what is not. After the concept is set, Ratio can use it and count the trees. For Ratio, there is now one definition of tree and one use for it, as previously defined. Ratio can not by itself reevaluate its fixed ideas of what "a tree" really means and what it can do. So in a situation where the world is changing (such as by global warming and extinction of species), Intellectus can reflect upon the deeper meanings of a tree and its use ("trees are unique living organisms, part of an organic ecosystem together with bushes and the rest of the forest") and see the need for a reevaluation and calculation in new ways ("It's not good to cut all the trees down for timber but let some of them be to save the ecosystem"). In a balanced mind, Ratio then starts using the new definition and the human or society acts accordingly. But in a world dominated by Ratio, there is a resistance against redefinition and more loosely set definitions if it makes it harder to count and organize. Ratio will prefer to stick by its fixed ideas and keep counting trees suitable for timber without reflection on destruction of ecosystems (for example). Intellectus can see the limitations of Ratio, but Ratio cannot see its own limitations.

Bornemark argues that we live in a world dominated by Ratio. We still use our Intellectus (or else the world would not make sense) but there has been a shift in the balance between the two. Someone dominated by Ratio has lost touch with what really matters. They measure for the sake of measuring and quantifiable data will always be more valuable than meaningfulness, connection, fluidity or being in wonder.

A society driven by ratio has a tendency to trust general guidelines and numbers more than the competence and feelings of humans in unique situations. This has led to an intrinsic use of non-generic guidebooks, checkbooks, paperwork, documentation and evaluation that hardly works for the good of businesses or projects but rather makes it difficult to act on the uniqueness of the situations or locations. Ratio is of course preferring the controllability of building codes before the chaos that self-builders and creative architects could mean.



The mind is exposed to the chaos of impression

Ratio sorts our perception into categories

Intellectus adds value and meaning to those categories

Intellectus can understand contexts and redefine those values if needed, ratio can not

2.3.2 Hartmut Rosa

Hartmut Rosa (1965-) is a professor of sociology at the university of Jena in Germany. In his book "Social acceleration a theory of modernity" (2015) he presents his theory of social acceleration.

Technological acceleration: Development of technology to speed up production, communication and traveling.

Acceleration of social change: Increase in the phase of life, affecting relationships, politics and institutions.

Acceleration of the phase of life: Increase in the amount of activity per unit of time.

The now used to be similar to the past, and the future derivable from the past and the present. That is no longer the case, with a world in constant flux where everything seems to go faster and faster. Rosa (2015) argues that this is a result of what he calls "social acceleration". The technological innovations are the core of the process of modernization and acceleration. While the acceleration started to be noticeable already in the 17th century, it sped up during the industrialisation and has continued to do so since. For example our means of transport have gone from on foot, to horses, steam boats, railroads, then bicycles, automobiles and planes. The means of food- and product production has exploded into a highly efficient global market of monocrops and factories. The acceleration of communication has gone from speaking, to telegraphs, telephones and then the internet.

Initially, the development uprooted the culture so that it could be redefined in ways with wider possibilities for a more comfortable and just life. It was assumed that the emerging efficiency would result in a more tranquil and harmonious life for people. Things that before took up a lot of time, such as building one's home, taking a picture instead of painting it, and cultivating one's food instead of buying it, have been optimized through means of technology and effective systems. But even though we've gained more time than ever, the paradox of the modern world is that we're more stressed than ever. Rosa (2015) speaks of a space-time compression, where here and now is no longer what it meant to be.

Apart from technological acceleration, there is also acceleration of social change and acceleration of the phase of life.

Social acceleration affects societal structures, institutions, politics and personal relationships. Before recent modern times, social acceleration meant a positive fluidity and faster pace of development of institutional structures. But in today's hyper-acceleration such structures become too slow and inflexible, and bureaucracy and even the law have a hard time keeping up with the demands for change. Social acceleration is also evident in our relationships, where lifelong monogamy has been replaced by dating apps and fast changing partners.

Acceleration of the phase of life means an increase in the amount of activity per unit of time. It is achieved either by doing things faster, by decreasing the amount of time between activities or by multitasking. Subjectively, it is expressed in a sense of stress and of "not keeping up". The three aspects of acceleration propel each other forward. For example, when there is a sense of "not keeping up", new time-saving technology is developed, which means we can do even more on less time, which increases our productivity, which in turn enables tighter deadlines, which means we need even more advanced technology. And so it goes on, like a stone put into motion on a slope, it is now rushing down.

A resistance to acceleration has always accompanied new development. It can be seen historically as skepticism to the telegraph, the automobile etc. It is longing for a calm and stable lost world. It can be seen politically as parties wanting to go back to "the old ways", either with a radical touch of environmentalism or ultraconservatism. It also shows in different deceleration ideologies promising well-being through slowing down. Most counter-movements however do not really make a difference to the progressive dynamization, but are simply momentary side-effects of acceleration. None of them has so far embodied a structural or cultural countertrend strong enough to make social acceleration slow down.

2.2.3 Ratio-domination and social acceleration in the field of architecture

The Ratio-dominated society and social acceleration can be seen affecting the field of architecture just as much as other fields. While the two often go hand in hand, Ratio-imbalance can be seen as the reason for the development, while social acceleration is more of an explanatory model of what happens. Both starting during the Enlightenment, it can be connected to a dualistic mindset and a scientific approach to truth (Bornemark, 2019; Rosa, 2013). The scientific basic principle of objectivity strengthens a Ratio-dominated mindset as it is aiming to find hard and unchanging definitions and generalized guidelines. This development has undoubtedly meant an immense increase of knowledge in the fields of for example medicine and technology, which has increased the quality of life for humans. Problems arise when Ratio tries to do the same with parts of life and society that actually demand some sensitivity to the uniqueness of situations, such as in interpersonal professions and architecture.

Given the increasing Ratio-dominated mindset it is no surprise that architecture developed towards more generalized building codes, involvement of professionals, top-down initiated projects and more industrialized means of building. Early examples seen in the history chapter are Carl Hårleman's (1700-1753) wish to find unified guidelines and aesthetics, or Jacques-Nicolas-Louis Durand's (1760-1834) typological theories. Later examples are Hannes Mayer who was director of the Bauhaus school 1928-1930. He proclaimed that architecture had nothing to do with art, creative inspiration or subjective intuition, but that it should be based on scientifically measurable data. He believed that if only the right data was collected, such as the angle of the sun and moisture of the air, the architectural design would "calculate itself" (Jormakka et al., 2013). Perhaps the most obvious of architecture done by a Ratio-driven society is the million homes program where the most important thing was the numbers - one million homes were to be created, in a rational and cost effective way (Nylander, 2013). The 20th century is also a great example of how a Ratio-dominated society can look different under different ideologies. During the million homes program the Ratio-dominated approach to housing was a quest by the welfare state, but the same mentality is now seen in the neoliberal capitalist society, where profit instead has become the most dominating factor in projects.

Today, it is obvious in the architectural field that arguments for beauty or coherence with historic locality are almost always valued lower than the argument of measurable cost-effectiveness. Similarly, fast and effective construction is valued higher than slowly and organically growing forth architecture and the uncontrollability of self-building. The field today heavily relies on strict building codes dictating what "good" architecture is according to generalizing research. The guidelines as stated in laws such as PBL and BBR are there to "ensure quality", but can be argued to lose sight of the very essence of quality. Seen through the lens of Bornemark's (2019) theories, Ratio can only measure quality in numbers and quantifiable data, but qualities that cannot be checked off on a box does not have any value. For example, the minimum dimensions for housing as stated in BBR does indeed make sure that a wheelchair can turn around in all parts of every apartment, but it doesn't ensure that the residents feel love for their home, feel connected to their neighbors and feel like they can creatively affect their lived environment. Those values are too difficult to measure. The definition of dimensions for accessibility is Ratio trying to do good by implementing a guideline to ensure the best for people in wheelchairs. And while that is not a bad quest by any means, Ratio is by that incapable of seeing that it simultaneously is illegalizing downsizing and making a homogenous building stock in

which architects and residents can't define what they need, if what they need is less than that of a person in a wheelchair. Striving for inclusion without a balanced mind is in this way turned into exclusion.

Although modern housing ticks all the boxes decided to be "good housing", many are unsatisfied with the housing stock being provided. Recent critique against the present order is housing-shortage, lacking aesthetics, high price and lack of possibility to affect and personalize (Arkitektupproret, 2024; Olsson, 2020). The most urgent is however the destruction of the Earth's ecosystem caused by our depletion of resources and high emissions (Hedenus et al., 2018), perhaps caused by the objectifying dissonance from the interconnectedness of all of life. Even when realizing that our ways of life need to change, society (led by Ratio) keeps going down that same destructive path. Allowing for a way of design that was more responsive to the uniqueness of situations and people would cause potential chaos and redefinitions of what has been decided to be "good" versus "bad" architecture, which Ratio wants to avoid. But by creating guidelines and implementing building permits Sweden has created a system so strict it cannot allow for the creative investigation and reflection of Intellectus, even in a time that demands urgent change.

Seen through the lens of Rosa's theories, tiny houses are both reacting against and are a product of social acceleration. There is no doubt that the tiny house movement wouldn't look the way it does without being preceded by social acceleration. The vernacular architecture of old demanded a slowness of change and a valuing of traditions. In our fast changing modern society it is almost impossible to imagine how a certain construction and aesthetic of housing could have been almost unchanged for a millennia, such as it was with both the viking longhouse and the Swedish hut. Rosa (2013) explains that in times with little change, there was a natural respect for and looking to elders for advice, as they were the ones with the most experience. When building a house, for example, tradition and well tried out methods were the most probable way to succeed. Today however, the fast development of technology means a whole new set of skills are required every 2, 5 or 10 years. Rather than being the most experienced, elders are seen as "not keeping up". Instead, innovation and boldness is idealized in our society, meaning the young can continuously reimagine living. Modern self-builders of tiny houses borrow from a multitude of different traditions for its construction as well as its aesthetics. Its smallness and mobility refers back to traditional human housing, but it comes with its very own characteristics. Modern self-builders, as opposed to the traditional ones, are very free and experimental in their designs, and no house looks quite like the other. In this way, it can be said to be the pinnacle of modern individualism and social acceleration.

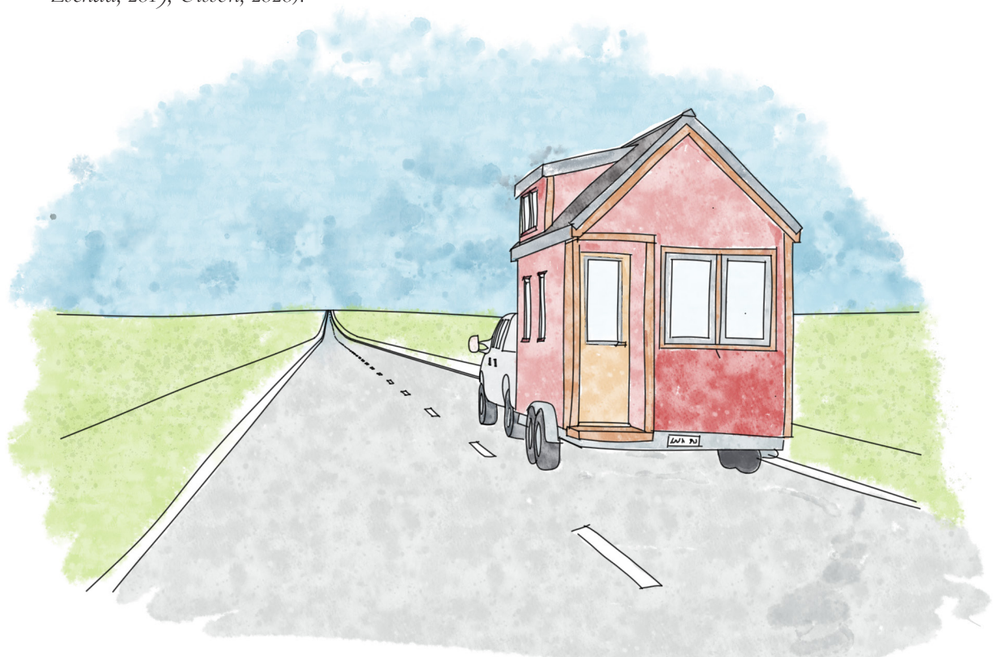
Simultaneously, the aim of building and living in such a house is often the opposite; with clear inspiration from different minimalist life-orientations, it's a reaction against the general societal development towards "bigger, faster, better". As Rosa (2015) points out, the promise of effectiveness didn't exactly lead to the relaxed and comfortable life it promised, as residents now simply have to stress about other things than their house, such as earning money to pay for the high standards and many square meters. The striving for more and better can be explained by a Ratio-dominated approach to life, as it can create an imbalance in the day-to-day life of ordinary humans so that quantifiable data such as income are valued higher than unquantifiable values such as meaningfulness, creativity and love.

Even though the downsides of modern life, such as personal burnout or the destruction of life in the biosphere, are well known, no fundamental changes are made. This can be explained by Ratio being unwilling or unable to redefine, rethink and change. Going back or reimagining new ways to live more in balance with nature and ourselves seem impossible in the fast phase that characterizes our society. It is as if though the "good life" has already been defined and cannot be otherwise. But somewhere in the cracks of the postmodern world, a tiny grassroot revolution of self-builders can be seen to sow small seeds of change by questioning the way we live, using their Intellectus to harvest the potential of social acceleration.

2.4 Motivations for joining the movement

In order for the actions taken to activate the potential of the movement to be relevant and effective, it is necessary to understand why people are joining the movement. This chapter therefore aims to understand who is involved in the tiny house movement and what their motivations are for doing so.

Choosing to explore the tiny house lifestyle is often preceded by some kind of life crisis, after which the person feels a need to revise their life choices (Mangold & Zschau, 2019). What has been assumed to provide happiness, and what actually does? What is a good amount of time to work, and what is a good enough house? When the mainstream way of working, consuming and living has failed, something new must be tried. As the title suggests, Mangold and Zschau (2019) summarizes the reason for "going tiny" as "In search of the 'Good Life'". It's a lifestyle pursued mainly by the middle class, and literature suggests that living in a tiny house is considered a way to lead a life with more autonomy, security, freedom, meaningfulness and decreased ecological footprint (Mangold & Zschau, 2019; Olsson, 2020).



Freedom and autonomy

One of the motivators for adopting the tiny house lifestyle found by research is to achieve "freedom and autonomy" (Mangold & Zschau, 2019; Olsson, 2020; Wilson & Wadham, 2023), which can be seen to underlie most other motivators. Mangold & Zschau (2019) mentions their participants feeling "stuck" "struggling" or "confined" in the conventional consumerist lifestyle, and sees adopting a tiny house lifestyle as a way to "get out" and have an alternative chance at finding happiness and a "good life". It's about exchanging the "have to" to a "want to" and be "true masters of their destinies" (Mangold & Zschau, p.19, 2019).

"They finally realized that the bigger-is-better philosophy everyone had told them to embrace turned out to be the root of their unhappiness" (Mangold & Zschau, 2019, p.7).

Adapting to the tiny house lifestyle can mean a life-changing event, where old truths and patterns are revised (Olsson, 2020) and empowerment and freedom is gained (Wilson & Wadham, 2023). Within the Ratio-dominated system, this kind of exploration is unappreciated and often even illegal. What the tiny house movement can be seen doing (under the radar of Ratio) is using their Intellectus to discover the shortcomings of the system, then re-examining and redefining the "good life" and the "good house" in more sustainable ways, whether it be personally or environmentally. The tiny house-movement shows a clear distrust in a rigid system, and would probably agree with Rosa (2015) that governments are not keeping up with the demand for change in a rapidly changing world. While tiny houses have been around for many years, they still exist in a gray zone law-wise (Olsson, 2020; Shearer et al., 2018), and will probably stay there for some time longer, since they don't fit in the mainstream concepts.

The anarchistic tendencies of self-building is arguably simultaneously one of the biggest strengths and weaknesses of the movement. Mobile, small, bottom-up and unique, it evades strict regulations and finds itself in a place where new dreams, ideals and ways of living can be tried out. The legal issues regarding building permits, minimal dimension of housing and sewage, to mention a few, however forces many to live in fear of "getting caught" (Olsson, 2020; Wilson & Wadham, 2023).

"I just know there's always the possibility that someone's going to report it" Kelly, 41 (Wilson & Wadham, 2023, p.342)

<u>Mobility</u>

Closely linked to "Freedom and autonomy", "Mobility" is deemed one of the most important aspects by Carras (2019) as well as Olsson (2020). It's a prerequisite for its ability to evade the law, as the house avoids initial building permits, and could move if noticed (Shearer et al., 2018). It's seen both as a freedom and an uncertainty to not be permanently placed (Olsson, 2020; Shearer et al., 2018). Finding a place to park the house can prove difficult in the first place, and many are thereafter dependent on "the kindness of friends and the ongoing indifference of planning departments" to be able to stay put (Wilson & Wadham, 2023).

A mobile living situation is an attractive choice in an accelerated society where no one knows what tomorrow looks like. A mobile house can adapt to climate change as well as need for change of location because of a new occupation or partner (Carras, 2019). It's a living situation that allows for an uncertain future in times of rapid and unknown change. It also allows for personal uncertainty and fluidity, as it makes it possible for its residents to "both own a house, yet not have to decide where to live" (Olsson, 2020).

Today, "digital nomadism" as a phenomenon is growing, with people working from home on their computer (Hely, 2023). Along with that the view on mobile architecture has gone from being seen as "less developed" or "primitive" to being "flexible and free" (Rosa, 2013). Perhaps it is another ideal created by social acceleration, the idea of getting the most out of life by not having to choose but instead to engulf in the ultimate art of multitasking; both living, working and traveling at the same time.

<u>Simplicity</u>

All tiny house dwellers in the studies of both Olsson (2020) and Mangold & Zschau (2019) mention "simplicity" as another motivator. Smallness goes hand in hand with the dimensions decided by vehicles, but the wish for simplicity exceeds that of space. Owning less is seen to be less stressful, less complicated and more efficient (Mangold & Zschau, 2019). Simplicity entails questioning materialist norms with clear inspirations from minimalist movements (Mangold & Zschau, 2019; Shearer & Burton, 2019).

"Because it's small, it's easier to oversee" Anika (Wilson & Wadham, 2023, p.339).

"It is this thing with reducing stuff. It's made me realize how much I think I need that I don't need" Pippi, 29 (Olsson, 2020, p.29)

"I don't like a materialistic lifestyle, that you always need to have more and bigger and higher. Achievement, perfection, growth, wealth. To me, living in a tiny house is kind of countermovement to say that you actually don't need a big house to have a good life" Anika (Wilson & Wadham, 2023, p.342)

Contrary to more idealistic movements such as Voluntary simplicity or Minimalism, the tiny house movement shows a more pragmatic approach to happiness, perhaps borrowing more from downshifters and downsizers (Mangold & Zschau, 2019; Olsson, 2020). Smallness and simplicity is not idealized, but chosen because it under the circumstances seems to be the best road toward personal happiness (Mangold & Zschau, 2019).

Tiny living is only partially a reaction against social acceleration. In a way, it utilizes the potential of a highly accelerated society to their benefit. The technological development was meant to provide time for people, but has paradoxically done the opposite (Rosa, 2013). But with more effective means of production, the possibility to get food and shelter while working less does exist, if only living a resourceful life. Reducing unnecessary consumption means an opportunity to take advantage of all the benefits of an effectively functioning system while partially distancing oneself from it. This non-revolutionary, semi-questioning approach has been criticized as a dependency on and exploitation of people who have made different life choices (Wilson & Wadham, 2023). Criticizing parts of the system, while being dependent on others, means the movement has little power to drastically change the general course of development (Rosa, 2013; Uggla, 2019). By experimenting with alternative ways of living, it could however be of importance in the shift towards more sustainable living. Promoting an attractive alternative to consumerism can tempt more people to reconsider their needs and pursue a more sustainable lifestyle. Instead of forever striving for growth and wealth, a tiny house suggests that "less is enough" (Wilson & Wadham, 2023).

<u>Sustainability</u>

Many build their own mobile tiny house as a way to take matters of sustainability into their own hands (Olsson, 2020; Wilson & Wadham, 2023). Even though the negative effect that the modern mainstream lifestyle has on the Earth is well known, politicians seem unable to radically change accordingly. Experimenting with simpler and more resource-efficient ways of living can be seen as exercising Intellectus' ability to reimagine the good life in ways more in line with the new situation. Lowering the carbon footprint and reducing consumption are often mentioned reasons for choosing to live in a tiny house (Olsson, 2020; Wilson & Wadham, 2023). The lack of idealism that characterizes the movement is however also evident in its approach to sustainability, as the choices are primarily argued for by personal gains (Mangold & Zschau, 2019; Olsson, 2020). In cases where solar power or carbon toilets are installed, the arguments to

do so are often based on personal freedom or lower costs rather than environmental gains (Mangold & Zschau, 2019). What is mainly pursued is "feeling good" rather than "doing good", meaning is primarily motivated by a personal pursuit of a happier life (Mangold & Zschau, 2019). It can however be discussed if Mangold & Zschaus' study (2019) reflects the mindset of the American tiny house movement specifically. Still, Olsson (2020) shows a similarly low focus on sustainability among Swedish tiny house owners, where about 30% mentions sustainability as a motivating factor.

"I wanted a reduced carbon footprint. I wanted to spend my life doing rather than having. I wanted a space that was aesthetically beautiful... that I felt I could stay in control of." Amy, 37 (Wilson & Wadham, 2023, p.331)

The lack of idealism can be argued to have pro's and con's when it comes to gains for the environment. It loses the moralization otherwise characterizing "environmental" movements, which could be a reason for its success in promoting a lifestyle that, regardless of main motivator, does lead to a lowered carbon footprint and less consumption (Carras, 2019; Olsson, 2020). Its focus on personal choice and increased happiness promotes a more sustainable lifestyle as something that is desirable instead of a compromise. However, without idealism the rebound effects can be greater and the choice of lifestyle a less permanent one (Mangold & Zschau, 2019).

<u>Economy</u>

"Economy" is the most mentioned factor for adopting the tiny house lifestyle in several research papers (Carras, 2019; Mangold & Zschau, 2019; Olsson, 2020; Wilson & Wadham, 2023). It is both directly seen as a "way out of debt" or to "reduce expenses". Living debt-free means the freedom to break free from oppressive structures of society in order to live a more rich and fulfilling life (Mangold & Zschau, 2019).

"It's time that I want. I want time to do what I want to do. But this is based on financial freedom. If you have that you can do whatever you want." Abbe, 29 (Olsson, 2020, p.27).

Tiny houses opens up an otherwise inaccessible housing market for more economically marginalized groups (Mangold & Zschau, 2019; Wilson & Wadham, 2023). It's a way of putting power back into the hands of those that struggle to find their place in the capitalistic world. In the USA, it is to higher degree used by those "in need" economically (Low Income Housing Institute, n.d.; Mangold & Zschau, 2019), but globally it's a dream mostly pursued by highly-educated, above average income citizens (Olsson, 2020; Wilson & Wadham, 2023). Although making possible a low-expense lifestyle that could alleviate financial stress, initial economic and social capital is needed to build the house (Olsson, 2020), why it has been criticized for entrenching rather than undermining class divisions (Wilson & Wadham, 2023).

Wilson & Wadham (2023) suggests that rather than the state providing cheap ready-made housing for the economically marginalized, perhaps one of the solutions could instead be to provide opportunities for the residents to create the housing themselves. Self-built mobile tiny houses can provide a higher level of affordability than mass-produced apartments in the suburbs, but does so while being a beautiful and attractive choice that puts power in the hands of the residents.

<u>New experiences</u>

The time gained from less work is instead possible to spend on activities that provide more happiness. All participants in Mangold & Zschau (2019) express a desire to "live life to the fullest" and be able to "pursue hobbies and passions". This doesn't necessarily mean less consumption, but a shifting from material to immaterial consumption (Mangold & Zschau, 2019). This can result in rebound effects and decreased environmental gains.

"I'm an experience person (...) I'd rather spend $2000 on a trip to South America than on a TV" Bernie (18-34) (Mangold & Zschau, 2019, p.14).

For others however, the time gained is spent pursuing a life more in line with the values of Voluntary simplicity (Olsson, 2020) - gardening, spending time in nature, hanging out with friends, developing hobbies and doing sports or meditating.

<u>Meaningful relationships</u>

Living tiny is seen as a way to increase family time as well as time to meet new people (Mangold & Zschau, 2019). The self-building aspect is an important factor in the increased feeling of community, as help from friends and family is often needed during construction (Olsson, 2020). Building together builds a strong base for friendship (Stenberg & Harling, 2022; Volny, 1976) and "it's not only about living small, but cooperating on a larger scale" (Olsson, 2020). Living in a tiny house also means being part of a movement.

"I feel included in some sort of movement, that it becomes a sort of community around the lifestyle and the life choices, so it's very easy to meet like-minded people through this" Jonathan, 36 (Olsson, 2020, p.34).

<u>Building and design</u>

"Building and design" is another natural motivator in a movement characterized by self-building. Many who adopt the tiny house lifestyle have a wish to customize and personalize their home (Olsson, 2020). 50% of the participants in Olssons study (2020) built their own home, and 30 out of 35 of the participants in Wilson & Wadham (2023) engaged in some part of the construction or design-phase of their house. Many express a desire to create a home that "works for them" (Mangold & Zschau, 2019). Self-building can result in increased self-esteem and sense of capability (Wilson & Wadham, 2023) and a way to be autonomous in terms of repairs and refurbishments (Olsson, 2020; Wilson & Wadham, 2023). Not paying others to build for you drastically lowers the price and availability of housing.

"I wanted to be quite self-sufficient in knowing that if something goes wrong with my house, I've literally built it, I can probably fix it." Aine, 47 (Wilson & Wadham, 2023, p.343)

Wilson and Wadham (2023) suggests that women are often framed as weak and incapable of tasks such as manual labor. Building your own house can in this way provide a sense of empowerment, increased self-worth and a capacity to reclaim control of their lives. Regardless of gender, building your own tiny house means reclaiming responsibility and influence over one's home. History informs us that house-building is an intricate part of being human that has gotten lost along the way of standardization and rational production. A more participatory building process would allow for engaged individuals to surface and reclaim responsibility for their built environment (Wilson & Wadham, 2023). Such a development would have to come from a general shifting from the blind belief in elitist specialism and towards a democratization of the professional skills.

2.5 How is the tiny house movement practiced in Sweden today?

Aiming to activate the potential of a grassroot movement means actions need to be implemented in a local context, why it is necessary to understand its unique situation and needs. This chapter therefore shows in what way the tiny house movement is practiced in Sweden today by showcasing examples of local organisations, projects and courses. It aims to give an overview of the Swedish branch of the movement and what it needs to develop.

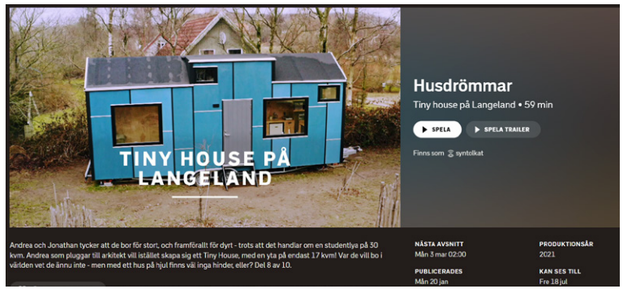


Figure 17: My own tiny house has been represented in both television (SVT Husdrömmar, 2021), radio (P4, 2022) and newspapers (Nybyggeri, 2021) (Expressen, 2021).

2.5.1 Actors and activity

The Swedish tiny house movement consists of private initiatives of construction, self-building organisations and companies building and selling tiny houses. It has been getting known to the public through social and mainstream media, which is propelling the interest in and growth of the movement. As there is no umbrella organisation, it is impossible to say how big the movement is.

Some of the articles published in mainstream media within the last few years are "Many long to build their own little hideaway" (DN, 2024a), "The interest is growing for living in small spaces in self-built tiny houses." (BTF, 2021), "She's building her dream house - on 24 m²" (DN, 2024b), "Sofia (38) built her own 'Tiny house'" (Skövde Nyheter, 2024), "Linda sold the house - built a tiny house with her daughter" (SVT, 2023a), "Viktorias tiny house is made from reclaimed materials and is low cost; 'I wanted to downsize'" (SVT, 2023b), "Katrin thrives in her tiny house in the middle of nature." (Ahlberg, 2023).

Although the articles mentioned are only a small part of the articles published in the last few years, it's enough to hint that the tiny house is something that fascinates and inspires many, also on a general public level. The tiny house is portrayed as an achievable dream, possible to pursue regardless of gender or age.

Apart from mainstream media, many of those building a tiny house share their stories on social media such as Instagram and Facebook. People interested in the phenomenon or in building something themselves can "follow" other examples. Experiences of building and living small are thus shared within the community and within society at large.

2.5.1.2 Swedish self-builders

Figure 18: Erika developed increasing allergies in conventional houses, and attempted to build her own tiny house with non-toxic materials. She shares her story on the instagram account @erikastinyhouse

Figure 19: David and Eliza run the off-grid homestead "Humble Habitat", where they hold courses in tiny house construction and solar energy. They aim to work "towards true sustainability and regenerative living systems." (Roxproductions.se, 2025) and share their story on Instagram @roxorama

Figure 20: Filip and Petra build their tiny house for "the freedom to choose, to stand on our own two feet and be creative in community with like-minded people. The challenge gives us the reward we seek: a safe, natural place from which to build on our future." (F. Coxner, personal communication, 13 May 2024)

Figure 21: This tiny house situated outside Uppsala, Sweden is self-designed and self-built. The process from trailer to finished house and took two years and can be seen on Instragram @erimitaget. It's made using a high degree of reused-, and natural materials.

2.5.2.2 Aided self-building

BOBINI

Location: Gunnilse, Göteborg
Members: 250 (2025)
Activity: Tiny house construction site, self-building courses, political advocacy, co-op projects with other organisations, innovative building solutions, reused materials, working for a tiny house village combined with local small-scale farming

EGNAHEMSFABRIKEN

Location: Tjörn
Members: 600 (2025)
Activity: Tiny house construction site, research, community building activities, events, political advocacy, co-op projects with other organisations, working for a tiny house village on Orust

For those wanting to live in a tiny house, there are several roads towards fulfilling that dream. Several companies are offering ready-made tiny houses. As some don't involve any kind of self-building they are not relevant for deeper investigation by this thesis. Many companies however offer to build a tiny house for their client according to their wishes. While not providing the advantages of self-building such as increased confidence and lowered price, some level of self-design can still result in a personalized and unique house for those that don't want or can't build a tiny house for themselves. Fabian Bräuer from the tiny house-building company Treesign explains that he always builds uniquely according to the clients needs (Personal communication, 15 April 2025). Jan Wiechmann has been building mobile houses for over 30 years, but has recently begun to offer his clients to join in during the construction. He explains that the interest for it has grown in the last years as a way to reduce the price and get more of a relationship to the finished house (personal communication, 23 Mars 2024).

For those wanting to build themselves, it can be done privately (with help from family and friends) or with help from an organisation. Due to the mobile nature of the houses, many dare to start a project without a prior building permit, allowing for it to take place in private gardens or other sites that need not necessarily be the final destination of the tiny house (SVT, 2021).

Two local organisations specializing in self-building of mobile tiny houses are Bobini and Egnahemsfabriken. In close proximity to their workshops it is possible to rent a space for building your tiny house and simultaneously receive professional help.

Figure 22: The houseboat "Anna" was a EU-financed co-op project organised by the French organisation Catorze and local self-building organisations Bobini and Egnahemsfabriken, among others. During cooperative building-evenings a house boat was built (Husbåten Anna – Egnahemsfabriken Tjörn, 2022.)

2.5.2 Self-studies for self-builders

Those wishing to build entirely by themselves need to gather the necessary information. Some have a previous education in carpentry or architecture, but the movement also attracts many who completely lack any experience from the field. The alternatives available for attaining the necessary information is either by self-study or by attending a self-building course.

Many resort only to self-studies. There are several books on tiny house-construction from the USA (Louche, 2016; Marshall, 2019). The means of construction, the laws and system solutions are however so different from a Swedish context that the books can only offer general knowledge or function as inspiration. There is as of now no Swedish books specifically aimed at tiny house construction.

Youtube is another way to get instructions for how to build practically. Most every step of construction can be found searching for suitable phrases such as "Installing a roof" "Paneling" "Attach window" etc. While not giving hands-on experience, it does make construction available for anyone who has the time to spend to learn.

Furthermore groups on Facebook such as "Tinyhouse i Sverige" (with 17 900 members January 2025) and "Tiny house community Sverige" (with 10 500 members January 2025) and different blogs on construction such as "byggahus.se" are used by aspiring self-builders to discuss problems and out-of-the-box solutions as well as give each other tips about new products or possible places to rent a space for ones house. The joint creativity and free sharing of experiences can not be assumed to always provide well functioning solutions, but lots of inspiration.

It is apparent when spending time in the tiny house community and reading through posts at Facebook groups that the amount of time and energy a completely inexperienced self-builder has to give to properly understand design, construction and the relevant laws is holding many back from attempting to follow through on the dream of building a tiny house. This leads me to the conclusion that more easily available information would make it considerably easier to join the movement. I know from experience how much time it took to get into the vast theory, even with the bachelor in architecture that I had upon starting my project.

A good handbook sould be both relevant and easy to read, and contain an introduction to everything a self-builder needs to know before starting their projects.

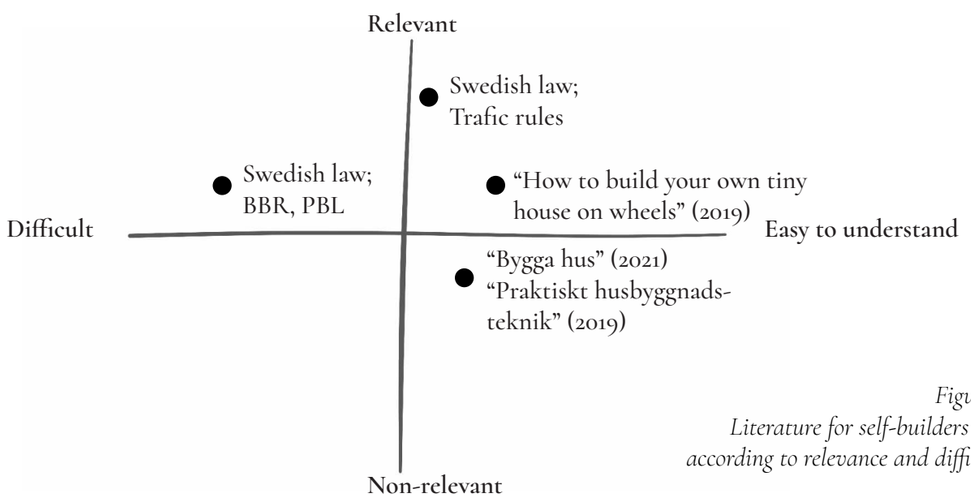


Figure 23: Literature for self-builders rated according to relevance and difficulty.

2.5.3 Self-building courses

A few recurring self-building courses for tiny houses have been appearing around Sweden in recent years, for example by self-building organisations such as Egnahemsfabriken and Bobini, but also private ones, such as held at Humble habitat. The self-building courses available teach construction and in some cases theory regarding construction or building permits.

I participated in two local self-building courses in order to learn how self-building was taught and who the self-builders were. Participating provided insights into what questions are asked by the participants and how they evaluate the courses and means of learning. Observation and insights have been gathered in a field diary as Appendix 5(a&b).

"Build a mobile hen-house"

Type: Online
Location: -
Application: Web page of Länsstyrelsen
Participants: 14 (out of 14 applicants)
Price: 500 SEK
My role: Participant
Duration: Spring 2024
4 evenings 18-20.30
- 22 Januari
- 19 Februari
- 4 Mars (moved to 8 April)
- 8 April (moved to 26 August)

The course was a collaboration between Egnahemsfabriken, Länsstyrelsen and several interest organizations. It was financed by the European Union and Svenska ägg. The focus of the course was to build a mobile hen-house as a way to encourage small-scale organic hen farming as a means for sustainable development. The design was made by the architects at Egnahemsfabriken in close collaboration with an organic hen-farmer. In the form of online evening lectures and digital material such as a step-by-step guide, the participants were encouraged to build-along from home and share their experiences with each other online.

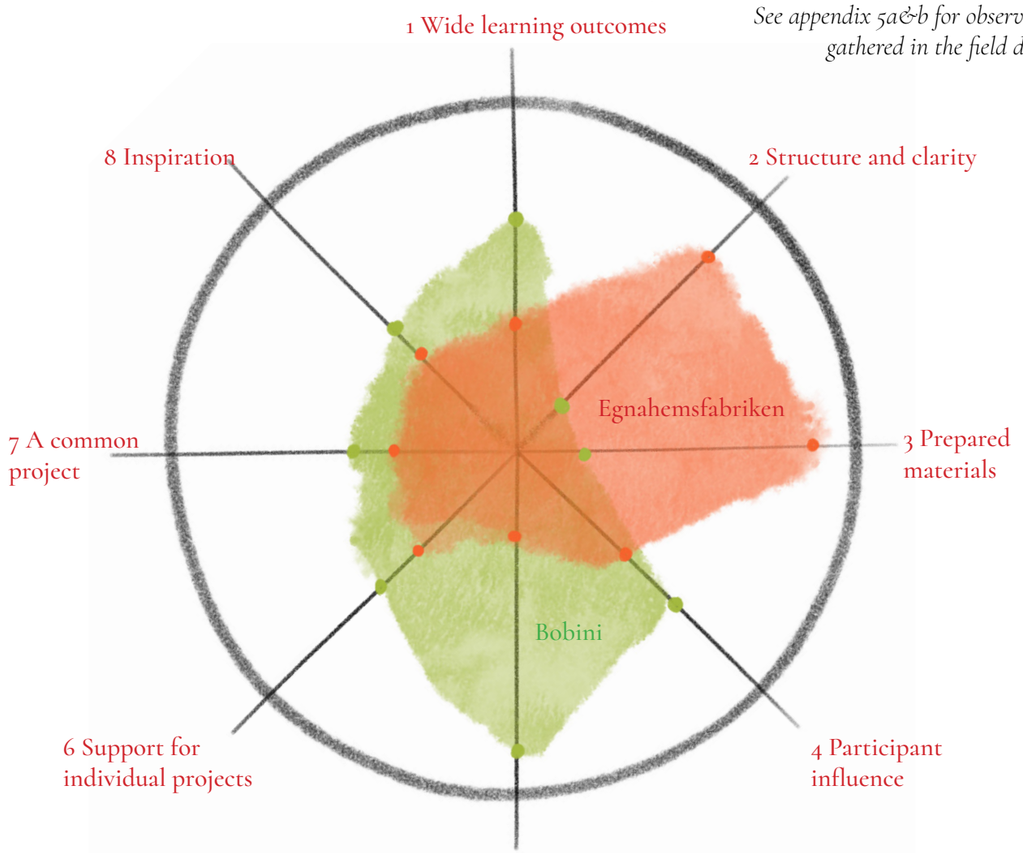
"Learn to build tiny houses"

Type: On-site
Location: Gunnilse
Application: Web page of Angereds folkhögskola
Participants: 12 (out of 41 applicants)
Price: 2500 SEK (I went free)
My role: Participant and teacher in design workshop and SketchUp course
Duration: Spring 2024
6 weekends 9.30-16
Every fourth weekend starting 3 February

The course was a collaboration between self-building organisation Bobini and Angereds folkhögskola. The course had run twice before. As a long time member of Bobini and with the possibility of me holding a lecture or two during the course, I was allowed as a 13'th participant for free. The course took place in the workshop of Bobini, an old car garage surrounded by several half-finished tiny houses. The course taught construction by allowing its participants to practice construction on the third party tiny houses on site under the guidance of two carpenters.

2.5.4 Comparison courses

Figure 24: In comparing the two courses I found that 8 parameters were relevant for a successful course. Red indicates Eganhemsfabriken and green Bobini. The further out on the circle, the higher the rating. The rating is based on my own experience and evaluations from the participants. See appendix 5a&b for observations gathered in the field diaries.



Relevant information shared in the two courses:
- Construction - how to build a house
- Introduction to tools and safety
- Build with new and reused materials
- Design workshop
- SketchUp course
- Basic theory (laws, ventilation and moisture, dimensions for interior planning, what screws to choose)
- Online materials (step-by-step-guide, price- and time calculation, drawings)

Asked for/missing information:
- To build a tiny house from start to finish
- More theory - not just touching on things on surface but getting more in-depth knowledge (laws and rules for trailers and buildings, construction, system solutions including electricity, toilets, water and heating)
- Theory gathered as downloadable material (handbook)
- More focus on participants' projects, including design and price- and weight estimations

2.5.5 What makes a good course?

1 Wide learning outcomes
Those attending a tiny house-course want to build a tiny house. Thus, everything you need to know to do so should be included in the learning outcomes. This means the course should cover both how to design, theory and of course every step of how to build. Egnahemsfabriken provided enough theory to construct a house, but lacked the practical experience due to it being online. Bobini had the advantage of on-site construction but halted in theory. A mixture of online theory and on-site construction would provide the participants with a wide toolbox with all the relevant learning outcomes.

2 Structure and clarity
The course needs to be well planned and information about it needs to reach the participants. The two courses were very different in terms of structure and clarity. Egnahemsfabriken had prepared materials and daily schedules, while Bobini improvised day by day and had nothing planned. While the structure provided by Egnahemsfabriken was better, both courses failed to deliver what they promised because they relied on third party tiny house owners or on the participants of the course to get something built. It leads me to conclude that top-down planning and scheduling is needed to guarantee a qualitative course, but must be implemented in combination with the teachers being in power to ensure the follow-through of that plan. Information needs to reach the participants continuously and surely, such as by mail, chat, online Drive and printed materials.

3 Prepared materials
Having prepared materials that are readily available for the participants makes it easier to get an overview of the course as well as of the building- and design process. Being able to access the material after the course also enables re-learning and remembering after the course has finished. Bobini had no materials prepared which made it more difficult to visualize what the teachers were talking about and to remember it afterwards. Egnahemsfabriken had excellent materials prepared. On the online Drive the participants could access professional drawings, a SketchUp model and a step-by-step guide of the hen-house, along with excel sheets with calculations of price and time. Other than that, the participants would benefit greatly from material on all other relevant theory, such as in a handbook covering what a tiny house is, relevant laws for buildings and vehicles, design guidelines, system solutions and construction theory.

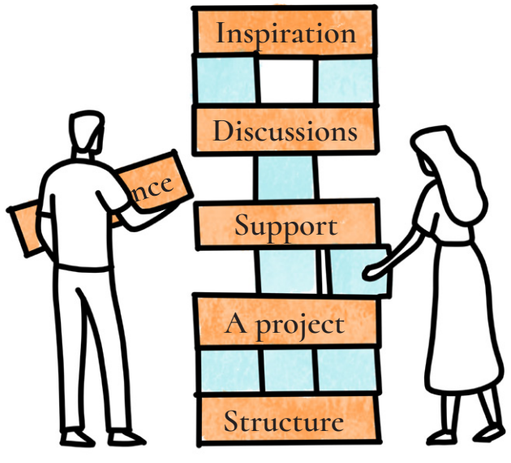
4 Participant influence
A balance in top-down planning and being open to suggestions should be aimed for. A well planned schedule should be able to be tweaked to accommodate requests. In order to be able to let participants influence the outcome of the course, the teachers need to have established a culture that allows for students to make suggestions and for the teachers to be in control of how the course develops. Bobini aimed for high influence, enabled through daily check-in/check-out sessions. In reality, it got confusing for the participants and the actual possibility to affect was small. The online format of Egnahemsfabriken's course made it difficult to create a discussion open enough for people to make requests, but small changes such as changing the date of the two last meetups to better fit the speed of progress was made.

5 Informal discussions and collective problem solving
Building together is a social activity, where informal discussions and collective problem solving is a big part of learning. A good course should enable the participants to make friends, have a good time and learn in a relaxed and open environment. Egnahemsfabriken struggled with the social aspects as the online format made it difficult to talk in smaller groups or even dare to ask questions. Bobini focused a lot on interpersonal relationships and the growth of the individual. They managed to create an open environment through non-authoritative teaching, daily check-in/check-out sessions and a loose schedule. It became clear how important it is to encourage dreams and reevaluations during the course. It's not just about building, but in order to harvest the potentials of the tiny house movement it is equally important to encourage new ways of thinking. The social aspects however need to be balanced with teacher-led construction and prepared solutions.

6 Support for individual projects
Given that most who participate in a tiny house construction course do so because they want to build their own tiny house, support for the development of the participants individual project should be an integral part of the course. This could be done by having workshops, providing prepared materials (such as budget templates), teaching tools for sketching (such as SketchUp) and by facilitating group discussions about their projects. Egnahemsfabriken provided a lot of materials and were supposed to have offered individual tutoring. Bobini briefly presented a 10-step program to aid in the planning process, but it could have been even more integrated into the course.

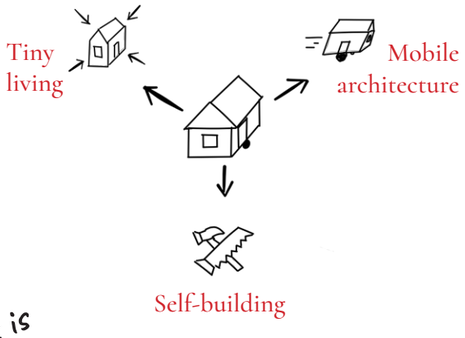
7 A common project
In order to go through every step of construction from start to finish, the teachers need to be in control of what is built. Egnahemsfabriken relied on the participants to build and share their progress. Bobini relied on third-party owned tiny houses, which put others in power of when and if things were getting done. The slowness of the construction is probably the main reason why people were dropping out of both of the courses. Following a project throughout the course that is planned and organized by the teachers allows for the participants to learn things in the right order and to test all stages of construction, from framing to interior, and in the end feel like they created something together.

8 Inspiration
The self-builders benefit from being exposed to inspiration to be able to dream, visualize and come up with out-of-the-box solutions. Bobini offered site-visits during the course, and the participants got to partake in the creation of several tiny houses around the workshop, hearing about the dreams and goals of those owners. It acted as inspiration and to see what's possible.



2.6 Summary and takeaways

By means of literature studies and participant observation from within the movement, the chapter has attempted to give a deeper understanding of the history and contemporary relevance of the tiny house movement, what the possible gains and issues are connected with it, who is involved in the movement and for what motivations, and what is needed for the movement in Sweden to grow. This summary is meant to give an overview of the takeaways, forming the criteria for further research.



What is it?

(Olsson, 2020):

- A standalone structure of less than 400 sq.ft. (about 37 m²)
- Intended as a long term residence
- Typically built on trailers or otherwise moveable
- Some level of self-building involved

The 3 concepts constituting the self-built mobile tiny house are all deeply rooted in the history of architecture. The first modern tiny house was built in 1997 (Shearer & Burton, 2023). It combines the strengths and counteracts the weaknesses of the three concepts. It's promoting individually unique designs and small-scale self-building, developed according to the dwellers' needs.

What attracts people?

- Freedom and autonomy
- Mobility
- Simplicity
- Sustainability
- Economy
- New experiences
- Meaningful relationships
- Building and design

What does it have to do with sustainability?

- Challenging unsustainable thought-patterns
- Not held back by norms, legislations and other actors
- Able to change faster than the system does
- Small size means reduced use of resources and consumption
- Shifts focus from material to immaterial values

= Redefining "the good life" in equally attractive but less emissive ways

How could it be encouraged?

The self-builder needs:

- Practical experience in building
- Knowledge of relevant theory and support in the design process

This could be provided through:

A self-building course

A handbook

A design to build during the course

How could the potential of the movement be activated?

The tiny house movement is creating a lot of interest, also from the general public (p.43). My research indicates that what is halting the growth of the movement, and by that also the possibility for it to influence architecture in a more sustainable direction, is the difficulty for aspiring self-builders to acquire the necessary knowledge and skills. Self-builders need a wide set of skills to go from idea to finished building, that in our professionalized society are unavailable for the common person. The research indicates that the self-builders need theoretical knowledge, knowledge of how to design and plan a project, and finally hands-on knowledge of how to build and use different tools. Moving from theory to practice, I therefore set on the task of mitigating these hindrances in an attempt of activating the potential of the movement.

I see a lot of potential in meeting my goals by starting a self-building course. Participating in self-building courses gave me good insight into how these skills can be taught (appendices 5a&b). In developing a new course, I'm therefore guided by my theory of the 8 important parameters (p.48). Step 7 - "A common project" indicates the need for a design to be built during the course as a way to ensure that something new happens every meetup, and to give the participants the chance to test all aspects of construction. As my research indicates that relying on third-party construction can be risky (appendix 5a&b), the safest way to ensure quality is for the course-organizers to be in control of a house being built. I therefore see the necessity to develop a design to be built during the course.

I could either organize some kind of co-design at the start of the course, or design something myself prior to course start. I examined the process of co-creation but deemed it to be too time consuming (Stenberg, 2020). Not being able to finish drawings or purchase materials until the collective design was done would also be a struggle timewise. By designing prior to the course, I could pursue more time-consuming aspects such as creating a step-by-step handbook to more pedagogically communicate how to build the house, and to focus on collecting reused materials to lower the emissions. Designing myself would also give me the chance to explore more radically alternative means of construction (on a general- as well as detail scale) that could better fit the needs for a tiny house than conventional construction. I therefore arrive at the conclusion that the best course of action would be to attempt to find the funds for managing the project myself, and to finish all the preparations before the start of the course. Being economically responsible, I will also be the one to manage the house afterwards, which could be advantageous if wanting to exhibit it at Chalmers or other venues.

Apart from merely teaching hands-on building skills, the research suggests that the course needs to be complemented with theory-lectures. The necessary theory is difficult to get by as there is no coherent literature for tiny house construction in a Swedish context (p.46). Doing the research in order to start a project is therefore a time-consuming exercise and a task that it can be assumed not everyone feels capable of taking on. By gathering all the necessary theory and communicating it in a pedagogical way, the stepping stone for joining the movement could effectively be lowered. My research therefore proposes that a handbook could be an effective tool to activate the potential of the movement, and that the theory compiled could be taught during the course.

Finally, my research suggests that the course should provide support in the planning-, and design-processes of the participants, for which the "10 steps" and the design workshop in the course by Bobini could be further developed (appendix 5a).

The following pages provide a brief summary of what the research in Part 1 indicates are important aspects for respectively the handbook, the course and the design.

What makes a good course?

A successful self-building course should include these 8 parameters:

- Wide learning outcomes - The course should include a wide set of learning outcomes, including how to design, relevant theory and every step of how to build a tiny house. It could benefit from being a mix of on-line/on-site.
- Structure and clarity - The course needs to be well planned, present information in a logical order and be well communicated.
- Prepared materials - Materials such as drawings, a step-by-step guide, a handbook on all relevant theory and excel sheets for budget calculations should be available.
- Participant influence - It is important to allow participants to give feedback and for the teachers to be in power to change the course according to that feedback.
- Informal discussions - It is important to work for an open and friendly environment that can facilitate collective problem solving and a sense of togetherness.
- Support for individual projects - As all participants want to build a tiny house themselves, the course should be planned to support their development.
- A common project - In order to go through every step of construction from start to finish, the teachers need to plan and decide over a tiny house to build during the course.
- Inspiration - The self-builders benefit from being exposed to inspiration to be able to dream, visualize and come up with out-of-the-box solutions.

What does the handbook need to cover?

The handbook needs to cover all the theory necessary for a self-builder to construct a tiny house in an easy-to-read manner. According to the research it should include:

- Support for the planning process - A step-by-step program aiding the planning of a tiny house, including tactics for going through a successful downsizing process.
- Construction principles - Basic knowledge about construction principles allows the self-builders to understand and be creative with their design in a safe and durable manner.
- Sustainability tactics - Knowledge needed to make sustainable choices, such as the environmental impact of different materials.
- Laws and rules - All relevant laws and rules regarding vehicles and buildings should be listed and explained.
- Energy and system - The self-builder needs information about insulation, heating, ventilation, electricity, solar power, mobile toilet solutions, water installations and sewage.

What makes a good self-built mobile tiny house?

The design of the tiny house should be prepared before the start of the course, and be visualized in drawings as well as in a step-by-step handbook. The teacher needs to be responsible for the whole chain of construction to be able to plan, to ensure development and to be able to adjust the course according to feedback. The design needs to reflect the motivations of those wishing to join the movement, while being adapted to fit the requirements of being built during a course. Based on the research, it can be concluded that building and living in a tiny mobile house should be an Intellectus-rich experience where norms and needs are revised and minimized. The house should enable a modern life open for all possibilities; a life characterized by freedom, autonomy and flexibility. The house should be able to move - whether it's because of changing life situations or a future climate crisis. Both the construction-, and the living-phace should be a rich experience full of meaningful activities and connections with other people. Although a personal choice which can result in many different architectural designs, general design guidelines can be summarized as follows:

- Low price - as financial freedom is the most mentioned reason to adopt the tiny house lifestyle, the price for building and living must be low to be attractive. Standard construction costs 45 859 SEK/m^2 (SCB, 2023) and a tiny house could aim for at least half of that, with reused or low-cost materials perhaps going as low as below 10 000 SEK/m^2.
- Minimal dimensions - As most of the environmental and economical benefits of the tiny house are connected to its size, it's important to cut away excess space.
- Fulfill the needs of the habitants - A house not sufficiently fulfilling everyday needs won't create the sense of "less is enough", rendering it useless as a long-term housing solution. The needs will differ from person to person, but should reasonably at least provide a bathroom, storage, possibility to sleep, eat, work, hang out and pursue hobbies. The level of comfort, including system-solutions, can greatly vary from "very simple" to "very comfortable".
- Mobility - The tiny house needs to be relatively easily to move to enable off-site construction and possibility to move in case of changing life situations. For high mobility a lightweight construction is needed.
- Creative design - The tiny house is a reaction against standardized solutions, instead putting the individual in charge of how they want to live. Individual solutions and aesthetics are paramount to being content on less space. Self-builders should be encouraged to exercise their Intellectus and dare to go for out-of-the-box solutions.
- Simple construction - The construction needs to be easy and intuitive enough in order for it to be built by non-professional self-builders. This means using easily available materials and tools as well as avoiding complicated solutions. It needs to be structurally stable and safe for use.
- Environmentally sustainable living - For many, adopting the tiny house lifestyle is a way to lower their carbon footprint. This can be done by building with materials with a low carbon footprint or using reused materials, and having a design that encourages a life of less material consumption.
- Inspire to a more meaningful lifestyle - The house should actively be promoting an anti-consumerist lifestyle, inspiring to pursue more meaningful, non-material activities. This can mean space to hang out with friends, a parking spot close to nature or a community, or perhaps aesthetics that encourages stillness and reflection.

Part 3

Creating the course, the handbook and the design

Based on takeaways and conclusions from Part 2, Part 3 covers the development of a self-building course, a handbook in tiny house construction and the design of a mobile tiny house. It aims to continue exploring the research question "What skills are needed to build a sustainable mobile tiny house and how can they be pedagogically communicated to self-builders?" and the research question "What is a suitable design for a lightweight, easy-to-construct, low-cost, sustainable mobile tiny house?". The overall aim of the outcome is to enable the tiny house movement to make a positive impact on the development towards a more sustainable architecture by actively mitigating the hindrances found to be holding the movement back.

3.1.1 Collaborations

The research in Part 2 informs me that a suitable course of action in order to activate the potential of the tiny house movement would be to hold a self-building course.

I started with contacting Bobini and Angereds folkhögskola and asked about possibilities of a collaboration. Bobini being an organisation for self-building and experimental architecture, and Angereds folkhögskola interested in continuing to have self-building courses, both parties were eager to do what they could to support my project. The course I attended as part of my research in 2024 was still under development. We agreed for me to take over the course and use it as a testbed for my research, as a means to develop the course to be better for the future. Taking over an existing course meant that the general structure was already in place, although I could twist, add or remove some few things. The location was to be the same, meaning the workshop of Bobini. One of the advantages of cooperating with the school was their ability to fund rent and salaries.

Initially, the plan was for one of the original teachers to be my co-teacher, but in September 2024 he declined. Looking for a new one, I wanted someone knowledgeable in carpentry as well as teaching, as that's where I lacked professional experience. I decided on Andreas Börjesson, whom I had met several times during tiny house-conferences in the last years. He has a nearly perfect resumé, being both a professional carpenter, teacher, having a bachelor in architecture and many years experience in teaching carpentry. He himself lives on a self-built house boat, and lately held the self-building course "Husbåten Anna" mentioned on page 45. He was more than interested to participate, and also provided a lot of valuable input regarding the course planning as well as the design.

3.1.2 Funding

I needed to find funding to cover the cost of the materials. I searched online for funds available for architecture students. It was scarce, as most of them specifically couldn't fund building materials. I ended up applying to broader funds where the connection to architecture was weaker. I applied to 4 funds and got granted two (see figure 25). There were a few options I chose not to pursue, such as being funded by construction warehouses, since perhaps they would demand their logo to be published and their materials to be used, which could affect the final outcome. In the end, I gratefully received funds for a total of 65 000 SEK, amounting to the maximum total budget of my design.

Fund:	Applied:	Granted:
Estrid Ericssons stiftelse	21 000	10 000
Irisstipendiet	55 000	55 000
Längmanska kulturfonden	25 000	0
Helge axel jonsson stiftelse	10 000	0
		= 65 000 SEK

Figure 25: Funds applied for and granted, the biggest contributor being Irisstipendiet.

Figure 26: My two partners for the course were Bobini and Angereds folkhögskola.

Course info:

Type:	On-site + online
Location:	Gunnilse
Application:	Web page of Angereds folkhögskola
Participants:	10
Price:	3000 SEK
My role:	Teacher and researcher
Duration:	Spring 2025 7 weekends 9-16 (every third weekend) + 9 online lectures 18-19.15 (every other week)

The 10-step program:

1. Define your needs
2. Find reference projects
3. Sketch and model
4. Calculate budget
5. Plan: where, when, with who?
6. Learn to build
7. Make building plan
8. Find materials
9. Build your house
10. Find a place to live

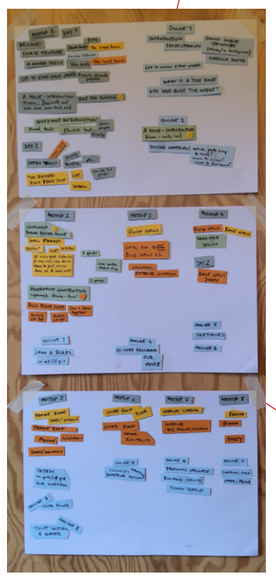
8 parameters for a good course:

1. Wide learning outcomes
2. Structure and clarity
3. Prepared materials
4. Participant influence
5. Informal discussions and collective problem solving
6. Support for individual projects
7. A common project
8. Inspiration

3.2 Course development

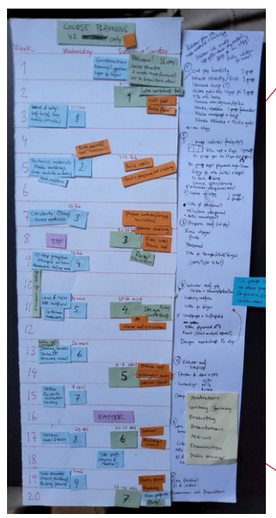
My aim for the course was to empower and enable the participating self-builders to actively take part in the architectural development towards sustainability by enabling them to design and build their own tiny houses. I therefore wanted the course to give the participants everything they needed to know to be able to create independently. In other words, I wanted the course to cover most relevant theory and provide practice in construction by building a tiny house from start to finish. I also wanted to include support for the participants' individual projects. In Bobini, they used a "10-steps toward your own tiny house", which I developed further and decided to loosely base the course on as a way to support the participants' planning processes. We would however only be able to cover some of the steps during the course (shown in black as opposed to grey in the figure to the left).

I base the structure of the course upon my previous research and the 8 parameters I found to be important aspects in developing a good course. I take a lot of inspiration from the courses I attended, trying to take the best from both and adding what I found was missing. As the research informs would be beneficial, I aimed for a well-planned and structured course. The development started with me writing down all important aspects I wanted the course to cover. I estimated the maximum capacity of participants in the workshop to be 10. I attempted to estimate the time it would take for construction from start to finish for the 10 participants, and realised that 7 building weekends would be necessary. I wanted to include all the necessary theory, while not wanting to take too much time away from the weekends. I therefore decided to place the theory as online evening lectures in between the building weekends, amounting to 9 lectures.



As a first step all aspects of the course were written down and sorted in color and logic order.

For a while, I considered building two houses (orange and yellow on schedule) - one experimental and lightweight, and one with only reused materials. I later left the idea for a more focused course.



The final schedule contains 7 building weekends and 9 online lectures, during which the participants get to build a tiny house from start to finish as well as prepare their own future projects.

Lectures

B1 - Introduction and floor
Presentation of course structure and teachers. Tools and safety. We build the floor.

T1 - What is a tiny house?
The history behind small, mobile, and self-built houses. The relevance for the environment.

T2 - Houses that last
A short course in construction theory and the functions of a building envelope.

B2 - Walls
Cut out the exterior and interior cladding. Insulate and assemble the walls.

T3 - Circular construction
Alf Andersson talks about building with recycled materials.

B3 - Taklagsfest / Roof party
We raise the walls and build the roof. According to tradition, a roof-raising party is held!

T4 - 10-step program
Introduction to the 10-step program and how you can work with it, before the design workshop.

T5 - Rules for vehicles and buildings
Review of relevant regulations for the house (trailers, accessibility, and building permits).

B4 - Roof + Design workshop
We continue building the roof and hold a design workshop where everyone creates a floor plan.

T6 - Sketchup 1
As a follow-up to the design workshop, we will learn the 3D-modeling program SketchUp.

B5 - Window and door
We finish the exterior and install the windows and doors. The construction of the interior begins.

T7 - Sketchup 2 och budget calculations
We learn how to export drawings and create budget calculations using the SketchUp-model.

T8 - Houses that function
Energy balance and system solutions including electricity, water, sewage, toilets, heating systems.

B6 - Interior and systems
The construction of the interior continues, and we begin the installation of electricity and water.

T9 - Study visit
Studyvisit in my tiny house!

B7 - Presentation of projects
Presentations of individual projects. We finish building the last details and hold a celebration!

Timeframe

The online lectures held every other Wednesday evening supports what's done on the weekends.

The beginning of the course gives the participants basic knowledge about tiny houses and construction.

Before the design workshop, the participants get started on the 10-steps and get an introduction to relevant laws and rules.

The design workshop is followed up by a SketchUp-course and how to calculate a budget

A visit to my tiny house to inspire the participants.

Spring 2025 week	Theory Wednesday 18-19.15	Building weekend 9-16
1		
2		11-12 jan **B1**
3	15 jan **T1**	
4		
5	29 jan **T2**	1-2 feb **B2**
6		
7	12 feb **T3**	
8		22-23 feb **B3**
9	26 feb **T4**	
10		
11	12 mars **T5**	15-16 mars **B4**
12		
13	26 mars **T6**	
14		5-6 april **B5**
15	9 april **T7**	
16		
17	23 april **T8**	26-27 april **B6**
18		
19	7 maj **T9**	10-11 maj **B7**

We do something new every building weekend, such as the floor, then the walls, then the roof... If we don't finish in time, I take half a day building to make sure we're on schedule. This ensures that there is always something new to look forward to.

A roof-raising party!

With some experience behind them, the participants start to design their own tiny houses.

Design workshop

Before we do system-installations in the tiny house, we have a lecture on the subject

In the end, the participants get to show their projects to another, and celebrate their progress!

The application process

The course was published on the web page of Angereds folkhögskola at the end of September 2024. An application form could be reached via the web page, where the applicant got to reply to a number of questions. As participants were dropping out of the two self-building courses I attended, I felt it important to find the most motivated this time. Furthermore, I wanted to make sure that all participants had a project in mind that they could work on during the course. At the end of the application period, 1 December 2024, the course had received 44 applications.

During the application process, I read through all the applications and roughly sorted them in more or less suitable for the course. About half were disregarded due to only "wanting to get better at carpenting" or answering things like "It sounds fun" when asked to give motivation. I furthermore aimed for a somewhat even distribution of age, and wanted the distribution of gender to correspond to that of the application (1/3 men, 2/3 women, 1 binary). It was clear to see that it was generally younger women (average below 35 years) and older men (average above 35 years) applying. As per rule set by Angereds folkhögskola, everyone from north-east Gothenburg were given a spot (2 people) and everyone with a non-European name (1 person).

Good communication being an important aspect of a successful course, I set up a google drive. A folder was created for each aspect, such as "course planning" (containing the schedule), "drawings" (containing drawings, a step-by-step-guide and a SketchUp file for the design) and "The handbook". A folder for each online lecture was created, where a recording of the online presentation would be made available after each lecture. An invitation to the drive as well as an invitation before each lecture or building weekends were sent out by mail. Before the course started, the participants were also invited to a WhatsApp group for quicker sharing of information and feedback.

The application:

- First and last name
- Home address
- Phone number
- Briefly answer: Why are you applying for the course? Are you planning a project?
- Briefly answer: What are your expectations?
- Briefly answer: Do you have any previous building experience?
- NOTE! The course is part of a master's project at Chalmers, and as a participant, you will be part of the research. By participating in the course, you agree that anonymous data will be collected and presented in the project. Online lectures will be recorded and made available to participants after the lecture. Clips from these may also be used as documentation in the project, along with short video snippets from the building activities. No images that clearly show faces will be published without participant consent. The course is planned for all 10 participants to attend the building weekends. If you already know that you will not be able to attend several of the weekends, please give your spot to someone else! Have you received and accepted the information?

The course drive:

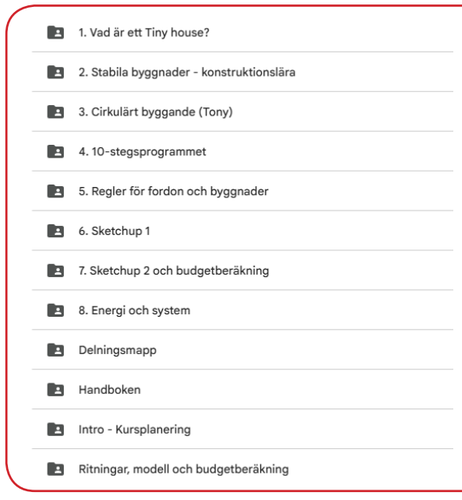
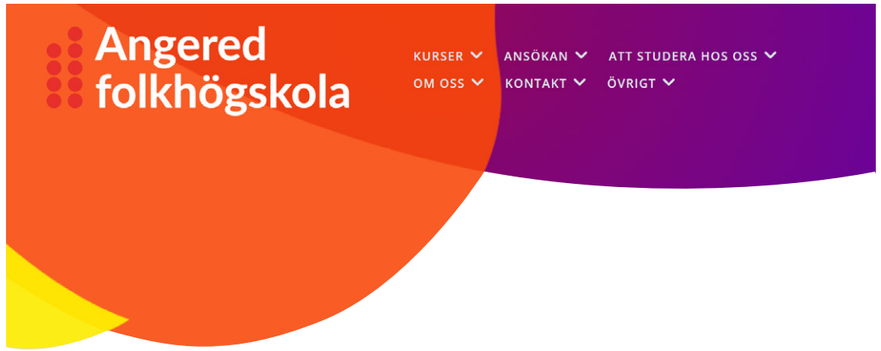


Figure 28: Recreation of parts of the course web page with text translated from Swedish to English.

The course webpage:



Learn to build a tiny house

SHORT COURSE IN ARCHITECTURE AND SELF-BUILDING OF MOBILE TINY HOUSES

Welcome to a course in self-building of mobile tiny houses! The course combines architectural theory with construction to provide both the theoretical and practical skills needed to start your own project. The course is specifically aimed at those of you who have a future project in mind, as you will develop your idea during the course. We, the teachers, are architects and carpenters specialized in mobile tiny houses, and we will guide you continuously and answer any questions.

The course is based on a master's project in architecture at Chalmers, focusing on self-building of mobile housing. Together, we will build an experimental structure with an unconventional lightweight construction, where mobility and tiny living are taken to the extreme. In addition to this, there will be more traditional tasks to practice on in the workshop. You will familiarize yourself with tools, get to know different materials, and learn how to build with reclaimed materials.

COURSE CONTENT

- Joint construction of a mobile house from start to finish
- Practical knowledge of tools, machinery, and materials
- Theory such as relevant regulations, system solutions, budget and how to make drawings
- Architectural design strategies for small homes

About the course
Cost: 3000 SEK
Spring semester 2025

Organized by
BOBINI and
Angered folkhögskola

Building weekends:
09:00 - 16:00
January 11-12
February 1-2
February 22-23
March 15-16
April 5-6
April 26-27
May 10-11

Online lectures:
18:00 - 19:15, every other Wednesday, starting January 15, 2025.

During the online lectures, we will provide an introduction to everything you need to know in order to plan and design your house.

3.3 The handbook

As the research suggests that lack of available information is one of the aspects halting the development of the tiny house movement, I set on the task of creating a handbook. The handbook is primarily aimed at self-builders wanting to build their own sustainable tiny house on wheels. It could however also be of interest to architects and politicians wanting to understand the premises of tiny house construction. The focus is on the one hand on understanding what laws and rules apply, and on the other on becoming able to make informed decisions in a design process and to build a tiny house. The handbook is written in Swedish as it's meant to be used during a course held in Swedish, and as it covers laws and solutions relevant to a Swedish context.

The handbook is inspired by the literature mentioned in chapter 4.2.4. It aims to include most aspects of relevance in an easy-to-read manner. Literature that was more "difficult" to read, such as law paragraphs, was translated into easily understandable illustrations. It was a never ending evaluation deeming what was relevant and not, wanting to keep things short yet not omit any important information.

During the development of the course and online lectures, it got even more clear how necessary it is to be able to refer to some kind of literature when teaching self-building. Relevant subjects such as laws and rules means big amounts of information needs to be taught. Adding a lot of text is messy on powerpoint presentations, but fitting for a book. Furthermore, gathering the necessary information in the form of a book has the advantage that many others can access the information in the future. As the previous chapter informs, the handbook should include:

- Support for the planning process
- Construction principles
- Sustainability tactics
- Laws and rules
- Energy and system

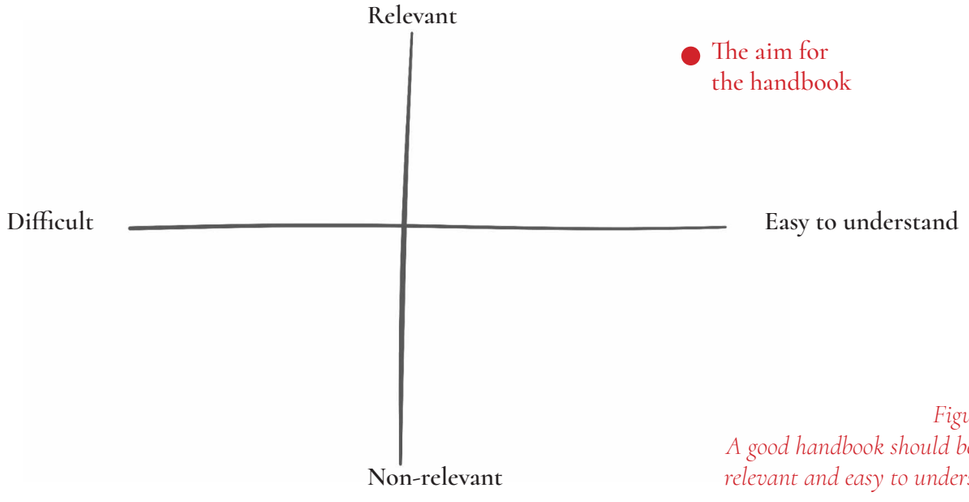


Figure 29: A good handbook should be both relevant and easy to understand.

The handbook was developed one chapter at a time. I started with the chapter "Hus på väg" / "House on the road", about the house as a vehicle and all relevant traffic regulations. It was the chapter I was least knowledgeable about myself. Working in the form of a handbook proved to be a very good way to gather and remember the information I researched. The structure of the chapter, 21x21 cm with lots of illustrations and short parts of text, became the layout of all the following chapters.

The second chapter, "Hus på plats" / "House on site" covered the tiny house standing still, and all laws that apply for when it is thus considered a building. I find myself often going back to that chapter to check something up myself regarding for example building permits or demands for ventilation.

Done with the laws and rules, I still deemed two more chapters necessary to convey in the form of a handbook. The first being "Hus som håller" / "Houses that lasts", a chapter about construction principles, materials and the functions of a building envelope. In it, I reproduce learnings from my architectural education that are needed to make informed choices in a design process. I included it to give self-builders the means to be creative in their designs.

I thereafter made the chapter "Hus som fungerar" / "Houses that functions" about system solutions, namely; insulation, heating, ventilation, electricity, solar power, mobile toilet solutions, water installations and sewage. Like the rest of the chapters of the book, it's a topic where a lot of information is needed in order to be able to make informed choices.

To make the handbook fitting especially for the course, a chapter containing a quick guide to SketchUp was added.

I later on added an introductory chapter presenting the 10-steps used at Bobini. During the course, that was only presented in online presentations, but was added to the handbook in order to reach those who might be reading the book without participating in the course in the future.

All above mentioned chapters are covering topics that self-builders need to know about during their planning processes. As the individual planning happened outside of course hours, that again argues for gathering it in the form of a handbook, as it means they can go back to look at it whenever they want to spend time on their design processes.

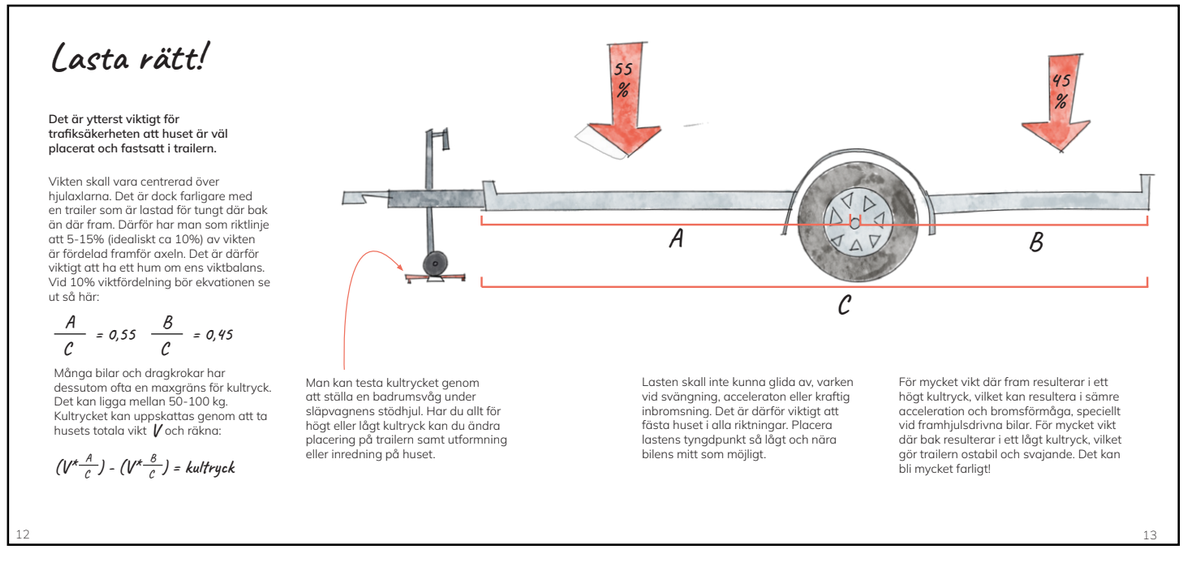
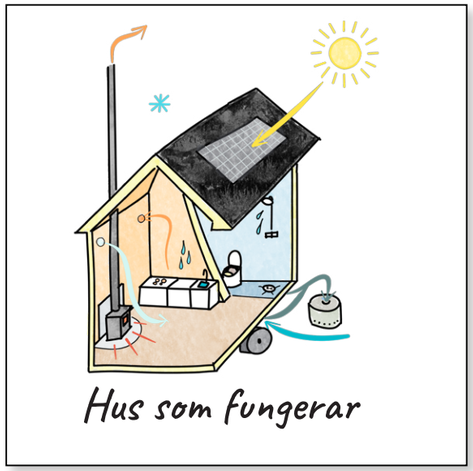
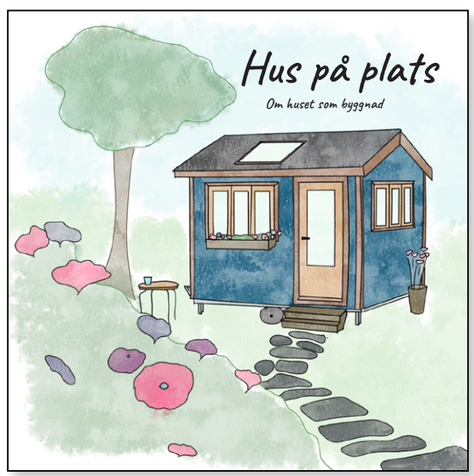


Figure 30: A spread of the handbook, showcasing how to load a trailer and calculate the pressure on the car.

The whole handbook can be accessed in Appendix 1.





3.4 The design

According to my 8 parameters for a successful course, it is important to build a common project from start to finish in order to go through different aspects of construction. The tiny house design should be ready before the course begins and be presented in both drawings and as a step-by-step guide. As conventional construction is not developed for tiny houses, I also wished to take the chance of developing a means of construction that was more suitable for a lightweight, easy-to-construct, low-cost, sustainable mobile tiny house.

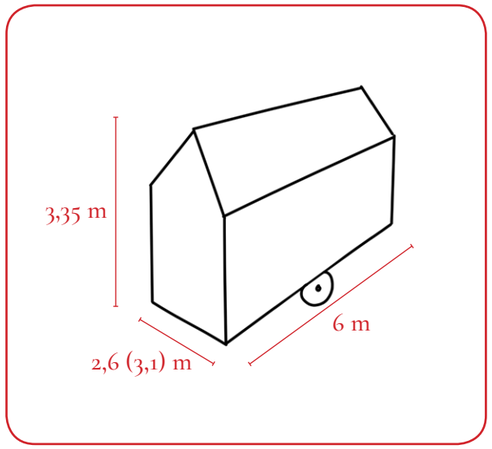
According to the takeaways from Part 2, a tiny house answering to the needs of the movement should fulfill the following criteria:

- Low price - If possible >10 000 SEK/m².
- Minimal dimensions
- Fulfill the needs of the habitants - At least provide a bathroom, storage, possibility to sleep, eat, work, hang out and pursue hobbies.
- Mobility - Lightweight construction
- Creative design
- Simple construction - Using easily available materials and avoiding complicated solutions.
- Environmentally sustainable living - Minimize the carbon footprint
- Inspire to a more meaningful lifestyle

The design should also meet the practical needs of being built during the course and not exceed the budget decided by the funds:

- Should be possible to construct from start to finish by 10 participants during 7 weekends.
- May not cost more than 65 000 SEK

Being a mobile house, the trailer and the rules applying to vehicles also affect the design (For full list of rules, see Appendix 1). Being built in the workshop of Bobini, the height of the opening of the garage door (3,35 m) decides the maximum height of the house.



Furthermore, my own experiences from building my tiny house as a self-builder makes me want to avoid what I found to be difficult or tedious. The aim is to make the process of construction faster and easier, by exploring some of the following ideas:

- Utilise bent plywood to increase the strength and reduce the weight
- Reduce the amount of steps/layers
- Build the wall as a sandwich element
- Avoid working with metal

Lastly, avoidance of building permit is pursued, as it gives the most freedom both in terms of design, construction and moveability. The house will however fulfill requirements stated in BBR (BFS 2011:6).

The design is not meant to become a new dogma of construction, but is meant to inspire others to engage in the Intellectus-rich activity of developing experimental architecture.

The trailer

Driving licence

B Car max 3.5 tons + either a trailer of up to 750 kg, or a trailer with a total weight exceeding 750 kg, provided that the combined total weight of the car and trailer does not exceed 3.5 tons.

The type and speed of the trailer was the first thing to decide on, as it's deciding the maximum weight. Contacting a company selling custom made trailers, I got a primary estimation for price of 29 000 SEK. As it would consume most of my budget, it became clear that I needed to find the trailer second hand. Buying a second hand trailer is also advantageous from an environmental perspective, as steel has a high environmental impact (appendix 1).

In order to find a second hand trailer, I set up searches on second-hand online markets such as Blocket and Marketplace. It took months to decide what I wanted and find a suitable trailer. One question to address was what speed I wanted the house to be able to be transported in, and by what car. In order to best meet the criteria of mobility, I decided to aim for a lightweight tiny house that could be transported with a B-driving licence. My research into the laws of vehicles informed me that in order to drive the house at 80 km/h, I would need a trailer made for the purpose, which was more expensive. The two alternatives if going for a fast trailer are to either have the house being considered freight, in which case it needs to be detachable for the trailer to be inspected every two years. The other alternative was for the finished house to be inspected and re-registered as a camper van, but which put the project at risk of not being usable if not passing the inspection.

If considered a "Efterfordon", the house could only be driven in 30 km/h, but with the advantage of it not having to be inspected or being detachable, which felt like the alternative that would give me the most freedom of design and use.

There were several caravan chassis for sale, in various conditions. I had contact with numerous sellers and I went to look at two promising chassis, both turning out to be quite rusty upon inspection. I finally found a chassi in good condition for the low price of 1500 SEK. The maximum weight of the chassi is 1250 kg, although it can be assumed to handle a bit more if only being towed at 30 km/h.

Figure 31: 3 types of vehicles (from appendix 1; "Hus på väg"). Defining the tiny house as an "efterfordon" proved to be the best solution.

Looks the same but different rules...

	Trailer vehicle + freight	*Re-registered DIY construction*	*"Efterfordon" (trailing vehicle)*
	A registered trailer with the house as an indivisible and removable load.	A re-registered vehicle that becomes either a kiosk cart, caravan, or similar.	An unregistered vehicle.
+	Can drive at 80 km/h Inspected and safe	Can drive at 80 km/h (depending on what it is classified as) Inspected and safe	Freedom in design More flexible weight restrictions No taxes or fees
-	The house may only be fastened with straps The house needs to be removed during inspection Annual cost	Less freedom during construction Annual cost	Slow - 30 km/h Your responsibility to ensure it's safe!

Building permit

The next thing to consider was whether to go for a building permit, or how to avoid one. As a regular building permit means the design needs to be finished before the construction begins, it highly limits the possibility to make changes along the way and to use reused materials acquired continuously. As the tiny house would be built on a trailer in a workshop, an initial building permit is postponed either way, and would be relevant only when and if the tiny house would be permanently placed at a site (and thus no longer be defined as a vehicle but instead a building). This gives the most freedom of creativity and ability to make changes along the way.

The aim for minimal dimensions means a regular building permit for a full-time residential home would be out of the question, as that requires the tiny house to be accessible to wheelchairs (see figure 32). If the tiny house would be placed at an empty plot, a building permit for a "fritidshus / vacation home" would be the only solution. It however costs a lot of money and would make moving the house require a permit for demolition. The same goes for "Attefallshus", which is a possibility when placing the tiny house on a plot with an existing house. Storing the tiny house as a camper-van would be a possibility, though it would then not be allowed to use the tiny house for habitation. The best option is therefore to fit the requirements for "friggebod", which is a permit-free house of maximum 15 m². It however requires the tiny house to be maximum 3 m high. Considering that most trailers are at least 50 cm high, that leaves the house to measure about 2,5 m. It's a little low, but might be possible given the account that the wheels could be detached, should anyone care to measure the height.

Figure 32: The different kinds of building permits (from appendix 1). "Friggebod" proved to be the best solution.

	Main house (permanent housing)	*Main house (vacation house)*	*Attefallshus*	*Permit free complementary house in the countryside*	*Friggebod*	*Camper-van*
Max area	No	Max two apt.	30 m²	"Not dominate"	15 m²	-
Max height	No	Max two floor	4 m	No	3 m	-
Building permit	Yes	Yes	Simplified	No	No	No
Price	65-155 000 SEK	45-135 000 SEK	~ 20 000 kr	-	-	-
Can live in?	Yes	Yes	Yes	Yes	Grey zone	No
Energy decl.	Yes, if >50m²	Yes, if >50m²	No	No	No	No
Wheelchair accessible	Yes	No	Yes, if housing No, if vacation	Yes, if housing No, if vacation	No	No

References

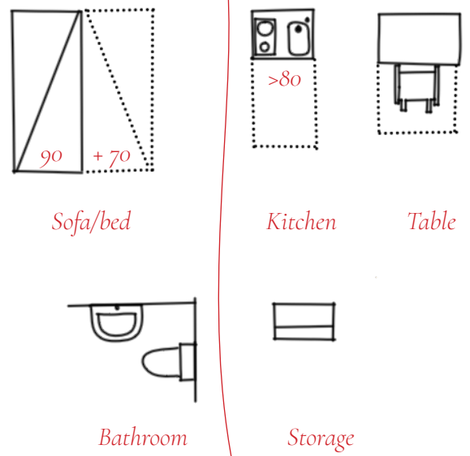
The process of developing the design started with finding reference projects that fulfill one or more of the criteria established. The projects are chosen the minimal dimensions of living and for their creative experimentation of shape and means of construction.

Figure 33:
"Kotten" ("The pine cone") is designed by Torsten Grind. It utilises the strength of bent plywood to minimise the weight of the roof. Originally built to function as a summer house by the designer, the little hut has received a lot of attention, why several courses have been held in which participants got to build their own "Kotte". A "Kotte" can be built in 13 days by 3 people, why it serves as an inspiration for more effective ways of construction.

Figure 34:
"Shepherd's hut" by Canadian tiny house company Güte is an inspiring example of how to work with the roof bending from front to back, without the house looking like a camper van. The use of wood and detailing associated with old-style huts make it look both modern and traditional. The interior has basic functions beautifully balanced within the minimal space.

The design process

Required functions (measurements in cm):



The tiny house should have minimal dimensions in order to be able to be built during the course and be lightweight. It however needs to include the most basic functions of a house in order to be usable. This includes a sofa that can be pulled out to a bed, a table with sitting possibilities, a kitchen with a sink, stove and storage, possibility to store clothes, food and stuff, and finally a separate bathroom with a toilet and a sink.

Starting off with hand sketches, I attempted to fit the functions into as small a space as possible. I experimented with a bent roof in different shapes and forms, and arrived at the "half-circle". It is a shape that extends the roof all the way down in the front and the back of the house, thus only leaving 2 walls to be constructed. The metal usually rimming the edge of the roof is avoided, simplifying the building process. The shape is aerodynamic for transport.

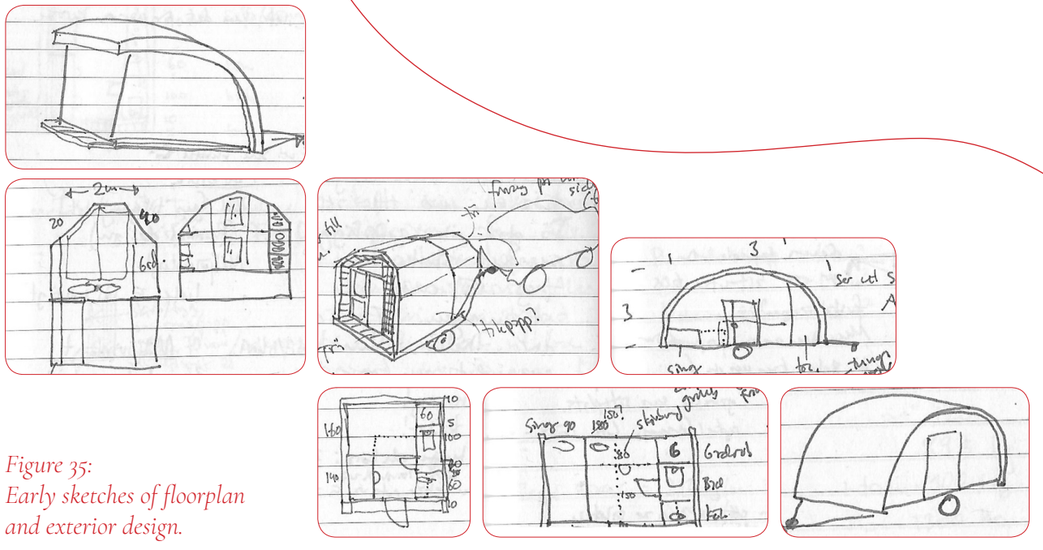
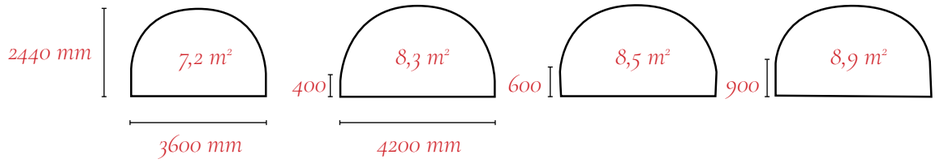
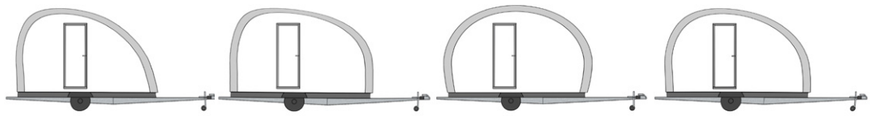
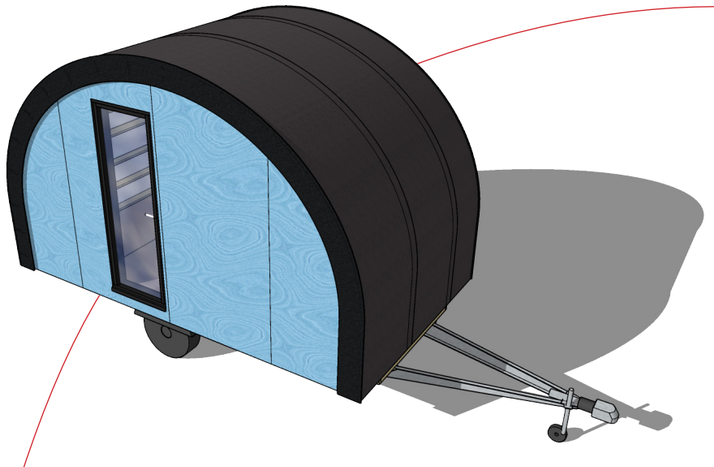


Figure 35:
Early sketches of floorplan and exterior design.



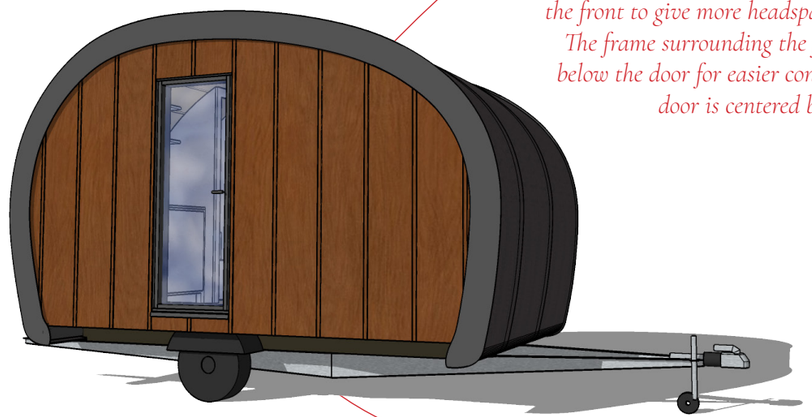


2: I experimented with ways to increase the usable space inside by raising the half-circle according to the above depicted tests. I also make the house slightly longer (4,2 m) to better fit the table inside. I move from sauna-paneling to plywood as the exterior cladding to reduce the weight.



3: Inspired by more organic shapes, I make the roof higher in the back of the trailer to make the kitchen and bathroom more usable. I decided to go for a more wooden look and to extend the frame surrounding the facade to make a full circle.

1: Moving into model-making, I built a test model scale 1:10 to try out possible means of construction. I decided to use the standard dimensions of a plywood sheet to decide the dimensions of the house. The first version is thus three standing plywood sheets wide (3,6 m), the wall being one plywood sheet high (2,44 m) and the roof one plywood sheet wide (2,44 m). The roof is exactly one roll of roofing felt along (7 m). The building of the model was also a way to test new means of construction. A stop-motion video of the construction can be seen digital appendix 6a (see link p.117).



4: The final exterior design is slightly raised in the front to give more headspace above the bed. The frame surrounding the facade is removed below the door for easier construction and the door is centered between the trims.

The construction

Full budget calculations to be found in appendix 4, and more information about drivers licences, trailers and GWP in appendix 1 (the handbook).

The means by which I attempt to achieve a more lightweight, low cost, easy-to build and sustainable design is by reducing the size and changing the means of construction.

In order to limit the environmental impact and price I aim to use as much reused materials as possible, with a focus on the materials with the highest GWP (Global warming potential), such as the steel trailer.

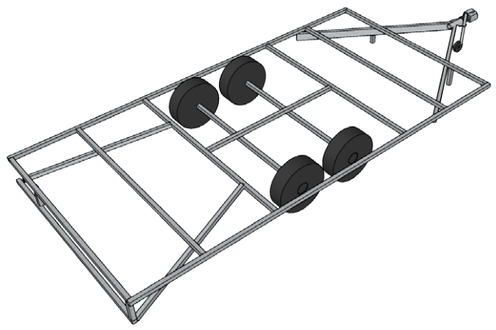
In order to be able to tow the house with a B-drivers licence and build on the second-hand-trailer, I needed a radically lighter-than-average design by reducing the dimensions of building materials. Other than minimising the weight, I wished to minimise the steps required to build a house as well as the difficulty level of those steps by building the floor and walls as sandwich elements.

Reused materials

Type	GWP (CO_2-eq/kg)	Price new (SEK)	Price reused (SEK)	
Trailer	12,9 (steel)	28 800	1870	
Window	11,9 (glass)	4000	500	
Styrofoam insulation	22	2500	300	
PiR Insulation	68	800	0	
Trims	-	400	100	
Bathroom sink	-	500	0	
Composting toilet	-	9800	0	
Foot pump water x2	-	2200	300	
				Total saved:
SUM:		49 000 SEK	3170 SEK	45 830 SEK

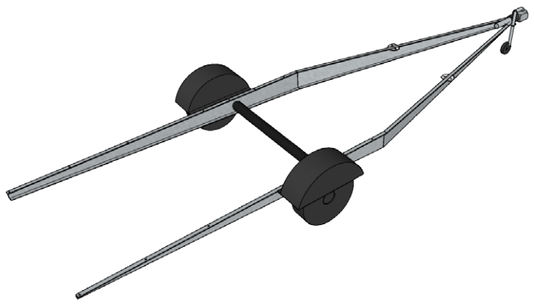
Trailer

28 800 kr



A regular newly produced tiny house trailer of relevant size is easy to order from one of several companies offering. It comes with a sufficiently wide frame and can handle a lot of weight, but has a high price and high environmental impact due to the GWP of newly produced steel.

1870 kr

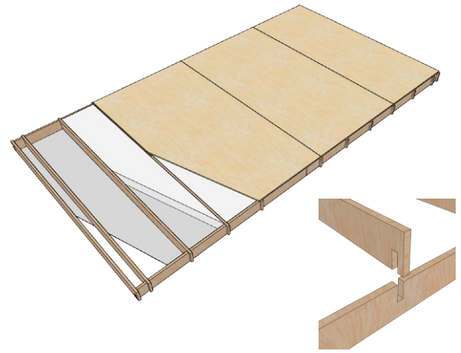


A second-hand trailer can be found on online markets and come in all shapes and types. For this project, the chassis of a demolished caravan was purchased to be used as a “efterfordon” (30km/h), with a total maximum weight of 1250 kg.

Price and weight of standard construction referring to materials only! If adding the price of land, labour and permits the price multiply.

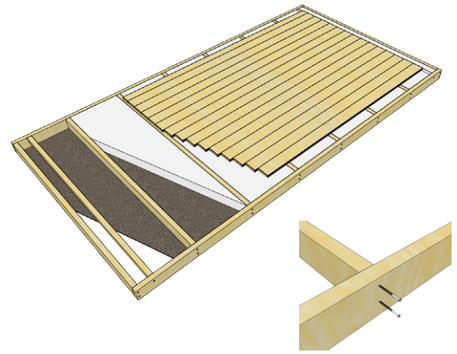
Floor

476 kr/m²
14 kg/m²



A floor framing consisting of 21x120 plywood-studs placed at a distance of 400 mm, pre-cut to fit as a click-system without screws. Held together by a 12 mm plywood floor. Wind-paper as moisture barrier below.

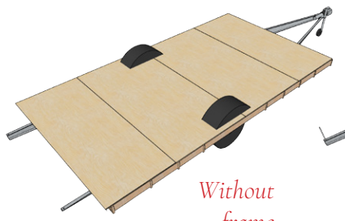
717 kr/m²
21 kg/m²



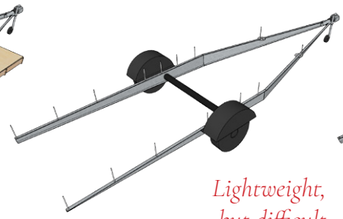
A conventional floor framing consisting of 45x120 wooden studs placed at a distance of 600 mm, fastened by screws. 21x100 mm wooden board floor. 3 mm oil-impregnated board as moisture barrier below.

Placing floor on trailer

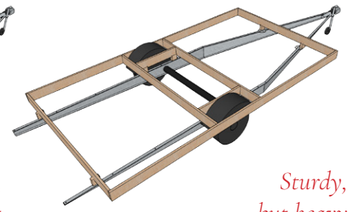
The wheels would penetrate the floor if building directly onto the trailer. I explored several different ways of lifting the construction without adding too much weight or making it too complicated to build.



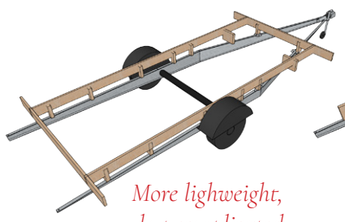
Without frame



Lightweight, but difficult



Sturdy, but heavy



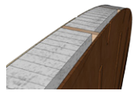
More lighweight, but complicated

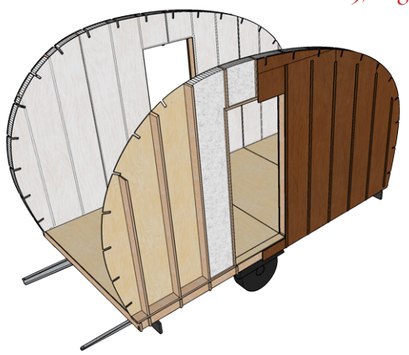
Easy to build, but heavy

Lightweight and easy. Also allowing the floor frame to be attached from below.

Walls

708 kr/m²
15,6 kg/m²





The 100 mm styrofoam in between the 120 mm studs leaves a 20 mm air gap without adding another step.

A wall built with 21x120 plywood studs, cc400. The whole wall is built horizontally as a sandwich element, and is finished as it is raised. The use of reused styrofoam as insulation makes it possible to remove the moisture barrier as well as the wind paper. Placing the door and window in between two studs and directly against the back side of the facade avoids the use of trims and metal, reducing the time of construction.

740 kr/m²
28 kg/m²

A conventional wall built with 45x95 wooden studs, cc600. It is built in several steps, first framing, (then a pause while building the roof), applying wind paper, the air gap, the facade, the insulation, the moisture barrier, the installation gap and finally the internal cladding.

Roof

667 kr/m²
20 kg/m²

Using bitumen tape along the upper plywood edge provides weather protection.

A roof built with 21x120 plywood rafters attached into the facade. As the 4 mm plywood on the roof increases in strength when bent, it can handle higher snow-loads despite the minimal thickness.

608 kr/m²
26 kg/m²

A conventional roof built with 45x120 wooden rafters resting upon the wall frame. The boards (or sheets) below the roofing felt need to be around 20 mm to handle snow-loads.

My design

Split plywood for studs
Cut plywood studs for floor joists
Make notches
Assemble studs
Attach wind barrier below
Insulate the floor
Glue + screw on the plywood floor

Cut plywood for interior + exterior walls (with notches)
Cut studs for the walls (with notches)
Glue + screw the studs to the interior plywood
Insulate the walls
Glue + screw on the exterior plywood
Split plywood for roof rafters
Make notches with a jigsaw
Raise the walls

Fasten the roof to the frame
Cut and attach plywood to the ceiling
Insulate the roof (from outside)
Fasten wind barrier on roof
Cut and install laths for air gap
Attach plywood to the exterior roof (uncut)
Cut and attach plywood arch along roof edge
Attach arch to roof with bitumen tape
Lay top layer roofing felt
Waterproof edges with bitumen sealant

Varnish the interior ceiling
Paint the interior walls
Sand + varnish the floor
Attach trims facade
Paint facade

Install windows and doors
Attach trims
Install the water and electricity (exposed, no professionals)

Finish floor → Finish walls → Finish roof → Interior → Installations

Figure 35: An illustration of how "unnecessary" steps in the building process have been removed and moved about to attain a quicker and simpler building process. The result is shown by the left column (my design) being considerably shorter than the right column (standard construction) and the order of construction more logic.

Conventional construction

Cut studs for floor joists
Screw together floor joists
Add laths for subfloor
Attach subfloor (board)

Cut studs for the walls
Screw together wall sections x4
Control measure the diagonals
Attach temporary cross braces
Raise the walls and screw together the frame

Cut rafters for the roof
Measure and cut angles at the edges
Fasten the roof to the frame
Cover the gap above the top plate
Cut and fasten oil impregnated board
Cut and install laths for air gap
Lay roof sheeting
Attach drip edge
Fasten triangular fillet
Lay roofing underlayment
Lay top layer roofing felt
Paint and install gable boards

Fasten wind barrier to the facade
Cut and install laths for air gap
Install drip edges above window/door
Pre-paint panel boards
Install exterior cladding
Cut exterior cladding at corners and openings
Install door and window flashing
Install door and windows
Cut and fasten exterior trims
Cut and fasten corner boards
Cut and fasten window/door frame trims
Paint the facade

Insulate the floor
Lay temporary boards
Insulate the roof (from inside)
Insulate the walls
Install vapor barrier
Cut and fasten studs for installation layer
Install wiring+plumbing in the walls (by a professional)

Cut and fasten beadboard
Cut and fasten ceiling panels
Cut and lay floorboards

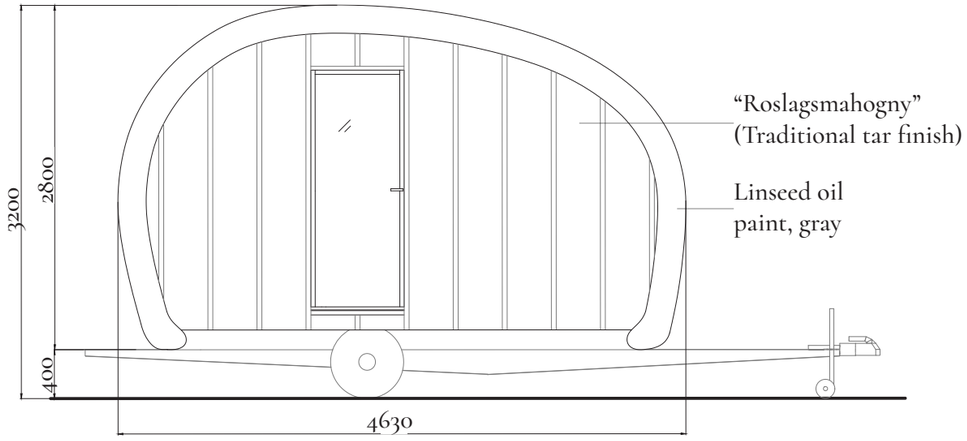
Cut and fasten trims
Complete the installation work (professional)

Framing → Finish roof → Exterior walls → Insulation, start installations → Interior, installations

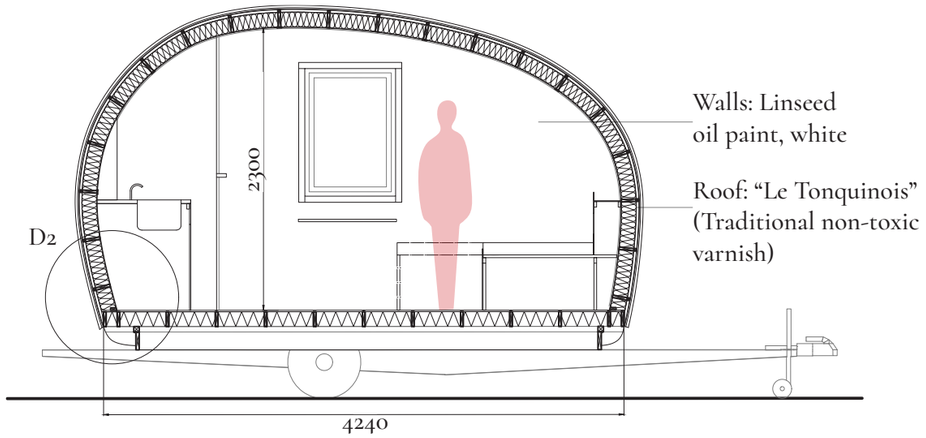
Drawings

All measurements in mm
For drawings in bigger scale see appendix 2
Stated scale valid when printed in A4

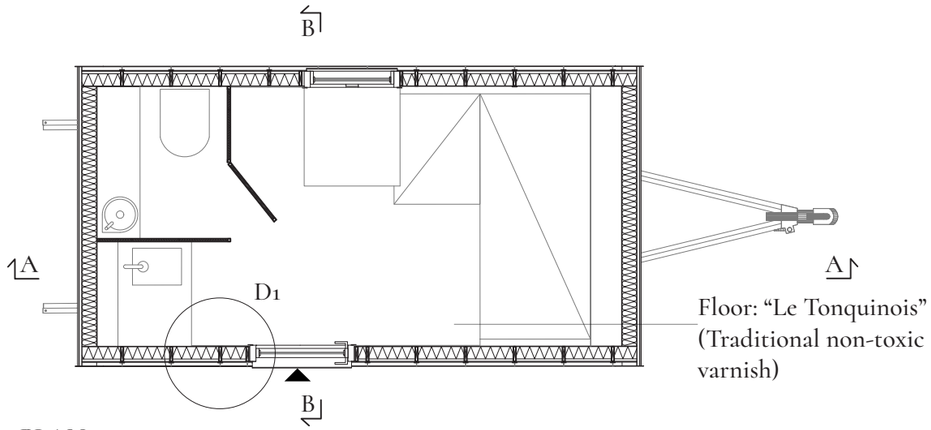
0,5 m — 4 m



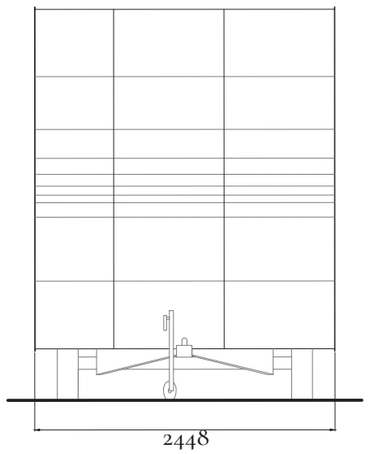
ELEVATION, RIGHT 1:50



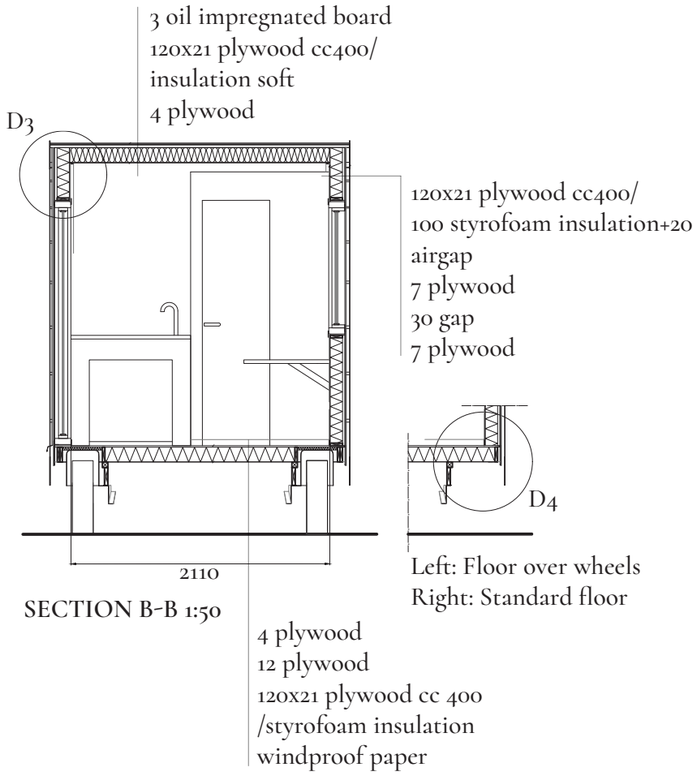
SECTION A-A 1:50



PLAN 1:50

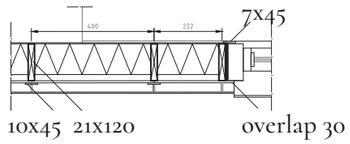


ELEVATION FRONT 1:50

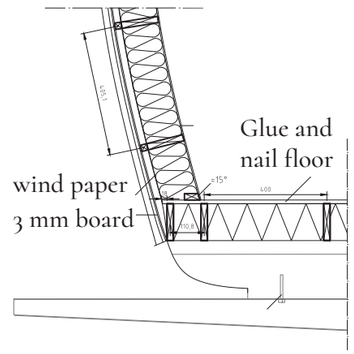


SECTION B-B 1:50

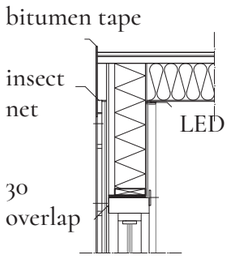
DETAILS 1:20



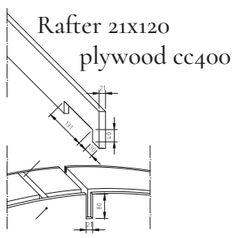
DETAIL 1



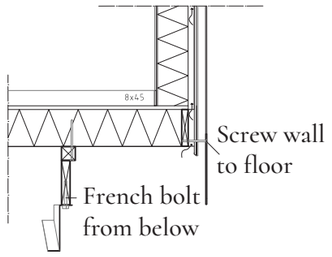
DETAIL 2



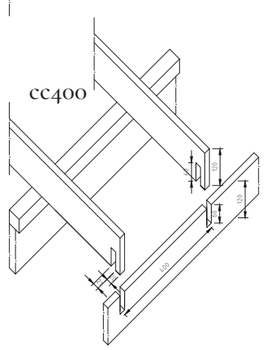
DETAIL 3



Principle wall/
roof construction



DETAIL 4



Principle floor
joist construction

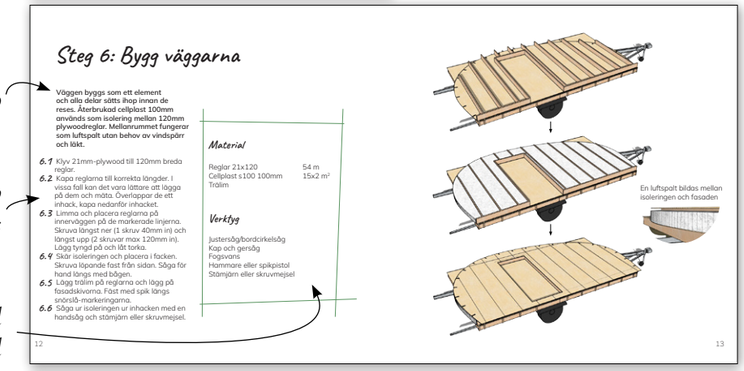
The step-by-step guide

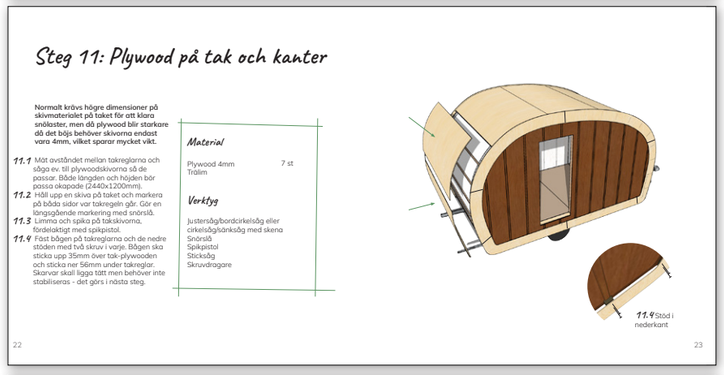
In order to communicate the construction in a pedagogical way, standard drawings have been complemented with a step-by-step handbook showcasing how to build the house, including what materials and tools are needed. The whole guide can be accessed in appendix 3.

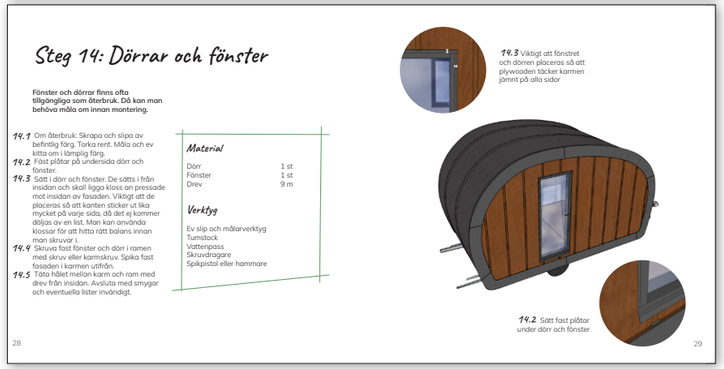
General info

Step-by-step instructions

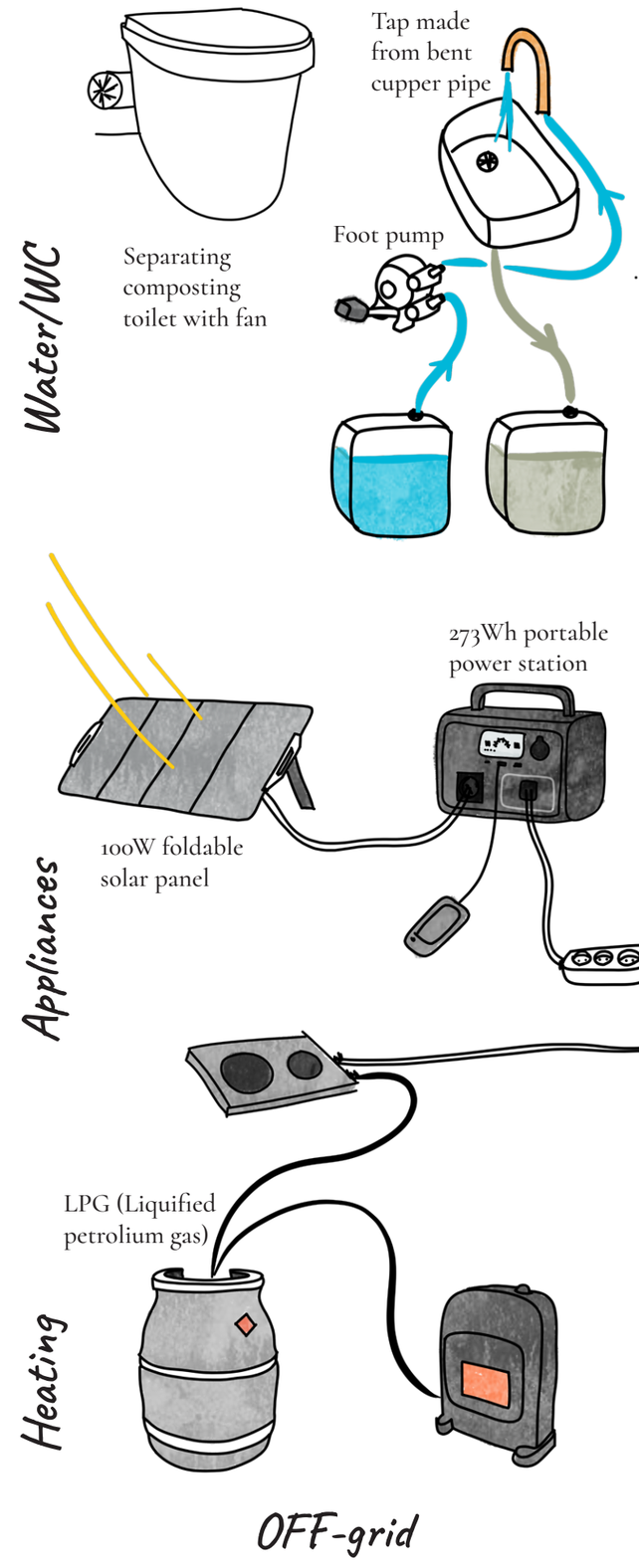
Tools and materials needed







System solutions



The house functions ON- as well as OFF-grid. All systems can be installed without professional help, reducing the price and increasing the autonomy. A way to do a safe and legal electric system without involvement of professionals is using a power distributor with integrated fuses. It is complemented with an all-in-one OFF-grid portable power station and a solar panel. A simple water system is used with foot-pumps and taps connected to the sink in the kitchen and bathroom. Clean water is brought in by bucket, and gray water collected in the same way. As the house is not connected to running water, there are no legal demands for connection to a sewage system. The required ventilation airflow is 0,35l/s/m2, meaning 280l/s for the house, and is handled by the fan of the composting toiletas well as by a passive solar ventilator. The required heating is 60W/m2, amounting to 480W. A heating mat and heating sheet on the bed provides heat without taking up space, and is complemented by a gas-heater when on the road. See appendix 1 for more details on the different solutions.

Part 4

Activating the potential of the movement

In Part 4, the material from Part 3 is put to the test by holding the self-building course in which the handbook is used and the design is built by participating self-builders. Real-life feedback makes it possible to assess whether the conclusions and proposed solutions are correct and working. It actively invites 10 new self-builders into the field of architecture, providing material to explore the research question "How could self-builders of tiny houses contribute to sustainable development if enabled to join the field of architecture?". The process can be read about in detail in appendix 5c, while the follow pages provides a short summary of the research.

Fall semester 2024

The whole process can be read about in detail in appendix 5c.


Figure 36: 1:1 models to test my construction and fitting tools.

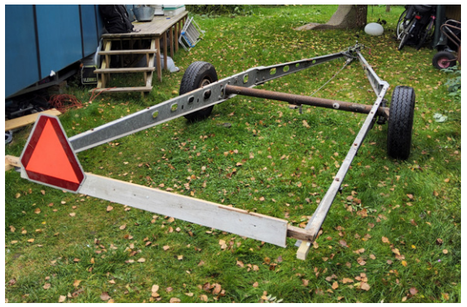


Figure 37: I bought the material with the highest environmental impact reused, such as the steel-trailer, the styrofoam insulation and the window.

Figure 38: The trailer needed some bolts removed and a new front wheel.

Spring 2024
I attend the self-building course at Bobini and we decide that I will take over the course the upcoming year together with one of the original teachers.
I apply for funds.
I make the first sketches and preliminary budget calculations for the design and start testing constructional solutions in models.

August 2024
The planning starts.
The carpenter from Bobini can't attend, and I instead find the carpenter Andreas, who's living in a self-built house boat and has held similar courses before.
I start looking for reused materials.

September 2024
Meeting with Angereds folkhögskola to establish the course schedule and conditions of employment. The application opens.

October-November 2024
I develop the design and do 1:1 tests of constructional solutions in the Chalmers wood workshop.
I develop the handbook as course material.
I purchase the reused trailer and other reused materials.

December 2024
I finalize the design (that will however change again during the course) and make the step-by-step guide.
I buy tools and materials.
After the application deadline the 1'st of December I choose 10 participants for the course (gender and age distribution below).

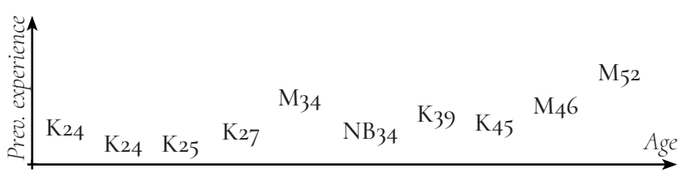


Figure 38: Gender, age and previous experience of the participants. (appendix 5c). F=Female, M=male, NB=Non-binary

January 2025

After months of preparation it was time to start the course. I had been nervous for the last 2 weeks before starting and had to spend much more time than I thought on preparing the workshop and purchasing the basic tools needed to start the course.

Seeing the participants felt amazing. After having spent so much time on the application process, it was as if I already knew them. Me and my co-teacher Andreas gave an introduction to the course structure, to the design we were going to build and to the workshop. As of every morning, Andreas held a dance-warmup.

With all 10 participants present the workshop was crowded, with 4-5 different workstations at all times. It was very intense to supervise. Having the step-by-step guide was a great help. The plan was to finish the floor on the first weekend, and we almost made it (I revisited to put the plywood floor on the next week.). The participants seemed very positive with the first weekend and the promised future lectures. I however felt like I needed to make amends to lower the intensity, by better preparation and some kind of resting-space.

In the first online lecture I presented the reasons I've found for people to join the tiny house movement and asked if they felt it was correct, and the most mentioned comment was: "I recognise myself in everything!".

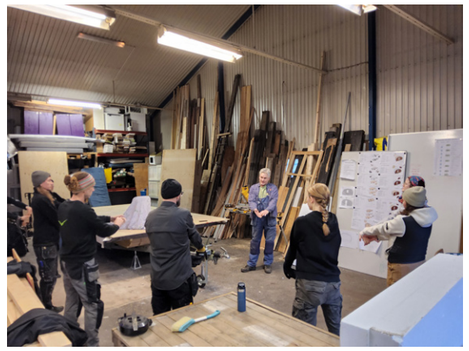


Figure 39: Morning gymnastics each morning

Figure 40: Several groups working simultaneously

Figure 41: Styrofoam insulation in between studs of 21 mm plywood, and 12 mm plywood for floor.

(Ring indicating working outside of schedule)

6, 7, 9 January 2025
I spent a week cleaning the workshop, repairing the trailer, printing all the needed materials and preparing workstations for the first building weekend.

(Red circle indicating building weekend)

11-12 January B1
We build the floor, from framing to insulation.

(Pink circle inducating theory lecture)

16 January T1
What is a tiny house?

23 January
I revisit the workshop to finish the floor.

30 January T2
Construction principles and going through the step-by-step guide.

I continuously tried to improve the course based on my observations and the ongoing feedback from the participants. For the second building weekend, I decided to introduce a check-in/check-out-session every morning and afternoon. The reason was to give everyone a chance to share how they felt, both for the sake of solidarity, but also to give me a bit more feedback for my research. I also created a to-do-list next to the step-by-step-guide to better visualise what we were doing that day. I tried different ways of installing a rest space, and what worked in the end was a beanbag that tired participants could relax on in the afternoon.

The feedback showed that the participants experienced a lot of "FOMO" (Fear Of Missing Out) when we were working with many different workstations simultaneously. They preferred all working on the same step, to be able to learn from each other and have rewarding collective problem solving. This was very much the case during weekend 2 and 3, where we built the walls. We first cut the interior and exterior plywood sheets for both walls all at once, then built the whole walls as sandwich elements. Weekend 3, we raised the walls. It ended up being very stressful, as half the group were absent due to sickness, and we ran into some problems attaching the roof laths into the walls and getting the walls straight. We however managed just in time and could hold a roof-raising party.

Figure 42: Check-in/check-out-sessions at the start and end of each day gives everyone a chance to give feedback and raise thoughts

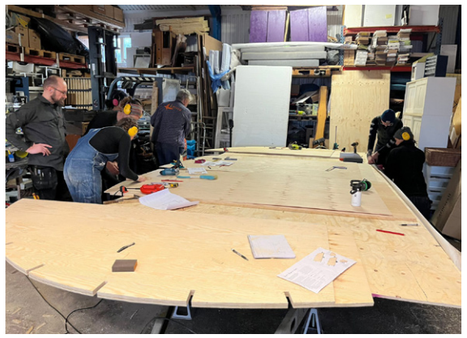


Figure 43: We cut the 4 sheets of plywood used on the exterior and interior walls at the same time.

Figure 44: We finished weekend 3 with a roof-raising party for family and friends.

Figure 45: During a design workshop the participants got to develop their own floor plans according to their individual needs.

Figure 46: Us teachers had to help out to make it in time. Work was progressing slowly with the self-builders, which leads me to see the role of professionals in a more positive light.

The online lectures complemented the building weekends well. While I sometimes struggled to explain different concepts online (such as the air gap or vertical loads, which would be easier to show on site), it still seemed to give the participants a frame of reference and a common language that raised the level of understanding during the building weekends. After having learnt the basics of construction in the first part of the course, it was time to start the processes of the participants' own design processes. The theory lectures about laws and rules (which had been asked for since day one) and a lecture about the 10 step-program really got the participants going. On the fourth building weekend, we held a design workshop where everyone got to make their own floor plan. It was fun, but the limitations of self-builders also got more obvious to me. The floorplans were far from perfect, and keeping focus seemed very difficult for some of the participants, both on designing and on building. For the second weekend in a row, we got much less done than what I was expecting and I started feeling frustrated with my participants. Until that point, I had clearly seen in what ways self-builders could positively influence the field of architecture, but I now started understanding the importance of professionals to provide structure, efficiency and of course knowledge for self-builders. I suddenly felt more like an architect and a teacher than as a common self-builder, and I started seeing the role of professionals in a new and more positive light.

(I always spend 1 day in the workshop preparing before each building weekend)

1-2 February B2
We start building the walls.

12 February T3
Guest lecturer Alf Andersson speaks about building with reused materials.

22-23 February B3
We finish building and raising the walls.

26 February T4
The 10-step program.

12 March T5
Rules for vehicles and buildings.

15-16 March B4
We're supposed to build the roof but doesn't get very far.

20, 27 March
I finish the interior roof and apply 3 layers of varnish.

26th March T6
SketchUp

Being behind in schedule, I realised we might not finish the construction on time, which didn't feel good as I had promised the participants that we'd be able to install water and electricity. I decided to step up in my role as a professional and spent several days in the workshop completing half-finished tasks and preparing for a smooth and fun building weekend. Despite my best efforts, only about 6 participants per day were present during the two upcoming weekends. I'm starting to think it might be the fact that it's a weekend-course, meaning people are often tired or have other plans. Still, I was relatively at ease, be it the feeling that I had done all that I could or the apparent increased independence of the participants - they are now comfortable with most tools, and to my pride also capable of making decisions and solving problems without my aid.

I however think the theory lectures got a little bit too complicated for them. My aim is to make them able to draw and plan their upcoming project independently, and I find the 3D-modelling tool SketchUp to be easy for beginners and very useful for those tasks. Time was however short, and realising I might expect too steep a learning curve, I instead experimented with ChatGPT and shared a few prompts that could be helpful in making a budget and otherwise planning your construction. I think AI might prove to be very useful as a short-cut in the planning processes of self-builders in the future.

Figure 47: I spend a lot of time in the workshop in-between building weekends, sometimes joined by a participant or my daughter (less effective).

Figure 48: Toxic-free, traditional paints are used.

Figure 49: We struggle to attach the roofing felt on the sides, but do our best with asphalt glue.

Figure 50 (Left): Everyone was working hard to finish the exterior and interior of the house.

Figure 51 (below): Resting in the finished sofa below a shiny roof lit up by LED-strips.

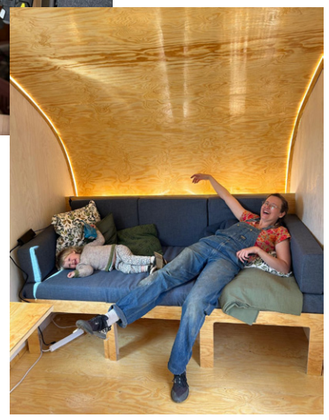


Figure 52: Proud self-builders and teachers in front of a finished house.

Coming up to the final weekend we were behind in schedule. While entertaining the thought for some time to skip much of the interior and instead take it easy, holding the lecture on system solutions encouraged me to push on as to let the participants see the water and electrical system in the house. I did realise that the interior of the bathroom would be impossible due to the drying time of paint, but the rest I hoped we could manage. I also decided to skip the planned presentation of everyones' individual projects, as it seemed most of them hadn't had time to develop their designs.

The workshop was a bustling bee-hive of activity. The first day we finished the exterior with window, door, facade trims and paint. The second day it was crowded in the tiny house - often 5 people standing on top of each other, each working on their task. With everyone focused, an amazing team effort made sure we reached our goal!

We finished by bringing the house out of the workshop. Pushing the house out, we could see it from a distance for the first time. It looked so pretty in the sunlight, the shape and the colors in harmony. The interior got better than I had dared dream of - we managed to build the kitchen, bathroom walls, table and the pull-out sofa. The blue and flowery cushions went perfectly against the expressive golden plywood. The cherry on top were the LED-strips along the edges of the roof.

The final check-out was very positive, one participant perhaps putting the feeling perfectly into words by saying; "We freaking built a house together! That's amazing!"

See a video of the process in online appendix 6b, and see p.323 for an epilogue.

5-6 April, B5
We prepare the roof for roofing paper, paint the walls and prepare the facade for paining.

9 April, T7
Follow-up on SketchUp and how to do a budget calculation.

8-16 April
I spend many days in the workshop trying to get back on track, sometimes joined by a participant. We cut, paint and attach the frame, paint the walls and finish and paint the floor.

23 April, T8
System solutions and how to assess u-value and environmental impact.

26-27 April, B6
We finish the roof, prepare trims and start on the interior.

5,7,8 May
I spend several afternoons in the workshop planning for the interior and preparing materials

9 May T9
A visit to my tiny house.

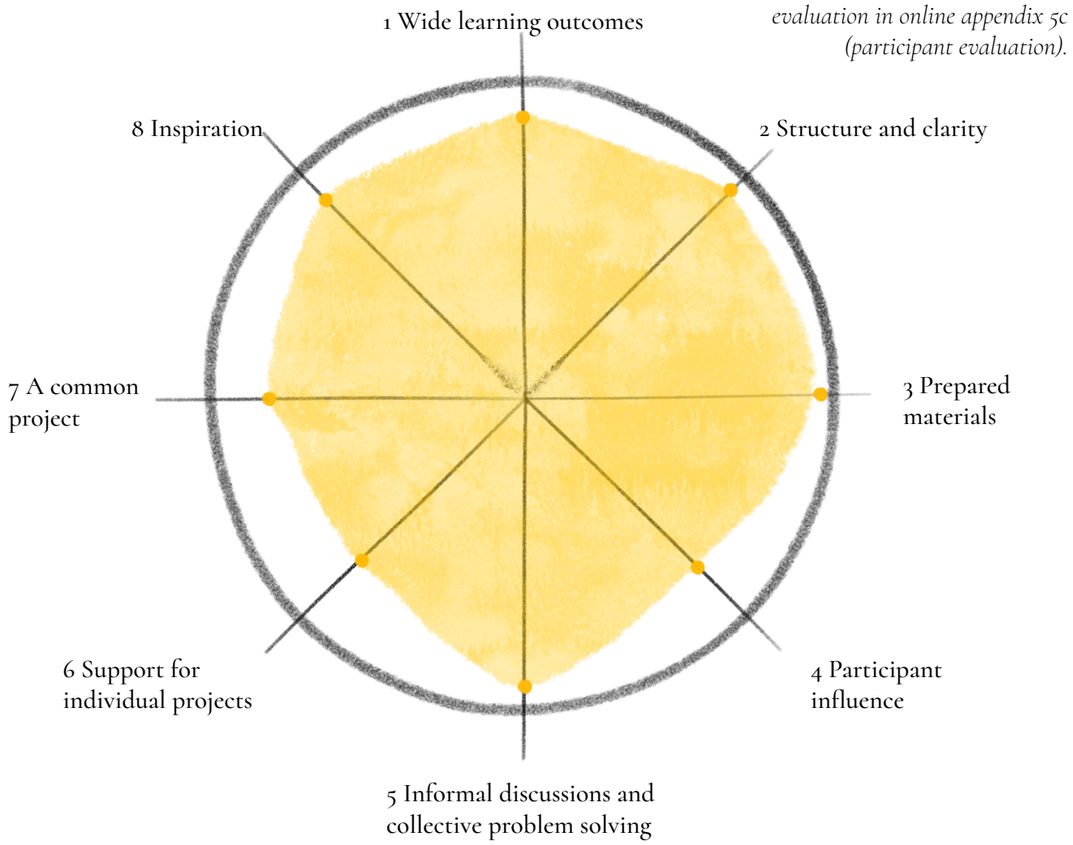
10-11 May B7
On the final weekend we install the water and electricity, finish the interior and have a party.

19 May
I spent a day in the workshop finishing the last tasks.

31 May
The house is brought to Chalmers to be exhibited, before moving to my garden.

4.3 Participant evaluation

Figure 54: Upon completion of the course, the participants got to fill in an anonymous evaluation form. 8 out of 10 participants answered. They got to rate each of the 8 parameters between 1 - 5, and leave an optional comment. The circle below indicates the average rating each of the aspects got (the further from the center, the higher the rating) and the text presents some of the feedback given in the comments. See the whole evaluation in online appendix 5c (participant evaluation).



1 Wide learning outcomes (score 4,75)
Most participants say that the combination of theory and practical aspects were good and that the course contained what they wanted to learn. They generally feel like they've gained a deeper understanding of the building process and of the theoretical aspects. One person wants more focus on building with reused materials and another on the design process.

2 Structure and clarity (score 4,75)
Most are very happy with the structure and find that the course followed a red thread in the theory and online lectures. They find the communication to be good. Someone felt like the lecture on reused materials wasn't very rewarding. Another felt it's a pity that it got stressful in the end and that they couldn't be part of some of the steps that I did in-between weekends.

3 Prepared materials (score 4,9)
The highest scoring aspect is prepared materials. Everyone agrees that it held a high quality and covered the most important aspects. One would have liked a lecture in the start on theory related to the workshop (on materials, screws etc.). Another finds that the material had a bit of a theoretical vibe that could be further developed to fit into a context of building together.

4 Participant influence (score 4,1)
Half the participants rated participant influence as 5/5, while one gave it the lowest score of the evaluation (2/5). The comments are however generally positive. People say that they felt like they could safely express themselves and that they got heard, especially thanks to the check-in/ check-out sessions. Two people agree that the possibility of influence wasn't big, but that it was a good thing that the structure was decided by the teachers, and that we still made decisions as a group during the weekends. Someone notes that we sometimes didn't finish on time and got to do a common check-out, thus not able to share our thoughts as a group.

5 Informal discussion and collective problem solving (score 4,75)
Everyone is happy about the informal discussions and the group dynamic. People feel like they could be themselves, and talk as little or much as they wanted. Someone notes that the men took a bit too much verbal space sometimes during lunch.

6 Support for individual projects (score 4)
The rating and comments vary a lot on this topic. Some say that it was good that there wasn't very much focus on the individual projects, because it would have been stressful to do extra work. Someone won't start their proper planning until in a few years and thus felt some lectures to be irrelevant now. One wants the SketchUp-course to be on-site. Another wanted more focus on the design workshop, and then another design-workshop towards the end of the course. One person would have liked a common wrap-up of the individual projects. Two people suggested dividing the course into one building course and one design course.

7 A common project (score 4,25)
People liked building a house from start to finish. 3 people think it would have been more interesting to build with conventional construction, while 3 others felt like lightweight construction was rewarding or just as good. One person would have liked to understand the system-solutions more.

8 Inspiration (score 4,6)
People feel inspired by building together, by the theory lectures, by tiny house-visits and by meeting each other and sharing alternative possible ways of living. One person found the design workshop to be most inspiring, one person liked collective problem solving, and one felt inspired by the fact that us teachers both live in self-built houses. One suggestion is to have tiny house visits at the start of the course or around the time of the design workshop.

Other comments
The most complaints are about the workshop - it being too small, the toilet being dirty and the tools disorganized. Regarding the scope of the course, about half finds it perfect, while 2 of them would have wanted it to be longer. When asked what could have caused the high level of absence, most people reply that it was probably just bad luck with a lot of sickness. The common suggestion is to take in more people and count on a few being away every time (although it is mentioned that it was rather nice being just 6 people at a time in the workshop). Someone suggests to make the theory lectures on site or otherwise less one-way. When asked for general tips on improving the course, people want to reduce the stress. Tips on how to do it are to have shorter days, a longer course, no deadline, and more time for informal discussions.

Part 5
Reflect
on the outcome of the research

In Part 5, a final discussion is held in an attempt to review the research and answer the research questions. Part 5 reflects the active research in Part 4 against the theoretical framework from Part 2. It attempts to assess whether the theoretical assumptions were correct and whether the course of action taken was successful in activating the potential of the tiny house movement. It examines the role of the architect and the role of the self-builder and whether and in what way they could benefit from collaborating. Finally, a personal reflection on the process is shared.

5 Reflecting

The main aim of the thesis was to understand as well as to activate the potential of the tiny house movement by pedagogically sharing the skills needed to design and build a mobile tiny house. This was done in an attempt to invite self-builders into the field of architecture with the assumption that they could contribute by exploring more sustainable ways of building and living. Architecture has become a professionalised field where buildings are designed according to codes and norms to be constructed by profit-driven companies, while bottom-up movements, amateur initiatives and ways of living that are outside the norm are not always seen for the potential they hold. But despite the urgent threat of global warming and the need to rethink living, radical enough ideas fail to be implemented by professionals. With a background as a self-builder of my own tiny house and with many years within the tiny house movement, my aim has been to highlight this as of yet rather under un-researched topic as a potential tool for sustainability for self-builders and architects alike. Working with a hands-on-movement, I acknowledged the need to move from theory to practice in order to test the feasibility of my theories, and therefore ventured to actively invite 10 new self-builders to the field of architecture through sharing information in the form of a handbook, a course and a design. In this reflection I will attempt to give a summary of contribution to the field through attempting to answer my research questions.

5.1 "What is the tiny house movement, what potential does it hold in regards to sustainable development and in what ways could it best be activated?"

My first sub-question was aimed at providing an initial understanding of the tiny house movement and its potential in order to find the best course of action to activate that potential. Through literature studies and participant observation, I developed a theoretical framework to inform the decisions made in the remainder of the thesis.

In order to deeply understand what the tiny house movement is and where it's coming from, I initially divided the self-built mobile tiny house into its three key components; namely *Tiny living, Mobile architecture* and *Self-building*, and examined them from a historical as well as contemporary perspective. I find that the concepts are deeply rooted in the history of architecture. Only recently have they started to decrease in favor of the modern top-down, big-scale, industrialized and professionalized means of building. (Nylander, 2013). While having resulted in effectively produced, accessible and high comfort housing, modern architecture has been criticized for being expensive, having inhuman aesthetics and lack of possibility for the habitants to affect their lived environment. As our homes have become products sold for profits they lost their value as a means for the habitants to excess their creativity, develop their skills and to build community, which has led to a decreased resilience (Volny, 1976). The three historically dominating concepts are however starting to reemerge in new ways, again proving useful to tackle the struggles of today. There are examples of both purely mobile architecture, tiny living and self-building-projects, each with their pro's and con's. The first modern tiny house was built in 1997 (Shearer & Burton, 2023). A tiny house can be defined as a self-built, long-term residence house below 37 m^2, most typically built on a trailer (Olsson, 2020). The research shows that the self-built mobile tiny house combines the strengths and counteracts the weaknesses of the three concepts. Mobile and tiny naturally goes hand in hand, but building it yourself lowers the price and increases the personalisation and sense of responsibility. The self-built mobile tiny house offers the most freedom both during the design-, build- and living-phase and can provide a sense of meaningfulness, self-realization and happiness for its dweller, which is perhaps one of the reasons it is becoming a worldwide phenomenon. The movement is inspired by different minimalist life orientations and can be seen as a counter movement to the modern building industry as it's promoting individually unique designs and small-scale self-building, developed according to the dwellers' needs, wishes and skills.

Perhaps another reason for the increasing popularity of the tiny house movement could be found in the newness of the lifestyle and buildings our society provides, as it has quickly moved far away from what our primal brains are developed for. The tiny house, although in many ways modern, rests upon what can be considered the first and most predominant architectural concepts – *tiny living, mobile architecture* and *self-building*. "Going back" to living according to these concepts might be more in line with what we as humans were developed for and feel is "right".

One of the biggest issues with modern architecture and the conventional lifestyle is of course its huge environmental impact (Hedenus et al., 2018). Our present day way of life is threatening the ecosystem through overuse of resources and excess CO_2-emissions. We need to lower our emissions by 43% before 2030 to limit the effects of global warming (UNFCCC, 2024), which requires drastic action.

In order to deepen my understanding of why the tiny house movement is emerging now and in what ways it is relevant to sustainable development, I mirror it against the theories of two contemporary philosophers, Hartmut Rosa (2014) and Jonna Bornemark (2018). I find that at the core of the unsustainable development lies changed thought- and behavioral patterns that can be traced back to the Enlightenment (Bornemark, 2019; Hedenus et al., 2018; Rosa, 2013).

According to Bornemark (2018) the development towards our modern way of life is an effect of a dominance within in our minds of the calculating "Ratio" instead of the reflective "Intellectus". Moving towards more industrialized means of producing housing can be explained by a Ratio-driven mindset and a constant strive for effectivity favouring general guidelines and industrialized means of producing houses before individual needs and collective processes. Similarly, society has moved towards increased consumption as the road towards happiness, perhaps because its measurement of success (money, GNP, or number of owned things) is so easy to understand by Ratio. In the process our material needs have not only been fulfilled but also increased (Ekstam, 2013), so that they no longer are aligned with the definition for sustainable development:

> *"Development that meets the needs of the present without compromising the ability for future generations to meet their own needs" ((UN, 1987).*

Even though the effect of our present way of life is threatening us with ecological extinction, we seem incapable of changing our ways. According to Rosa (2014) this can be linked to an ever increasing "Social acceleration" that can't slow down. In the words of Bornemark (2018) it is because the dominance of Ratio is making us unable to reevaluate our "needs", even when those needs show to be misaligned with the availability of resources. That could be the

reason we've been blind to warnings about environmental destruction as well as to research indicating that pursuit of material wealth is not the most effective tactic for happiness (Hausen, 2019; Malik & Ishaq, 2023).

What is needed is an Intellectus-rich practice to explore other ways of living - equally attractive but less emissive. Someone caught in the hamster wheel however lacks the possibility to reflect upon other ways of living. Most people seem to be, as Rosa (2014) puts it "running nowhere fast", not seeing a way out of the draining working-consuming-cycle and feeling incapable of doing anything about it. Social acceleration has uprooted and redefined society, always with the promise of a more harmonious life for humans (Rosa, 2013). Even though the more effective means of production could result in less work, the paradox of the modern world is that we're more stressed than ever. That makes us dependent on effectivity-increasing technology and passively provided housing, and hinders us from exploring an alternative to our way of life.

On the question "...what potential does it hold in regards to sustainable development?" I find that the tiny house movement can challenge these unsustainable thought-patterns. Building a mobile tiny house saves money by reducing consumption and living costs, which frees up time to reflect on what really matters. It presents an alternative to "the bigger the better"-mentality, and has instead succeeded in popularizing a lifestyle where "less is enough". The tiny house presents an opportunity to redefine our needs to better fit the availability of resources, while simultaneously providing a more fulfilling life by shifting focus to non-material values. Reevaluating assumptions and norms put on us by society is a way to activate our Intellectus and provide us with an opportunity to change. The result of going through the process: a happier life more in line with our values, is perhaps one of few things that can be attractive enough for us to break free of our mainstream consumerist patterns. It's a way for people to harvest the potentials of a rational and effective society without actively contributing to further social acceleration (Rosa, 2015). In this way, the tiny house can function as a counterforce to the imbalanced development.

Furthermore, self-builders of mobile tiny houses manage to go from just dreaming about another future (as many of us architects do) to actually implementing it within their own life. The building industry today is divided into a range of actors who affect and control one another (such as politicians, architects and construction companies), which can make it difficult to implement changes that are outside the norm. For example, all new buildings must live up to code that is formulated to ensure high living standards. But letting those that demand the most space decide the minimum dimensions means that it's been made illegal to design anything not fitting for a wheelchair (meaning it's impossible to legally design a full time habitation below 22 m² (Boverket, 2018)). This robs people of the possibility of sensing themselves what their needs are, and effectively stops any attempts at radical downsizing or voluntary simplicity within the system. Even if it would comply with building codes, an architect with a radically more green idea for a house could have problems implementing it as the construction company building it might change from a sustainable to an economic solution for the sake of profit. These are just some examples to highlight that in order for the system to change, all parties need to change simultaneously. In order to change, they need an alternative that they find worthy of changing to. As experimentation outside the norm is hindered by the many parties within the building industry, experimentation must happen outside the system. By focusing the executive power from a range of actors within the construction industry into one person or community, self-builders find a way to bypass norms and legislations. This provides a valuable opportunity to change faster than the system does - exploring an alternative that could hopefully influence mainstream construction in a more sustainable direction in the future. Although top-down sustainable initiatives would be more effective, bottom-up initiatives will have to lead the way.

Among the reasons for adopting the tiny house lifestyle, sustainability is however not top of the list. The most mentioned reasons found in the literature studies (Mangold & Zschau, 2019; Olsson, 2020; Wilson & Wadham, 2023) as well as confirmed by the self-builders attending self-building courses (Appendix 5a-c), is Economy as well as Freedom & Autonomy. Very much hand-in-hand, there is a general wish within the movement to lower one's expenses as a means to gain more freedom and be able to spend your time on activities that feel more meaningful than working and consuming. The tiny house movement is characterized by a non-idealistic approach, where one chooses to live in a tiny house simply because it seems to be the best road towards personal happiness (Mangold & Zschau, 2019). In many ways however, this leads to a more sustainable life whether it's the main intention or not; building a small house uses less resources, with reused materials and wood being both the cheapest and the most sustainable. Similarly, a lowered overall consumption and a focus on immaterial values is good for the wallet as well as for the environment. So whether it's done primarily for the environment, or for the economy, the outcome is often more sustainable compared to conventional living. The risks to be highlighted are rebound effects, the high environmental impact of the steel trailers and limited insulation. My research also suggests that in order to be successful, it must be a voluntary choice and fulfil the needs of the habitant in the long run (Hook et al., 2023), why it is not a relevant living solution for everybody. Adopting the tiny house lifestyle is in other words not necessarily a highway to a sustainable future. Still, it is paramount in times like ours to encourage and empower those that are actively redefining "the good life" in equally attractive but less emissive ways, which is why my research suggests that the tiny house movement holds a lot of potential in regards to sustainable development.

Even though the movement can be seen to be of interest to many, frequently mentioned in newspapers, television and social media in Sweden (p.43), the professionalization of our modern society means the information and skills needed to start a project is unavailable for the common person. The result is that although many want to, few can. On the research question "...and in what ways could it best be activated?", I therefore find sharing of information to be paramount. Self-builders need to be invited into the field of architecture and construction, yet be allowed to freely and creatively reimagine building and living in an Intellectus-rich manner. By sharing the essential skills necessary to build a house and by regarding self-builders as able contributors, the tiny house movement could affect the societal development in a more sustainable direction.

5.2 "What skills are needed to build a sustainable mobile tiny house and how can they be pedagogically communicated to self-builders?"

On the question "What skills are needed to build a sustainable mobile tiny house?", my research suggests that self-builders need a wide set of skills: They need theoretical knowledge such as about laws and rules, construction principles and system solutions. It is also necessary to be able to assess one's individual needs and create a functional design that fulfills those needs in an innovative design-process. Furthermore self-builders need to know how to build, being comfortable with tools and being knowledgeable about building materials. Lastly, I find it important to encourage the self-builders to dare to experiment with alternative solutions. As an answer to the research question "...and how can they be pedagogically communicated self-builders?", I arrive at the conclusion that a good way to pedagogically communicate these essential skills, is in the form of a comprehensive handbook covering most of the theoretical knowledge one needs to start a project, and a self-building course in which the participants would be allowed to learn how to build innovatively through the construction of a tiny house. I find that the design should be suitable to the needs of the movement and that it should be communicated in the form of an easy-to-follow step-by-step guide.

Figure 55: Carpenter and co-teacher Andreas is explaining how to fit a window into a frame at the self-building course. To the right, the step-by-step guide can be seen on the whiteboard, and in the background the half-finished house.

5.2.1 The handbook

Looking at what's available today, I find no comprehensive literature on the subject that covers everything one needs to know to build a sustainable mobile tiny house in Sweden today. I therefore find that such a book would enable many more to build their own house and reduce the time for preparations. I find that a good handbook should be both highly relevant and easy to understand, which is why I've attempted not to avoid any complicated subjects, but to convey them with pedagogical illustrations to make it more available. The theory I find relevant to include is design guidelines (the 10 steps), laws and rules for trailers and buildings, construction principles, different materials and their properties, and system solutions including electricity, toilets, water and heating. During the development of the handbook, I was torn between my wish to keep it short and the fact that self-builders often ask for very detailed information. I decided to let the chapters about laws for vehicles and buildings to be relatively extensive, as that's what's most difficult to understand when attempting self-studies. System solutions, for example, I kept quite brief as it's easy for readers to research further. It should be noted that I'm not an expert on all aspects touched upon in the handbook, and that the facts should be checked by professionals.

Figure 56: The handbook

The handbook was very well perceived by the participants in my course. The contents of the book were presented as online presentations during the course, but also available as an online PDF and as printed material in the workshop. The handbook has been updated with the questions asked by the participants during our lectures, why I now think it covers most of the basic relevant knowledge. The handbook could contribute to making self-building more available. As it gathers data from many different sources, it radically decreases the time otherwise needed to understand the theory surrounding the design and construction of a tiny house.

As the tiny house can per definition be both a vehicle and a building, there is a lot of confusion about what laws apply. The teachers in the self-building courses I attended often couldn't answer the questions from the participants, and were simultaneously not able to refer to any literature (appendic 5a&b). In some cases they did know the answer, but lacked pedagogically developed illustrations to effectively convey it. In either case, I hope the handbook can be of use. Having the theory gathered as downloadable material also puts the participants at ease when it comes to taking notes and remembering everything. I personally find that having all the relevant information gathered is invaluable in a design process, and have myself used it several times during the year.

The layout, text and some of the images are however made a bit in a rush due to lack of time within the timeframe of the master's thesis. Some of the guidebooks available on tiny house construction from the U.S. are over 300 pages long and full of text and inspiring photos of tiny houses, something I have obviously not been able to produce. Although I wish to keep this one in the form of a brief handbook, I do wish to spend more time revising it and extending the material on certain subjects with the hope of perhaps publishing it at a later date in order for it to reach many others.

5.2.2 The course

The course combines on-site construction, online theory and support in the design process, with the overall aim to make the participating self-builders ready to start their own projects. In order to learn about how best to teach self-building, I participated in two self-building courses arranged by local self-building organisations. Self-building courses aimed at tiny houses are just recently starting to appear, but it is my impression that they are still under development, why there was no literature to be found and few examples on how to develop them. I attempted to read about pedagogy and how to develop a general course, but couldn't find any fitting literature. Instead I developed my own parameters for a successful self-building course based on my observations. Luckily, the two courses I attended were very different, giving me varied examples of how to succeed or not. The 8 parameters gave me a very good framework when developing my course and could be a good starting point for someone else interested in engaging in a similar endeavor.

The collaboration with Bobini and Angereds folkhögskola was a very fitting setup for what I wanted to explore, and was possible only because of my long term engagement in the movement. Holding the course through an official school meant it could reach a lot of people through the course webpage, and that the course could be financed. That meant I could receive funds for renting the workshop, for tools and for salaries for me and the carpenter. I could of course have worked for free (and the salary I received nowhere covered the hours that I spent on the course) but it was a prerequisite for hiring the carpenter as my co-teacher and being able to use the workshop. Being dedicated to experimental construction, Bobini were happy to lend

8 parameters for a good course:

1. Wide learning outcomes
2. Structure and clarity
3. Prepared materials
4. Participant influence
5. Informal discussions and collective problem solving
6. Support for individual projects
7. A common project
8. Inspiration

the space and also provided open minded feedback during the design-and construction phase. The only issue when cooperating with a disorderly organisation such as Bobini is that the workshop was often messy and verbal deals not always kept in a professional manner. The best thing about the setup was the mutual benefits - while I got to explore what I wanted, the school got material to develop their course and Bobini could receive new members. Holding the course all by myself would have been close to impossible, and at least a lot more expensive and a lot more exhausting.

Holding the self-building course was however still very hard work. I initially thought my workload would be lowered by letting a group of self-builders build my design instead of doing it myself. The time needed for making collaborations, doing the preparations and holding the course however extended the time that it would have taken me to build the house myself. Planning for every building weekend to purchase the materials and prepare the many workstations to was very demanding. Being the main organizer and designer, I was also bombarded with questions during the weekends, running from group to group. During the first weekend I had to take a few hours break due to total overload, but as I got more comfortable in my role as teacher and the participants got more independent, I started to be able to relax more during the weekends.

In both courses I attended, attendance dropped as the course progressed. Many of the parameters developed were made to hinder this from happening; I assumed that a common project from start to finish would motivate the participants to keep coming in order to be part of every step of the construction. I focused on structure and good communication to clearly convey to the participant all the new things we would do every weekend. I also spent a lot of time on the application process, trying to choose the applicants who seemed the most motivated. I do believe the fact that we built a house from start to finish was a great way to keep the course interesting, I did experience the WhatsApp group to be a great way to keep in contact and send out reminders, and I do feel like most of those attending really wanted to be there. Still, the average number of people on each meetup was 6,5 (out of 10). It wasn't the case of dropouts - there were often different people missing, and they always contacted me and had more or less good excuses for not attending. I tried several things, but felt at a loss about how to make them attend. According to feedback from the participants, it was simply a case of normal bad timing with illnesses etc. One participant who had worked with organizing voluntary work says that they always counted on a 30% dropout-rate on weekend activities. A few people however also mentioned that the intensity of the building weekends sometimes led to them staying home if a bit tired, and that shorter days or a more loose deadline (f.x. by a longer course) could have helped. Perhaps the attendance could also be encouraged by some kind of diploma in the end for those that have attended at least 80%. Although a course such as mine can not compete with a full time education aimed at future professionals, a diploma like that might be useful to have in an employment process to be able to show that you have built a house, can manage tools and knows the basics of a design process.

Apart from low attendance, the progress of the work was halting simply due to slow work during the weekends. As the research suggests, I was confirmed during the course that many of those chasing the tiny house dream have been through some kind of life crisis pushing them to question the conventional way of living (Mangold & Zschau, 2019). Many of those in the course had, like me, been burnt out in the past, and actively needed to pursue a lifestyle where they didn't have to work as much, but instead lead a more peaceful life. Others had different injuries, such as myalgia or worn out joints, who couldn't work for that reason. It was clear during the construction that it limited their ability to work. Many were too tired after lunch to do anything substantial, or could some days not at all manage to hold a screwdriver. Many weekends the work also went on slowly because people took long coffee breaks or were very hesitant and careful in their tasks. The difference in speed was considerable when me and the carpenter worked on some part together, or even when I was there alone working in between the weekends. It can of course also be explained by our previous experience, but it is still worth noting that the self-builders weren't always as focused and working efficiently as professionals, meaning the construction took longer than necessary. Then again, perhaps that's something that we should all learn. To have fun, relax along the way and not get too hung up on strict deadlines. If you lead a relaxed life and have time to spend on designing and building, why not let it take a year or two instead of rushing through the process?

The combination of low attendance and slow progress is however not good when you have a deadline such as finishing a masters' thesis. Avoiding stress and doing things in a long-term sustainable manner is important to me, and something I wanted to put emphasis on during the course too. Personally I manage to keep a good work/ life balance by planning well and working

efficiently when I do. The slow progression during the course was however out of my control. Being dependent on self-builders to build my design thus proved to be frustrating, and in the end I had to spend a lot of time in-between weekends to keep on track. It resulted in me pushing myself too hard, and I'm sorry it also added a layer of stress during the course. This is something that was brought up in the feedback from the participants. I think it created a negative spiral: Because people were not attending, we got behind in schedule, which increased the sense of rush during the weekends, which made less people come because it was too "intense", making it even more stressful for those that were there. I could of course have accepted the slow phase and been okay with only finishing the shell. But I wanted to finish "properly", for my own as well as for the participants' sake, as I had promised them we'd do systems solutions in the end. I don't know if it was the best course of action to push on. Seeing the house finished (almost) on the last day made it worth it for me, and I hope the same goes for the participants attending. But would I do it again, I would calculate for absence and set the ambitions lower.

As my intention was to enable self-builders to be able to start their own projects, I saw it as important to "upgrade" from a mere course in construction to increased focus on the design process. I got the idea for the 10-step program from Bobini, but remade all of the steps they had put down as I found the process to be best developed otherwise. It is largely based on my own road towards a tiny house. The participants found it helpful during the course, and I hope they will be able to use it afterwards too. One participant, who refurbished her van during the spring, found it to be applicable for such a project too. As they are inexperienced in design processes, I put special emphasis on step 1 and 2 "Define your needs" and "Find reference projects", and also supported them through step 3 "Sketch and model" in a design-workshop. I

The 10-step program:

1. Define your needs
2. Find reference projects
3. Sketch and model
4. Calculate budget
5. Plan: where, when, with who?
6. Learn to build
7. Make building plan
8. Find materials (earlier if reused)
9. Build your house
10. Find a place to live

attempted to teach them the 3D-modelling tool SketchUp as a means to create drawings and do budget calculations, but a lot of them seemed to find it too difficult or not relevant right now in their processes. In the end I had planned for a session where every participant got to show their sketches and how their work had progressed, but I chose not to. Partly, it was due to us being behind and me prioritizing building. But it was also because I had noticed that not a lot of the participants had anything to show. It was perhaps too much to expect that they would be able to master all the aspects I presented to them, and find time outside the course. The feedback on whether people got enough support was very individual, with some being happy that there wasn't a lot of focus on it, and some wanting a lot more. I'm considering, as two of them also mentioned in the evaluation, if it would be better to divide the design and the construction into two parallel courses. I'm happy with my attempt to combine the two, but realize that it's difficult to find participants who want to focus equally much on either aspect. Those that wanted to design their house right now found the focus on design to be too little, and those that had plans to start building in a few years thought the design aspects took too much of the course. Out of the 10 participants, one finalized her design and planning and bought a trailer, one plans to start building this summer and two others next year.

Using AI to aid in the design-, and planning processes holds a lot of potential in shortening the time and the amount of things you have to learn as an inexperienced self-builder. I developed a prompt to aid in the early stages of the design process. I also attempted to use ChatGPT to make shopping lists of materials as well as budget calculations. I found that it worked well for otherwise time-consuming things like calculating the total length of meters of wooden studs, but that it missed a lot of important materials needed such as trims and metal edges. I urge further exploration into the possibilities and the limitations as a possible future research subject.

Chat GPT prompt: "I'm taking a course on building tiny houses and am about to start planning my own. I need to make a list of things I want (5-10 items) and things I want to avoid (1-3 items). Can you ask me 10 relevant questions, one by one, and then create such a list?"

I continuously tried to improve the course, largely based on the daily check-in/check-out sessions where the participants could share their thoughts. One example is the to-do-list to complement the step-by-step guide, that more clearly showcased what we were doing on a certain weekend. At the end of the weekend, when all notes had moved from "to do", via "being done" to "done", everyone also experienced a sense of accomplishment. Another issue brought up was that people were getting tired after lunch, but there was no place for a break in the workshop. I tried a few solutions before buying a beanbag, which was frequently used for the reminder of the course.

Figure 57: People chilling on the beanbag

Evaluating my previous answer to the research question "What skills are needed to build a sustainable mobile tiny house and how can they be pedagogically communicated to self-builders?", I found the handbook and the course to be a success, although I see potential for further development. I find that the information and skills taught in the book and course was adequate and presented in a logical order, the only thing asked for being a lecture early on about screws and materials in the workshop, and the inspirational visits to tiny houses to be earlier on. The biggest indicator for me that the course was a success was that I could see a clear improvement every weekend in regards to the participant's abilities as well as in their confidence. The discussions during the breaks went from eager questions about different laws or aspects of construction, to a calm sense that they actually got all their questions answered.

My contribution has been the development and first tests of the 8 parameters for a successful course that could be used as a framework for planning future self-building courses. After testing them I however find that some parameters could be reformulated. For example, the evaluation shows that the participants were happy not having a lot of "Participant influence", but rather liked a preset schedule. I also consider how "Support for individual projects" could be integrated, and whether it's better to not focus on every aspect of self-building in one course. I further developed the concept of the 10-step program and tested how to use AI to aid the design-and planning processes for self-builders, with the hope of making planning for self-building projects more available, faster and with higher quality results. Each of the above could be a good starting point for someone venturing to explore similar questions, but should all be considered tests that could be improved with further research.

5.3 “What is a suitable design for a lightweight, easy-to-construct, low-cost, sustainable mobile tiny house?”

In order to hold a successful course, we needed a common project to build from start to finish. Having built my own house relatively conventional I had experienced what an inconvenience it was when attempting to keep the weight down. As thinking outside norms and conventions is one of the greatest potential of self-builders, I found that teaching them how to do standard construction during the course would be counterproductive. I also saw the chance to activate my own Intellectus in a creative process towards a means of construction better fitting for the demands of the movement, which is why I ventured to investigate the research question “What is a suitable design for a lightweight, easy-to-construct, low-cost, sustainable mobile tiny house?”. I arrived at requirements for the design based on the theoretical framework set up in Part 2, but had to restrict the size of the house due to the limited amount of funding and the short time available for construction.

Low-cost?

Comparing the price of housing of my design with conventional housing (below), it becomes obvious what a difference it can make to reduce the space, reduce the amount of building materials, use reclaimed materials, avoid acquisition of land, avoid building permits and to self-build without the involvement of professionals. Although this house is perhaps a little bit too small to be considered a long term residence, my own house is only twice the square meter price - or in total 6,5% of that of a conventional house per person. It clearly shows what a radically more free life one can lead by building a tiny house, and how much more radical life choices one is able to make since one is not dependent on a full time job to pay of a mortgage. It can provide the opportunity to work less and instead spend time on things that provide more meaning. For professionals, it can provide the possibility to say no to jobs that demand that you help produce un-sustainable projects and instead work more according to your ideals. In other words, it’s a way for individuals to break free of the demands of the system and instead explore a life that provides more meaning and generates less emissions. The low price is in other words an important aspect to activating the potential of the tiny house movement. The total price overshot the budget by 4423 SEK, but could be lowered if one found a way to reduce the amount of plywood used or found more of the materials reused.

Standard construction: 45 859 kr/m² (SCB, 2021)
My design: 8264 kr/m² (16% of standard)

Standard m²/person: 42 m² BOA (SCB, 2023)
My design: 8,4 m² BOA

Total price standard house: 1 920 000 kr
Total price this house: 69 423 (3,6% of standard)

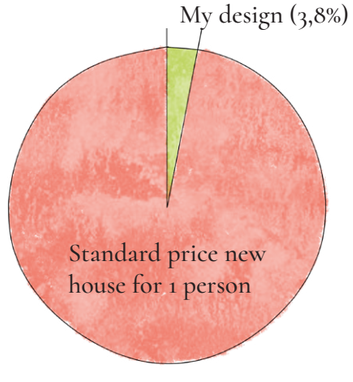


Figure 58: Price comparison between my design and standard construction. See appendix 4 for budget calculations.

Lightweight and mobile?

In order to increase the mobility and sense of freedom, I attempted to reduce the weight to a level where the house could be towed by a B-drivers licence and a normal car. The trailer I found could handle a house of about 1000 kg, and assumlingly a few hundred kilos more when towed in 30 km/h. My tactic for reducing the weight was to minimize the dimensions of the materials. I’m really pushing lightweight construction to its edge with my consistent use of thin plywood, and kind of succeeded in my goal, with a total weight of the house of 1129 kg inkl. furniture (See appendix 4 for full weight calculation).

The system solutions needed to be functioning OFF-grid for the house to be truly mobile, and as I aimed for a low price and high level of self-building the solutions had to be legal and safe to install without the involvement of professionals. System solutions not being my area of expertise, it was a struggle to figure out how to solve everything. Assuming that most self-builders are as oblivious as me inspired me to find solutions that were as simple as possible (as opposed to my architectural solutions that are perhaps a little bit more difficult sometimes). I’m very happy with being able to provide a functional ON-and OFF-grid electrical system without the involvement of professionals. I love the simplicity of the water system, but acknowledge that hot water might be necessary if the house should be considered a full time habitation (right now it can be gained only by heating water on the stove and connect the foot pump to such a bucket). Due to time running out, I also didn’t get to waterproof the bathroom within the timeframe of the course. If I do it later on, I might consider adding a solution for hot water and add a shower head. All of the system solutions attempted should be considered experiments, as it’s an area I leave for others to research further.

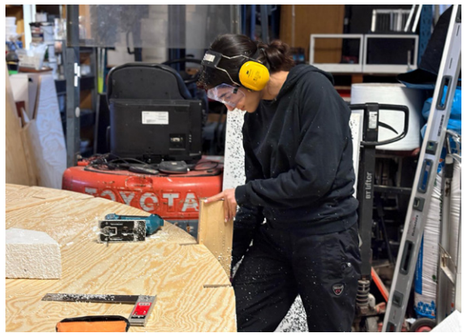
Easy-to-construct?

We were met with many difficulties during the construction due to the materials being so thin and the solutions previously untested, making me unsure whether I succeeded in making it more easy-to-construct. The time of construction was indeed reduced by removing steps, avoiding difficult tasks such as metal works, and by building the wall as a sandwich element. I believe removing the moisture- and wind barrier will be working out great, and it saved us time and money. However, both the time and difficulty was increased by other aspects. Would I do it again, I would first of all use wood instead of plywood for

Figure 59: The tiny house is so lightweight it can easily be pushed by hand (or more easily towed by car).

studs. It was sometimes a bit uncomfortable screwing together the walls from below, and the screws sometimes wouldn't grab hold of the plywood. I had thought the walls would be stiffer and easier to manage after they had been put together, but they were very wobbly (perhaps due to lacking a top plate/ hammarband). This meant that they were put on a little bit skewed, which meant it got difficult to attach the roof rafters (also because the jigs we had cut proved to be too narrow and not properly aligned). I had planned the house so that the plywood on the roof should have been whole, undivided sheets, but because the construction below was twisting and turning, we had to cut every sheet to fit individually. In other words, because of an early mistake that was difficult to avoid, the rest of the construction became difficult. Similarly, the frame surrounding the facade along the roof had to be cut by a hand-held jigsaw, which resulted in a very wavy line when done by amateurs, which was impossible to hide. I think this means of construction might be more fitting as a kit with pre-made laser cut pieces that a self-builder could assemble, as many of the issues we faced were connected with a difficulty cutting things precisely. That would however of course rob the self-builder of being able to adjust the shape. I'm also a little bit worried about the flattest part of the roof on top of the house, and hope that it won't bulge and allow water to stay. The design definitely has room for improvement, but I already have ideas for how some of the most pressing issues could be remedied. Setting very strict limits to budget and weight meant I had to try something new entirely, and of course some issues would come up - that's when you learn the most. What has been most liberating for me was to disregard the assumption that vertical loads needs to be carried directly by a frame. Finding out that a sheet-facade can do the same job allowed me to develop a means of construction suitable for round shapes (something otherwise very difficult to build with conventional construction).

Figure 60: We had to spend a lot of time correcting mistakes, such as cutting bigger jigs in the facade for the roof rafters to fit.



Sustainable?

A newly-built house always results in an environmental impact. In order to minimise the emissions caused by my design (as well as the price) I attempted to use reused materials as much as possible, and focus on the materials with the highest GWP. I found Blocket and Marketplace to be the best alternatives for trailers and materials, while Tradera was best for tools. As Andersson & Nilsson (2020) concludes, the market for reused materials is inefficiently organized, making it a very time-consuming process to find enough materials. Our guest lecturer on the course on reused materials says it takes at least a year to collect enough materials to be able to build a house (Appendix 5c). Just finding the trailer took months. Windows were relatively easy, while I failed to find a door. Plywood was rarely sold reused, why again the use of wood would have been beneficial. Some of the interior, such as the bathroom sink and the electric central, I obtained by talking to people at Bobini. Good contacts are probably one of the best ways to acquire reused materials on a bigger scale. Given the timeframe of the thesis, I'm happy with what material I could gather and the way it lowered the price (by approximately 45 830 SEK, see p.73), but didn't have the time to look into how much emissions were saved.

I furthermore tried to use only traditional and non-toxic paints. While they were great to work with, they needed many layers and long drying times, making it unsuitable for a course.

Figure 61: The house with its characteristic shape.

Suitable for the course?

I didn't want to build a conventional construction during the course as going against the conventional is what this project is all about. But I note that the self-builders seem too inexperienced to dare to go outside the norm when it comes to construction. In the feedback, 3 of them were happy to build a lightweight design, and 3 of them would have liked to do conventional construction. But I think their ability to build a house in any type of way isn't any lower because we tried to do it a little bit differently, and I hope that my experimentation inspired them to not get stuck in convictions.

The step-by-step guide?

When presented with the professional drawings on the first day, the self-builders understood nothing. The step-by-step guide proved much more easy to understand for non-professionals. I could easily visualize what we were going to do and how different joints were supposed to meet. My co-teacher agreed that it was a great aid in the teaching process. It was also an excellent way for me to keep track of what needed to be bought for the upcoming weekend and in planning for the different workstations. I find it a very good tool to communicate the process of construction to self-builders and architects alike.

A "tiny house"?

I have many times found myself explaining the concept of a "tiny house" to someone unfamiliar with it. They often say "Oh, so it's like a caravan?" and I reply "No, not at all, it's a house, although it's small and on wheels". Still, looking at the design we built, it might resemble a caravan more than a house. In many ways, the two concepts are of course similar, with the biggest difference being the fact that a caravan is more mobile and a tiny house is built with conventional construction and is meant as a full time habitation. As I wished to experiment with a more lightweight construction and focus on mobility, and as I due to the limitations in time and budget didn't want to build a full size tiny house, I guess I removed the aspects usually differentiating it from a caravan.

I do like the shape we ended up with, it feels organic and has a natural look. As my research question was "What is a suitable design for a lightweight, easy-to-construct, low-cost, sustainable mobile tiny house?", I find the design and means of construction proposed in this thesis to be quite successful. Perhaps one of the earlier versions with a symmetrical roof would however better have answered the research question, as it would have been easier to construct and would have reduced the price because of the efficient use of standard building materials. I acknowledge that there is potential for development in my design in regards to several aspects, such as being easy-to-build. I also see that the means of construction limits the possibility of building bigger houses the same way. The width as well as the height defined by a sheet of plywood (2.44 m) minimises the possibilities for sleeping lofts and much more floor space. Perhaps the question should have been asked differently to come up with a design more suitable for long-term housing, but I have learnt a lot by pushing the materials and solutions to their limits in trying to achieve an as lightweight, low-cost, easy-to-construct and sustainable house as possible.

5.4 The role of the architect

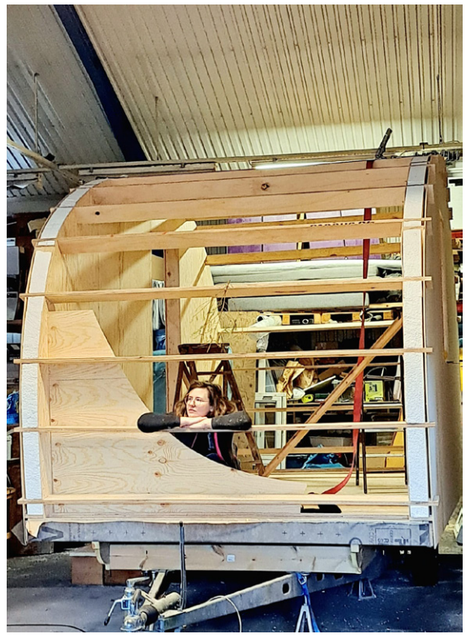
I came into this thesis wanting to activate and support the unrecognized potential of self-builders, but I have also grown in my respect for professionals. I wasn't sure of the role of the architect in a grassroot architectural movement such as the tiny house movement, and initially mainly identified myself as a self-builder. Through my experiences holding the course, I however realised that it was my professional self who organized and held the course, together with a professional carpenter and teacher. Even though there is a sense of co-learning and "solving things together" on the course, it is us teachers who have the interest and capacity to organise such a course and share our expertise with the participants. Being an influential force requires knowledge, experience and engagement - something that professionals possess as opposed to amateurs. While self-builders are open-minded and great at out-of-the box dreaming, translating that into reality is sometimes a struggle, both due to lack of knowledge and due to lack of focused interest. Architects on the other hand have more knowledge and the fact that we all choose to study architecture hints that we're passionate about the subject. While self-builders might just want to design and build this one house, architects want to spend their life designing houses. While it will be the first house that the self-builder designs, an architect, carpenter or engineer with many projects behind them can more easily spot mistakes and have more experience when it comes to what solutions work or not. A 7-weekends course simply doesn't compete with years of studies and years of working experience of a professional. Self-builders are however free of the convictions that professionals might have gained from working according to code and within the construction business. The differences in knowledge, skills and mindsets shouldn't keep us apart, they should be the reason we cooperate.

5.5 "How could self-builders of mobile tiny houses contribute to sustainable development if enabled to join the field of architecture?"

Summarizing my research to answer my main research question, I find that the strength of self-builders is their ability to be free of convictions and reimagine living in more sustainable ways. I find that even though their intentions vary, building and living in a tiny house limits the use of resources and consumption and acts as a counterforce to unsustainable societal patterns. I find that, if allowed into the field of architecture, that positive effect could grow and self-builders could affect the rest of society in a more sustainable direction.

I must however extend my first assumption - that enabling self-builders to join the field of architecture would be the most important course of action - and add that it would be equally beneficial to invite architects into the field of self-building. While amateurs can provide a more Intellectus-rich approach of creativity and innovation, those ideas can be realised more successfully with the help of professionals. Professionals could help drive a more radical change if inspired by unconventional ways and if finding means of acting outside the system. If I had the possibility to continue my research, it would be into how those two fields could work together - whether it's a diminishing of boundaries or a form of cooperation. Either way, I believe that if architects and self-builders shared their thoughts and experiences, they could complement and empower each other. That's when we'd be able to create something new that is bold but also really good. After this process, I still believe in the importance of sharing the power and knowledge needed to drive change so that more of us could act to combat global warming and meanwhile create a more human architecture.

Figure 62: Reflecting on the journey.



5.6 Personal reflection

During this year, my private and professional life has intertwined. Working with a movement that I was already a member of has had its pros and cons. It was easy for me to find collaborations and to blend in with the self-builders I met. But it also meant that I came with assumptions already made and had to remember to keep an open mind. Participating as a researcher also made it difficult to draw the line of when I was hanging out with friends and when I was observing objects of research.

Many of the previous assumptions I had have of course been confirmed, but deep-diving into the research has also provided many surprises. I would not myself have been able to list the reasons for people to live in a tiny house, but provided the research, I could easily recognize myself in each and every point on the list. Similarly, I was aware of the theories of the two philosophers I used, but hadn't combined it with the tiny house movement. Doing so gave me a framework for understanding and being able to explain what the tiny house movement is doing (and, simultaneously, what I'm doing). In this way it has been as much a journey in self-discovery as it has been into an architectural movement. I'll forever be grateful, both from a personal and professional perspective, for having been given the opportunity to full-heartedly deep dive into these questions, from the historical, contemporary, philosophical, educational, design-, construction-, and activistic perspectives as I have.

This movement is all about finding a sustainable way of life - to lower one's environmental impact as well as to slow down and focus on what's more meaningful. Again, being a part of the movement I'm investigating has meant I can all the time see in my own life if "it works". Doing this thesis in a personally sustainable way has been a priority. The many different objects of research was at times overwhelming. Although I find a high sense of meaningfulness working with it, family life, resting and spending time in nature have been important factors to prioritize. While I could keep it up quite successfully when managing my own time, the slow progress during the course made the last weeks a stressful struggle. As always with such a project, you wish you had more time. I'm happy with my contribution, but will continue to finish the last details on the house afterwards.

Getting to experiment with alternative ways of construction, not just in theory but in practice, was a huge liberation. When building our own house, we didn't dare to deviate too much from the standards in our inexperience. I've since thought of ways to make a design more suitable for the task, but only working with images and ideas often feels like half the work. The other half is to build it, which in our profession is most often done by someone else entirely. To test out ideas, feel the limitations of the different materials and to go through an iterative process with your hands is for me something that should never have been separated from sketching. Working full days

in the workshop was however hard, and I wouldn't like to do it every day, just as I don't want to work at the computer every day. Somewhere around the middle of the course, I was in the workshop about every third day, which was the perfect balance of theoretical/physical work. Where I got stressed from planning, the doing helped. When I got tired from doing it, the writing helped. It gave me insights into how I'd like to work in the future - just in between two professions. I think I'm not the only one who would benefit from mitigating the hard line between different types of work. Professionalisation has led most of us only to do one task 8 hours a day, easily leading to injuries and of course, as the thesis highlights, leading to a decreased resilience and an inability to change as a system.

During the whole process of writing this thesis, I've been living in my tiny house. My daughter was just a baby when I started reading the research and made the first drawings, and is now an active 2-year old running all over the house. It has given me insights into the limitations of tiny living. The house was perfectly designed for me and my partner, but our needs changed after having a child. While the first year went fine (except for some inconvenience climbing the stairs to the sleeping loft with a baby every night, as there is no other space for a baby-bed), the demand for space has grown along with her. There is simply no space to store a baby car seat and she already has more toys than can fit in her little shelf in the living room. While we've gotten good at minimizing our consumption, it is difficult to control the amount and sizes of gifts given, both to her and to us. With no properly sound-insulated rooms, it is also difficult to "get away" for a needed moment. I have had to find other spaces for the evening lectures for my course, for example sitting in the library or in our kind neighbors basement. It is getting clear that tiny living is much more easy for one or perhaps two persons, but that it is definitely more tricky for a family. How to combine tiny living with family life is something I leave to future research, if I don't find the solution before then. Perhaps the house built during the course will prolong our tiny house days, as it will now be parked in our garden as a much needed extra room.

No matter if we choose to move from or extend our tiny house further, going through the process of designing and building it has given me insights that I will relish for the rest of my life - both as an architect and as a person. That's why I still, after the realisations of the possibilities as well as limitations of the tiny house movement that I've made during this thesis, would not hesitate to continue my work. I wish to do what I can to encourage and empower self-builders as well as architects to take part in the architectural exploration towards sustainability that is made possible through the tiny house movement. I believe that change lies in our own hands, and with this work I hope to have increased the interest and lowered the stepping stone for anyone who wants to join our tiny revolution!

Thank you to everyone who made this project possible!

- Thank you Walter, Liane and Elsa for encouragement and for pushing me to do better.
- Thank you Bobini and Angereds folkhögskola for supporting me and enabling me to hold the course.
- Thank you Andreas for having been an amazing co-teacher and mentor.
- Thanks to all 10 participants who contributed by taking part in my experiment.
- Thank you Irisstipendiet and Estrid Ericsson stiftelse for providing the funds to make the project a reality.
- Thank you Jonathan for emotional support whenever I got overwhelmed.
- Thanks to my parents for research, sowing, babysitting and proofreading.
- Thank you Thelma for continuously reminding me of what's most important.

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List of figures

Figures not appearing in the list are created by me.

Appendices

To see the appendices online, scan the qr-code or copy the link: tinyurl.com/a-tiny-revolution

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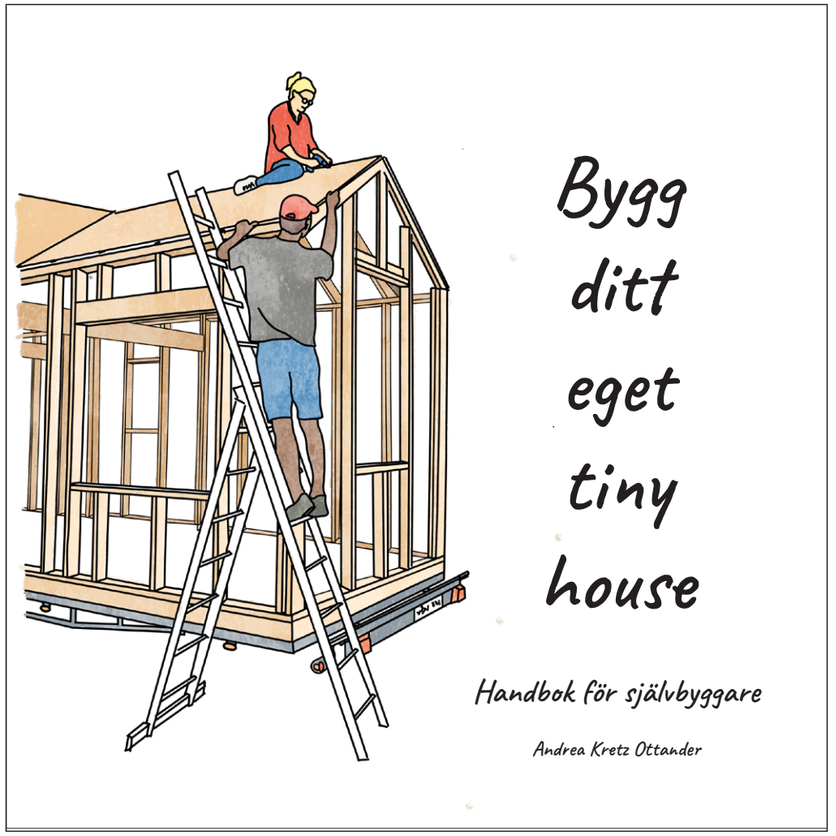
2: Drawings
3: The step-by-step-guide
4: Budget calculations
5: Field diaries: Participation Bobini (a)
Participation Egnahemsfabriken (b)
My course (c)

Digital appendices:
5b (participant evaluation)
5c (participant evaluation)
6: Videos: Stop-motion of design version 1 (a)
Video from the course (b)

Appendix 1:

The handbook



The handbook was originally printed as a 21x21 cm booklet. In order to include it as an appendix, the following pages showcase the guide in standard A4 size (210x297 mm). For original size, follow the qr-code on p.117.

Hej! Vill du också bygga ett tiny house?

Att ta reda på allt man behöver veta för att bygga ett tiny house är en tidskrävande process. Hur ska man tänka när man designar små bostäder, vad finns det för mobila toalettlösningar och hur mycket isolering behövs? Man behöver också sätta sig in djungeln av vilka lagar som gäller, vilket är svårt då tiny houset både kan klassas både som ett fordon och som en byggnad. Många hindras redan innan de försökt på grund av svårigheten att ta reda på allt man behöver.

Då jag byggde mitt eget tiny house i 2020 var jag mitt i en arkitektutbildning, men fick ändå spendera lång tid med att sätta mig in i förutsättningarna, hitta lämpliga lösningar och lära mig färdigheter som jag saknade. Då väcktes idén att samla all den teoretiska kunskapen som behövs för att bygga ett tiny house i en handbok. Resultatet är den bok du nu håller i handen. Den är menad att förkorta tiden det tar att förbereda sig för att bygga sitt eget tiny house, och för att öka nivån på de tiny houses som blir byggda.

Boken innehåller förutom en lista av alla relevanta regler också en genomgång av olika systemlösningar och tips om hur man kan tänka när man går igenom en downsizingprocess och hur man kan planera sitt bygge. Att lära sig bygga - det lämpar sig bättre att lära ut fysiskt, men boken innehåller också en genomgång av byggnadstekniska principer för att öka förståelsen för byggprocessen och hur man kan tänka om man vill skapa något mer innovativt.

Jag hoppas att du kommer att ha nytta av boken och jag önskar dig lycka till med att designa och bygga ditt eget tiny house!

/Andrea

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Innehållsförteckning

10-steg mot eget tiny house

Att designa och bygga ett hus från start till slut är en stor och tidskrävande process, även om huset är litet. För att gå från idé till färdig byggnad behöver man som självbyggare både agera arkitekt, byggherre, snickare och ibland ingenjör. Många kastar sig ut i processen utan tidigare kunskaper. Det är modigt, och görbart, men att få stöd på vägen kan göra arbetet lättare. De 10-stegen är ett sätt att bryta ner processen i genomförbara steg och få överblick över planeringsarbetet.

1. Definiera dina behov och önskningar
2. Hitta exempelprojekt
3. Skissa och modellera
4. Beräkna budget
5. Planera bygget: var, när och med vem?
6. Lär dig bygga
7. Gör en detaljerad byggplan
8. Skaffa material (tidigare om återbruk)
9. Bygg ditt hus
10. Hitta en plats att bo

1: Definiera dina behov

Grunden till ett bra projekt, och det steg som jag tycker man ska ge riktigt mycket tid och energi, är steg nummer 1; att definiera sina behov.

Att bo i ett mobilt tiny house innebär en platsbegränsning. För nästan alla människor kommer man behöva klara sig på mindre plats än man är van till. Att “downsizea” är en process där man reviderar vad man egentligen behöver, bortom vad man lärt sig att man “ska ha”. Det kan bli en väldigt spännande resa i att lära känna sig själv bättre - att skala bort det som inte var du, egentligen. Det man kommer fram till skiljer sig enormt från person till person. Någon älskar att laga mat och vill att köket fyller halva huset och ett bord för alla gäster den andra halvan. En annan klarar sig med en micro och en fåtölj. Någon vill kissa utomhus och hämta vatten i en hink. En annan vill ha ett helkaklat badrum med badkar. Inget är fel, det är bara personliga behov.

Gör man inte det här steget ordentligt, riskerar man att stå med ett hus som inte uppfyller ens behov. I ett större hus är det inga problem om man inser att man måste ha en ugn, ett piano eller en barnsäng - det går förmodligen att få in. I ett tiny house är det omöjligt om du inte planerade för det från början.

För vissa går det väldigt enkelt att lista vad man vill och inte vill. Om man behöver lite hjälp för att kickstarta designprocessen är ett tips att använda AI. ChatGPT eller liknande kan fråga dig frågor och kanske tydliggöra för dig själv hur du tänker. Vare sig du gör det “för hand” eller med hjälp av AI, titta igenom den färdiga listan efteråt och stryk och lägg till tills det känns som att allt det viktigaste finns med. Listan skall kännas väldigt mycket som “du”, och någon som läser den skall direkt få en bild av vad som är viktigt för just dig.

Jag föreslår att göra en lista med omkring 10 saker som är viktiga för dig, och några saker som du vill undvika.

Exempel på behovslistor:

<u>Exempel 1:</u>

1. Avdelbara rum (kunna vara ensam ibland när man bor två)
2. Kunna gå naken från sovrum till toa på natten utan att gå förbi ett fönster
3. “Komfortabelt boende” - ON-grid
4. Separat vardagsrum och kök
5. Kunna dansa utan att slå i saker
6. Flexibel projektyta
7. Plats att få barn
8. Minst 180-säng
9. Lätt att flytta
10. Miljövänligt

1. Ingen “korridorkänsla”

<u>Exempel 2:</u>

1. Heltidsboende
2. Inbyggd konstnärsateljé - stort, öppet rum med takfönster
3. Förvaring på oväntade platser - t.ex. under golvet
4. OFF-grid el med möjlighet till anslutning till elnätet
5. Två ytterdörrar på olika sidor av huset
6. Litet kök
7. 3x6m
8. Behöver inte vara lättviktsbygge

1. Ej nationalromantisk stil

Tips!

ChatGPT prompt för att kickstarta designprocessen:

“Jag är i gång med att planera ett tiny house som jag skall bygga. Jag behöver göra en lista över saker jag vill (5-10 punkter) och saker jag vill undvika (1-3 punkter). Kan du fråga mig 10 relevanta frågor (en efter en) om mitt framtida boende och mina behov, och sedan skapa en sådan lista?”

Ju längre svar du ger, desto bättre blir listan. Förkorta allt för långa svar genom att specificera “svara mig kortfattat” eller “ge ett svar på 100 ord”. Du kan också fråga AI om hjälp med andra delar av din planering. Testa fråga “På vilka sätt kan du hjälpa mig med att planera mitt tiny house?” för att få tips. Men kom ihåg att AI inte är “facit” - var kritisk mot svaren som kommer och redigera i efterhand.

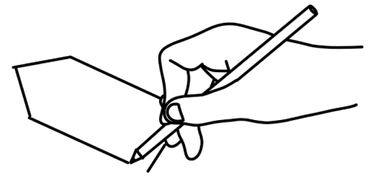
2: Hitta exempelprojekt

Att hitta exempelprojekt går hand i hand med att definiera sina behov. Det är ett sätt att närma sig vad man själv tycker om och inte tycker om.

Genom att hitta olika referensprojekt kan man få massor av inspiration och se hur andra smarta människor har löst samma uppgift. Det är också ett sätt att visuellt kunna prata med andra om vad det är man vill åt. Förmodligen finns det inte ett projekt som har allt man vill ha, men genom att leta runt lite hittar man förmodligen något projekt som har precis den köksupptällningen man gillar, något projekt som bara ser urgulligt ut och ett projekt med en smart trappförvaring. Om det nu är ett projekt som “bara ser urgulligt ut” skulle jag rekommendera att försöka sätta ord på vad det är som får det att se urgulligt ut. Är det fönstren? Färgen på fasaden? På så sätt kan du närma dig vad du själv vill ha. Det kan också vara bra att hitta några projekt som man inte alls gillar och sätta ord på varför man inte gillar det. På så sätt kan man undvika att hamna i samma fälla.

Det finns många videos på Youtube om tiny houses. Pinterest är också bra, då man kan spara bilder i olika mappar och få föreslagit fler liknande bilder. Besök i tiny houses är mer tidskrävande och kräver lite kontakter, men är egentligen ett överlägset sätt att få referenser vad gäller storlek och rumslig upplevelse.

3: Skissa och modellera



När man har en idé är det dags att börja skissa på hur den kan se ut.

När det är så begränsad plats som det är i tiny houses, men där ändå många funktioner skall in, så föredrar jag att börja med planlösningen framför utsidan. Men har man en väldigt specifik idé om utsidan kan man såklart också börja där och låta insidan anpassa sig.

Handskisser är oftast ett bra första steg då alla har tillgång till penna och papper. Jag föreslår att börja skissa ut hur funktionerna skall ligga i förhållande till varandra. När man känner att man fått till en grov skiss kan man gå över till att rita i skala med raka vinklar och linjal.

Även om man kan klara sig med handritningar, så kan det vara fördelaktigt att testa att modellera huset i 3D för att förstå rummet - speciellt med hus som har sovloft, trappor, överlappande funktioner och speciallösningar. Med en digital 3D-modell kan man enkelt flytta upp, bak eller fram något 20 cm och se hur det påverkar rummet. Jag rekommenderar SketchUp för tiny house-projekt. Det är ett program som man kan använda gratis och som är relativt enkelt att lära sig. På Youtube finns det massor av bra videos som förklarar hur man gör.

Fysiska modeller är en annan möjlighet. Kartong och skärkniv är lättillgängligt, men man kan också arbeta i trä, foamboard eller plywood. Dock behövs ofta färdiga ritningar innan man gör en fysisk modell och det är svårt att göra ändringar under vägen. Men det är ett fint sätt att verkligen lära känna sitt projekt, kunna vända och vrida på det och kunna visa det för andra.

Känner man sig osäker på hur en viss del skulle upplevas i verkligheten så kan man testa att bygga upp det i full skala. Genom att skära ut fönster i byggpapp och ställa fram kartonger som “bord” kan man få en känsla för det färdiga huset.

4: Budget (pris och ev. vikt)

De flesta av oss behöver en ungefärlig prisuppskattning för att veta om projektet kan bli möjligt. För de som vill bygga lätt, behöver man också beräkna vikten.

För att börja beräkna budget behövs ungefärliga ritningar. Det kan vara handritningar eller en 3D-modell. Ett bra program för att beräkna budget är Excel. Där kan man få en överblick över kostnaderna/vikten och enkelt lägga till och ändra dimensioner eller priser.
Du behöver ungefärliga ritningar för att ta ut längder, bredder och areor på de olika byggnadsdelarna. Använder du SketchUp kan du enkelt ta ut arean av exempelvis fasaden, men man kan också räkna ut det för hand. Du behöver också veta hur många meter virke du behöver för ditt hus. Som ett första överslag kan du räkna med 1,67 längdmeter/m² om reglarna sitter med standard 60 cm mellanrum. I ett senare skede kan du räkna mer exakt genom att rita eller modellera hela regelstommen och räkna antalet meter reglar. Det går också att få en uppskattning genom ChatGPT.

5. Planera bygget: var, när och med vem?

När man har en idé och har lyckats få ihop sin vikt- och prisbudget är det dags att planera bygget. För att kunna bygga behöver du en plats att bygga, du behöver tid att bygga och du behöver hjälp och stöd.

Då tiny houses är mobila behöver du inte bygga det där det skall stå framöver. Vissa har plats att bygga hemma eller i en bekants trädgård. Det går annars att hyra plats på självbyggeriföreningar såsom Egnahemsfabriken eller Bobini.

Det kommer att ta mycket tid att bygga ditt hus som självbyggare. Tiden beror mycket på hur komplicerade bygglösningarna är, hur mycket erfarenhet man har och hur mycket hjälp man får. Vårt bygge tog exempelvis 7 månader att bygga (6h per dag), men det finns exempel på både snabbare och långsammare processer. En bra tumregel är att det kommer att ta dubbelt så lång tid som du tror att det kommer ta.

Det är viktigt att överväga hur du klarar ekonomin under byggperioden. Vill du bara bygga på helger, eller behöver du ta ledigt?

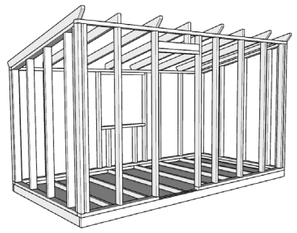
Det heter “självbyggeri”, men egentligen borde det kanske heta “tillsammansbyggeri”, då hjälp och stöd är väldigt viktigt i ett sådant projekt. Vissa moment kräver fysiskt samarbete för att klara, men det är minst lika viktigt att få mentalt stöd och uppbackning. Att bygga något tillsammans bygger gemenskap och gör processen lättare. Man kan få hjälp att både designa och bygga på självbyggeriföreningar. Vill man klara sig med hjälp från vänner och familj så är det bra att fråga sig för innan så man vet hur mycket hjälp man kan förvänta sig.

6. Lär dig bygga

Denna bok omhandlar främst planering av ditt tiny house-byggeri, men rimligtvis behöver du också lära dig att bygga innan du sätter igång.

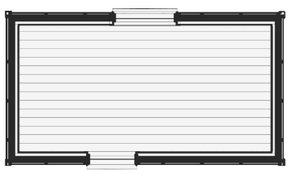
Vissa som ger sig på ett tiny-house byggeri är redan erfarna, men många är totala nybörjare på att bygga. Ändå skapas många fina tiny houses, vilket visar på att det faktiskt är görbart att lära sig själv.

Har man aldrig hållit i ett verktyg är en introduktion av något slag bra, vare sig det är från en vän eller genom att gå en byggkurs. Kurser finns exempelvis på självbyggeriorganisationer som Egnahemsfabriken eller Bobini. Det är viktigt att förstå riskerna och att tänka på säkerheten - det finns många verktyg man kan skada sig allvarligt på! Har man lite erfarenhet och vill lära sig hur man gör något nytt moment, så finns det genomgångar av det mesta på Youtube.

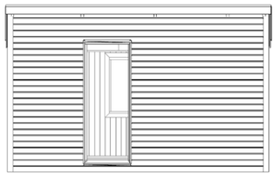


Regelstomme

Perspektiv



Plan



Fasad

Sektion

I ett digitalt modellerings-program såsom SketchUp kan man enkelt planera sitt bygge på den nivå man känner är lagom - detaljerat med reglar och fönster, eller mer enkelt med ytor. Det går också att exportera ritningar.

7. Gör en detaljerad byggplan (ritningar + tidsplan)

När du är färdig med förberedelsearbetet och är säker på att du skall genomföra projektet, är det dags att spika detaljerna och färdigställa en plan för ditt bygge.

Jag är en stor förespråkare av att tänka först, göra sen. Att bygga är väldigt intensivt, och det kan vara en stor lättnad att bara kunna följa en plan. Ju mer du planerar innan, desto snabbare går bygget. Har man följt de 6 tidigare stegen vet man redan ungefär hur huset skall se ut, vem som skall hjälpa en, när och var man skall bygga, hur man bygger och vad det skall kosta. I steg 7 kan man göra mer detaljerade ritningar och en mer korrekt budget och tidsplan.

Ska man söka bygglov redan innan behöver ritningarna se ut exakt så som huset kommer att bli. Bygglovsansökan behöver bli godkänd redan innan man börjar bygga. Vissa ritningar kan man göra själv, men annars kan man ta hjälp av en arkitekt. Ofta kan man med ett mobilt tiny house dock skjuta upp eller undvika bygglov (se kapitel “Hus på plats”). Då har man frihet att känna efter och göra ändringar i designen också under byggperioden. Med en sådan byggprocess kan det fortfarande vara bra att ha ritningar, men man kan se dem som mer preliminära.

Utifrån ritningarna kan man göra en mer exakt budgetberäkning, där man tittar upp exakt vilka material man skall ha och i vilka längder och kvantiteter. En sådan budgetuppställning är också guld att ha när man skall köpa material, då allting finns listat.

De ritningar som kan vara bra att ha är en plan och de fyra fasaderna. En stomritning, alltså en ritning som visar längder och placeringar på reglarna i stommen, kan också vara bra att ha. Ibland har man en sektion, alltså en “genomskärning” av huset. Det kan också vara bra med detaljer som visar exempelvis hur dörren sitter. Se sida 10 för exempel på hur det kan se ut.

8. Skaffa material

När planer och ritningar är färdiga, är det dags att beställa material. Vill du bygga med återbruk behöver du börja skaffa material tidigare i processen.

Det finns många byggbolag som man kan köpa hos eller få hemlevererat ifrån. Bygger man med nytt material är det bäst att beställa efter att resten av planeringen är färdig.

Vill man bygga med återbruk behöver man starta processen med att samla material mycket tidigare - räkna med ett år innan byggstart. Det läggs upp en del via onlinetjänster som Blocket och Marketplace, men för att hitta mycket behöver man också fråga runt hos bekanta eller på rivningar. Bygger man med återbruk behöver man i mycket större grad låta materialet bestämma designen.

9. Bygg ditt hus

Att bygga är för många det roligaste steget i att skapa sitt eget tiny house. Att se planer gå från idé till verklighet kan vara magiskt. Men att bygga är också ansträngande, speciellt om man är nybörjare. God planering, en generös tidsplan och mycket hjälp är fördelaktigt. Det är viktigt att planera in pauser, både under arbetsdagen och att ha sammanhängande semestrar. Kalla in hjälp när det behövs (du frågade väl folk i steg 5?). Att bygga är väldigt meningsfullt att göra med andra - arbetet går lättare och man kommer närmare varandra när man skapar något tillsammans. Kom ihåg att bjuda in till taklagsfest när stommen har rests!

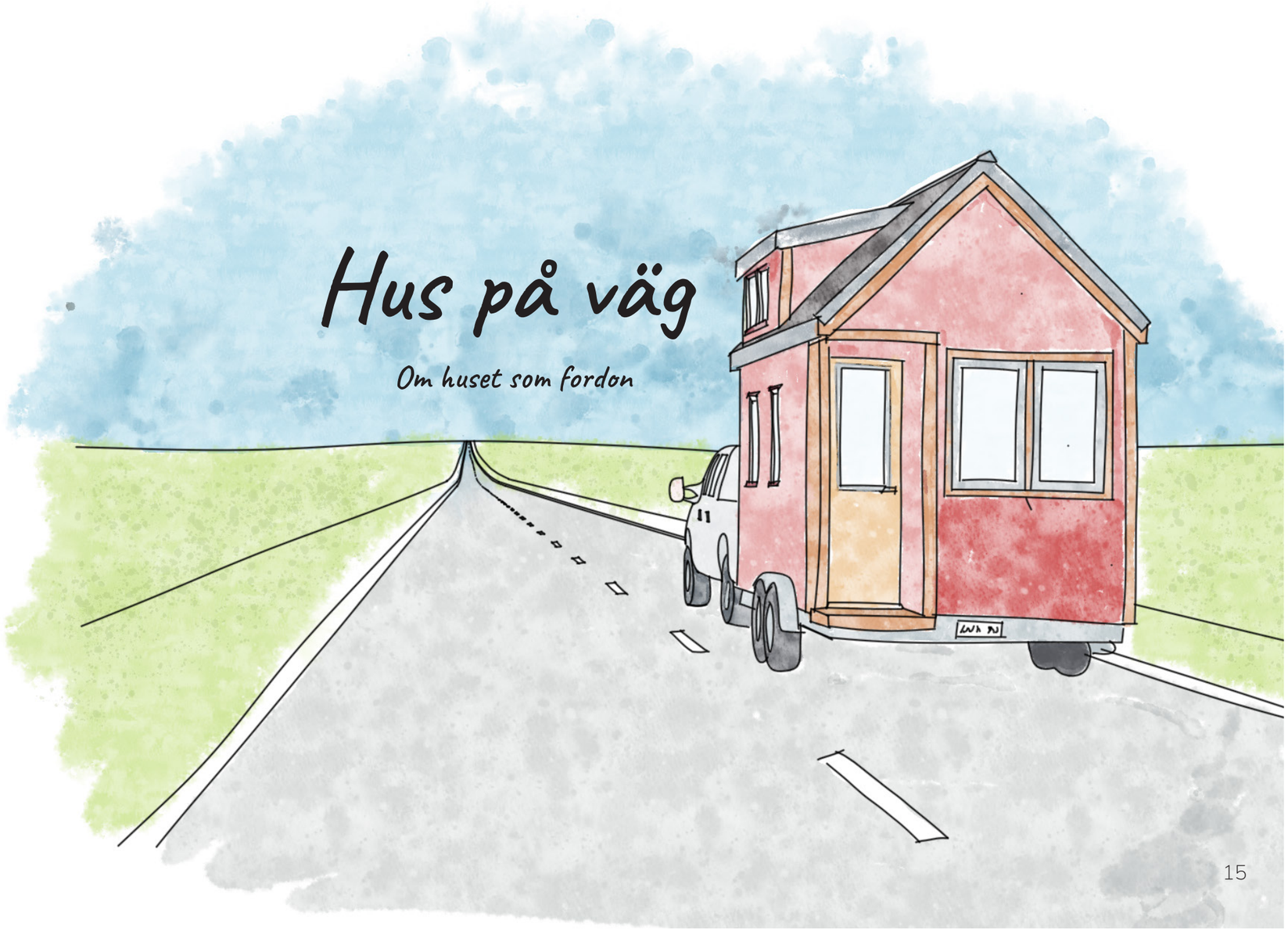
10. Hitta en plats att bo

Att hitta en plats för sitt tiny house kan man göra både innan man ens startar och till allra sist. Vissa har egen mark, medan andra hyr in sig på någon annans tomt eller reser omkring med sitt hus. Intressesidor på Facebook används ofta av folk som söker plats eller erbjuder plats att stå. Hyr du in dig på någon annans tomt, så kom ihåg att göra ett tydligt kontrakt mellan dig och tomtägaren, och kom överens om allt från hur avlopp hanteras till vem som står för bygglov och hur lång uppsägelsetiden är.

Om du har planerat väl och huset uppfyller alla dina behov så kan du se fram emot många års trivsamt boende. Att ha designat och byggt sitt eget hus ger en otrolig tillfredsställelse och stolthet, för att inte tala om vänskaper och massor av nya färdigheter.

Hus på väg

Om huset som fordon



Huset som fordon

När ett hus på hjul rör sig ute på vägarna definieras det som ett fordon, och faller därmed under samma bestämmelser som andra fordon vad gäller dimensioner, vikt och vem som får köra.

Ett fordon definieras som: En anordning på hjul, band, medar eller liknande som är inrättad huvudsakligen för färd på marken och inte löper på skenor.
Lag (2001:559) om vägtrafikdefinitioner

De lagar som reglerar fordon är fordonslagen, fordonsförordningen, trafikförordningen, körkortslagen, körkortsförordningen och lagen om vägtrafikdefinitioner. Alla regler som rör fordon går att läsa om på transportstyrelsens hemsida. Det går också att ringa till dem om man har specifika frågor.

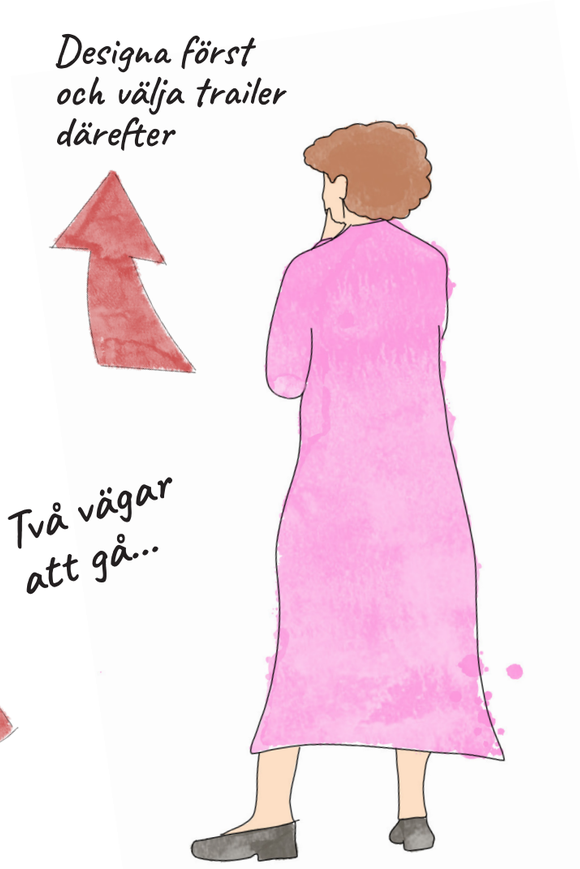
Detta kapitel tar upp:

- Att välja trailer
- Dimensioner och viktbegränsningar
- Körkortsklasser
- Släpfordon
- Omregistrering
- Efterfordon
- Lasta rätt

Att välja trailer

Att väja trailer kan göras både som första steg eller en bit in i bygget. Den avgör hur mycket huset kan väga samt vem som får köra det i vilken hastighet.

Är trailervalet det första du gör vet du från början dimensioner och max vikt och kan designa därefter. Gör du däremot din design först ger det dig mer frihet i det stadiet, men kanske får du leta längre eller betala mer för en trailer som passar precis.



Vikt och körkortsklasser

Något av det första du behöver bestämma dig för är nivå av mobilitet. Det är körkortsklass, vikt på dragbil och släp samt typ av släpfordon som avgör.

Vill du ha ett hus som du själv kan köra och planerar att resa mycket får du utgå från ditt körkort och din bil. Det kan dock vara en utmaning med viktbegränsningarna!

Skall huset mestadels stå finns det mer frihet att bygga tungt. Har du själv inte körkort och dragbil till att flytta huset går det att hyra en transportfirma att sköta flytten. Det går också att beställa kranbil. Då kan man lyfta på sitt hus och transportera det på lastbilens lågbädd. Tänk på att det bygger lite i höjden.

B Bil max 3,5 ton + antingen
- en släpvagn med en totalvikt på högst 750 kg, eller
- en släpvagn med en totalvikt som är högre än 750 kg, förutsatt att bilens och släpvagnens sammanlagda totalvikt inte är över 3,5 ton.

B(96) Bil + släpvagn 3,5 - 4,2 ton.

BE Bil max 3,5 ton + en eller flera släpvagnar på sammanlagt max 3,5 ton.

CE Tung lastbil eller personbil med en totalvikt över 3,5 ton samt en eller flera släpvagnar utan viktgräns.

OBS! För efterfordon är det inte körkortsklass som bestämmer, utan dragbilens vikt. Se s.22.

Tre typer av fordon

Likadant men olika regler...

Släpfordon + last

Ett registrerat släp med huset som odelbar och avtagbar last.

+
- Får köra 80 km/h
- Besiktigat och säkert

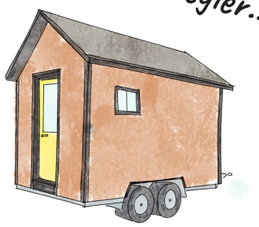
-
- Huset får endast spännas fast
- Behöver ta av huset vid besiktning
- Årlig kostnad

Omregistrerat självbyggeri

Ett omregistrerat fordon som klassats antingen kioskvagn, husvagn eller likande.

+
- Får köra 80 km/h (beroende på vad det klassas som)
- Besiktigat och säkert

-
- Mindre frihet under byggnation
- Årlig kostnad



Efterfordon

Ett oregistrerat fordon.

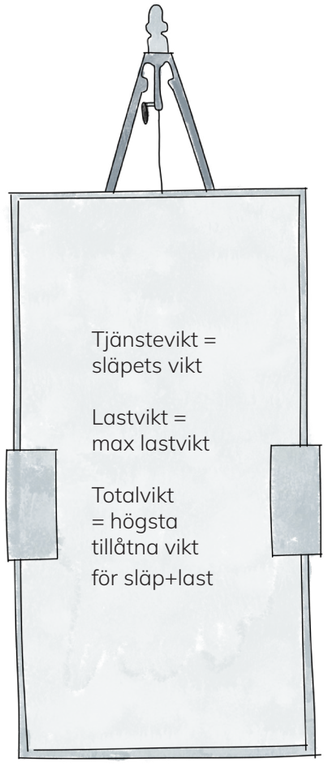
+
- Frihet i utformning
- Friare viktbegränsningar
- Inga skatter eller avgifter

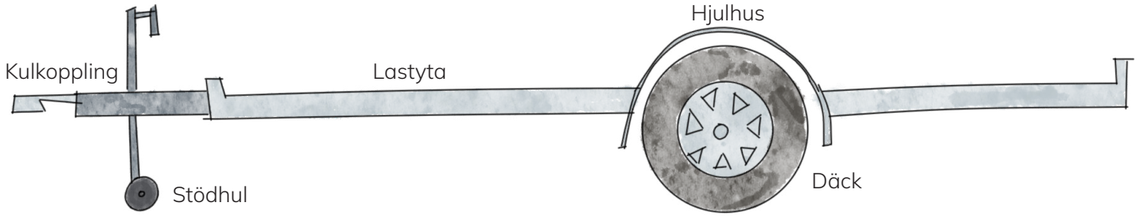
-
- Långsamt - 30 km/h
- Ditt ansvar att det är säkert!

Släpfordon

Ett släpfordon är ett fordon som är byggt för att kopplas till ett annat motordrivet fordon och är avsett för person- eller godstransport.

Hastighet: 80 km/h
Registreringsskylt: Ja
Kontrollbesiktning: Ja, 4 år efter att släpet tas i trafik, sedan vartannat år.
Fordonsskatt: Ej för släp totalvikt <750 kg. Över: se transportstyrelsens fordonskattetabell.
Trafikförsäkring: Nej
Lätt släp: Totalvikt släp ej över 750 kg, eller totalvikt dragbil + släp ej över 3,5 ton.
Tungt släp: Totalvikt över 3,5 ton





Hittar man ett <u>släp</u> som man vill bygga ett tiny house på kan man...

Alternativ 1: Spänna på tiny houset som "odelbar last". Man får då inte varaktigt fästa huset i vagnen (ex med bultar), utan med ex. spännremmar. Släpvagnen förblir då ett släp med samma vikt och mått som det står i registreringsbeviset. Kom ihåg att släpet skall besiktigas vartannat år, och då måste man kunna ta av huset tillfälligt.

Alternativ 2: Bygga fast huset i släpet och göra en registreringsbesiktning för att omregistrera från släpvagn till husvagn/kioskvagn.

Omregistrera

Bygger man på något sätt om ett släp så att dimensioner och vikt ändras, behöver det omregistreras. Det gör man genom en så kallad registreringsbesiktning. Syftet med en registreringsbesiktning är att kontrollera att fordonet uppnår svensk standard gällande trafiksäkerhet.

Alternativ 3; Göra om släpet till ett efterfordon. Det är dock inte så enkelt som att avregistrera och sätta på en LGF-skylt. Ett släp ämnat för godstransport kan aldrig bli ett efterfordon, menar många trafikpoliser. Trafikverket menar dock att det kan gå om man tydligt ändrar funktionen, så som att göra den "icke ämnad för transport av gods" genom att exempelvis göra om den till ett hus.

Det behövs en enklare omregistrering om man exempelvis breddar lastytan på ett släpfordon och planerar ha huset som avtagbar last. Vill man få själva huset registrerat kräver det att besiktningsmännen väger, mäter, synar och avgör att den nya konstruktionen är säker. Detta görs hos vissa besiktningsfirmor. Den nya konstruktionen kan bli klassad som exempelvis husbil eller kioskvagn.

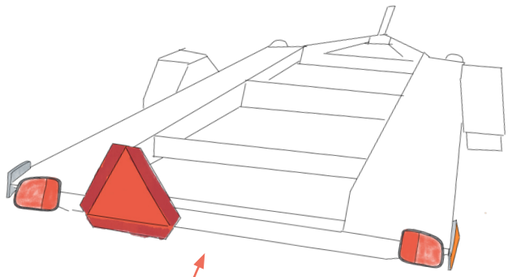
Efterfordon

Ett efterfordon är ett redskap eller annat som inte är en släpvagn men som är kopplat till ett dragfordon. Ett efterfordon är inte avsett för att frakta gods.

Hastighet: 30 km/h
Registreringsskylt: Nej
Kontrollbesiktning: Nej
Fordonsskatt: Nej
Trafikförsäkring: Nej
LGF-skylt: Ja

Exempel på efterfordon:
Skylift, kioskvagn, båttransportvagnar, husvagnar, tankvagnar, hövagnar, cirkusvagnar. Ett efterfordon kan man bygga själv, eller i vissa fall genom att avregistrera ett registrerat fordon.

Det är endast dragfordonet och inte körkortsklass som avgör om man får köra efterfordonet. Ett bromsat efterfordon får väga tre gånger dragbilens vikt, medan ett obromsat får ha samma vikt som dragbilen.



Ett efterfordon saknar alltid registreringsskylt

Efterfordonet ska vara försett med LGF-skylt, körriktningsvisare, två vita reflexer framtill, orangegula sidomarkerings-reflexer och två röda triangelformade reflexer baktill. Om fordonet framförs i mörker, två röda positionslyktor bak. Om efterfordonet skjuter ut mer än 20 cm i sidled från dragfordonet, två vita positionslyktor fram.

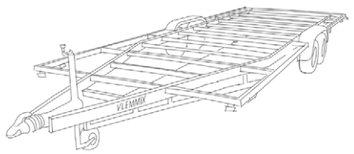
Köpa trailer

Det finns flera producenter av släp specialbyggda för tiny houses. På Blocket eller Marketplace kan man också hitta begagnade släp och efterfordon. Här presenteras några exempel på möjligheter:

Tips!

Via trafikverkets onlinetjänst “Fordons-uppgifter” kan man med regnumret se mått och godkänd vikt för alla släp och husvagnsunderreden.

Släpfordon

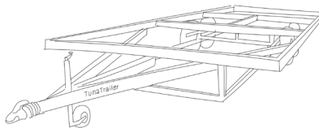


Vlemmix

Lastyta:	5,4-8,4 m
Pris:	61-81 000 kr
Totalvikt:	3,5 ton
Typ:	Släpfordon
Hastighet:	80 km/h

Hmm...

Efterfordon



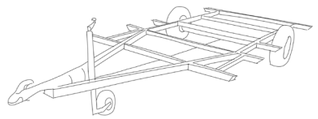
Tuna trailer

3-7,7m
31-60 000 kr
3 - 7 ton
Efterfordon
30 km/h

Treedesign

6,6-10m
105-139 000 kr
8,2 - 14 ton
Efterfordon
30 km/h

Begagnat



Husvagnsunderrede

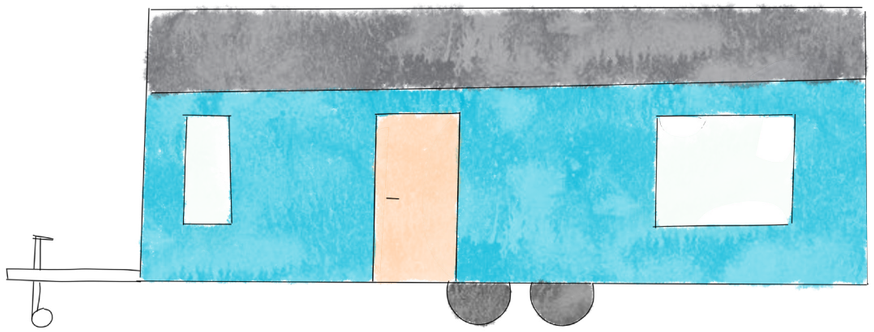
3-10m
0 - 10 000 kr
1 - 4 ton
Efterfordon, eller omregistration

Köper man begagnat kan det vara svårt att hitta exakt rätt dimensioner och bra skick. Det kan behöva svetsas och lappas. Det man vinner i sparade pengar betalar man oftast i tid!

Dimensioner

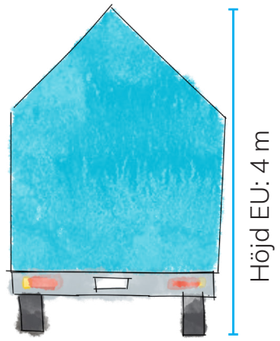
Utöver storlek på trailer finns det bestämmelser för maximala dimensioner för fordon. Detta sätter också gränsen för dimensioner på mobila hus.

Maxlängd i Sverige: 24 m



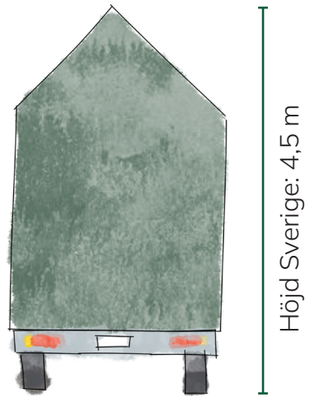
Maxlängd i EU: 12 m

Maximala dimensioner skiljer något från land till land. Vill du kunna resa utomlands med ditt hus bör du hålla dig till Europeiska standardmått!



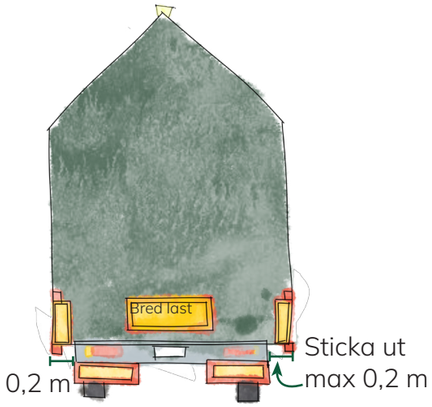
Bredd EU: 2,55 m

I Sverige däremot är mer generös med storlek, och våra fordon får vara både längre, högre och bredare.



Bredd SV: 2,6 m

Högre än 4,5m är också tillåtet, så länge man endast kör på vägar utan broar eller utstickande skyltar.



Bredd SV: 3,1 m

Odelbar last får vara 3,1m bred om den utmärkes som Bred last. Bredare än 3.1m går att söka dispens för från Transportstyrelsen.

Lasta rätt!

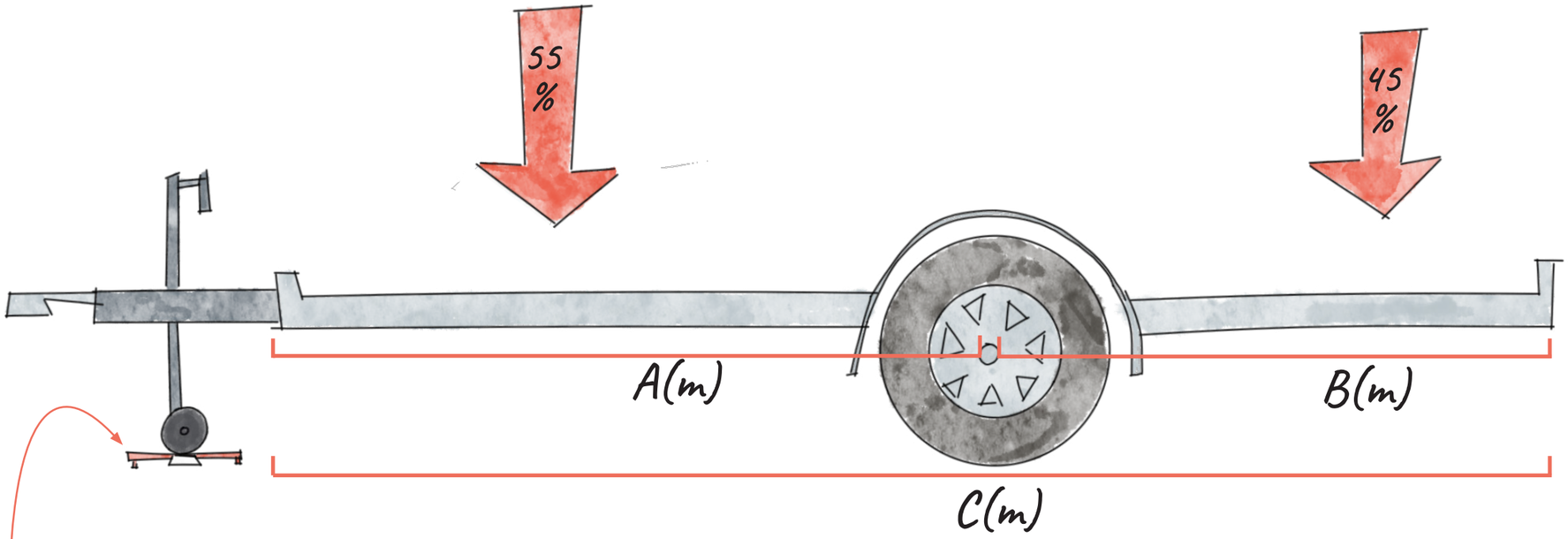
Det är ytterst viktigt för trafiksäkerheten att huset är väl placerat och fastsatt i trailern.

Vikten skall vara centrerad över hjulaxlarna. Det är dock farligare med en trailer som är lastad för tungt där bak än där fram. Därför har man som riktlinje att 5-15% (idealiskt ca 10%) av vikten är fördelad framför axeln. Det är därför viktigt att ha ett hum om ens viktbalans. Vid 10% viktfördelning bör ekvationen se ut så här:

$$\frac{A}{C} = 0{,}55 \qquad \frac{B}{C} = 0{,}45$$

Många bilar och dragkrokar har dessutom ofta en maxgräns för kultryck. Det kan ligga mellan 50-100 kg. Kultrycket kan uppskattas genom att ta husets totala vikt V och räkna:

$$(V * \frac{A}{C}) - (V * \frac{B}{C}) = \text{kultryck}$$



Man kan testa kultrycket genom att ställa en badrumsvåg under släpvagnens stödhjul. Det som kan påverka trycket är husets utformning och inredning samt dess placering på trailern.

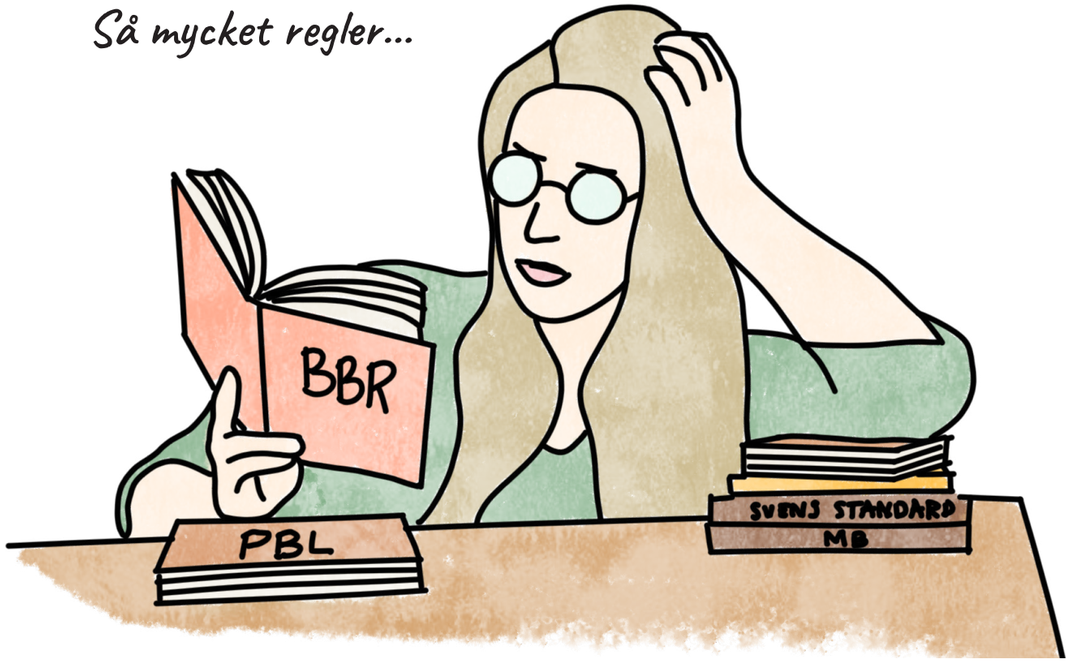
Lasten skall inte kunna glida av, varken vid svängning, acceleration eller kraftig inbromsning. Det är därför viktigt att fästa huset i alla riktningar. Placera lastens tyngdpunkt så lågt och nära bilens mitt som möjligt.

För mycket vikt där fram resulterar i ett högt kultryck, vilket kan resultera i sämre acceleration och bromsförmåga, speciellt vid framhjulsdrivna bilar. För mycket vikt där bak resulterar i ett lågt kultryck, vilket gör trailern ostabil och svajande. Det kan bli mycket farligt!

Hus på plats

Om huset som byggnad

Så mycket regler...



Huset som byggnad

Detta kapitel tar upp:

- *PBL, BBR*
- *Bygglov*
- *Placering*
- *Tillgänglighet*
- *Krav på byggnader*

En byggnad definieras som:
"En varaktig konstruktion som består av tak eller av tak och väggar och som är varaktigt placerad på mark eller helt eller delvis under mark eller är varaktigt placerad på en viss plats i vatten samt är avsedd att vara konstruerad så att människor kan uppehålla sig i den."
Plan- och bygglag (2010:900) 1 kap. 4 §

När ett mobilt hus står still en längre period definieras det inte längre som fordon. Istället faller det under samma lagar som andra byggnader, det vill säga Plan och bygglagen, Boverkets byggregler samt Miljöbalken.

Plan och bygglagen (2011:338) (PBL) styr var och när man får bygga. Boverkets byggregler (BFS 2011:6) – föreskrifter och allmänna råd (BBR) styr hur man får bygga. Bygger man nära strand gäller också strandskyddsreglerna i miljöbalken (MB). I lagen finns både förordningar och allmänna råd.

Lag, förordning och föreskrifter är bindande regler. Allmänna råd är inte bindande. Ett allmänt råd anger hur någon kan eller bör göra för att uppfylla den tvingande regeln som det allmänna rådet är kopplat till.

Bygglov

“Det krävs bygglov för nybyggnad och tillbyggnad. Nybyggnad betyder uppförande av en ny byggnad eller flyttning av en tidigare uppförd byggnad till en ny plats (*PBL 1 kap. 4 §*). Bygglov krävs också om en byggnads funktion ändras väsentligt. Det finns dock vissa undantag från bygglovsplikten.”
Plan- och bygglag (2010:900) 9 kap. 2-4 a, 6 §§

Byggnader står kvar i många år och påverkar både miljö och uttryck i ett område. Reglerna kring bygglov är ett sätt att reglera allas byggintresssen så någon inte bygger något som stör eller inverkar negativt på grannar och miljö. Det går att ansöka om bygglov via byggnadsnämnden. Där kan man först fråga om det behövs bygglov eller ej. Om det behövs, så får man inte börja bygga innan man fått ett startbesked. När bygget sen är färdigt, får det inte börja användas förrän byggnadsnämnden godkänt byggnaden enligt de krav som gäller och gett ett slutbesked.

Exempel bygglovsförfarande:

1 Ansökningsblankett med planer, fasader, sektioner och situationsplan
Ev: godkännande av en certifierad kontrollansvarig för toalett och kök
Ev: konstruktions-, ventilations-, och rörritningar. Eller: kontrollplan
2 Utstakning
3 Startbesked
4 Bygge
5 Lägeskontroll
6 Slutkontroll
7 Slutbesked med:
8 Signerad kontrollplan (Ev. olika intyg)
9 Inflytt

Och så börja om från början på nästa plats!

Vid flytt:

10 Ansöka om rivning
11 Startbesked rivning
12 Slutbesked rivning

Bygglov för små, mobila och självbyggda hus?

Bygglov är gjort för stillastående bostäder som byggs på den plats de kommer att stå. Det kan därför passa dåligt för mobila bostäder som ofta flyttas. Har man gjort ett bygglov eller en anmälan behövs rivningstillstånd för att få flytta, varpå processen börjar om på nästa plats.

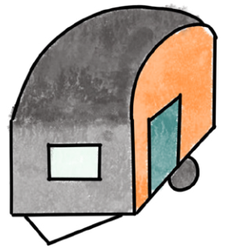
Bygglov kräver också en färdig design redan innan bygget sätter igång. Det kan sätta käppar i hjulen vad gäller byggande med återbruk som införskaffas under tiden. Det gör det också omöjligt att låta bygget vara en kreativ process där ändringar görs under byggnationens gång. Inblandningen av myndigheter och konsulter går ofta tvärt emot självbyggarens önskan om att med små medel göra så mycket som möjligt själv. Det kan därför vara en fördel att försöka undvika eller skjuta upp bygglov. Självklart skall man dock ändå ta hänsyn till grannar och bygga säkert och användbart.

Om du behöver bygglov för ditt mobila småhus beror på husets storlek, var det är placerat och vad du skall använda det till. Att bygga på en annan plats är där huset skall stå är ett sätt att skjuta upp bygglov. Då kan man ta fram ritningar först efter att bygget är färdigt, vilket ger större frihet under byggnationen.

Nästa sida presenterar olika typer av bygglov och bygglovsbefriade hus. Framför allt kan man undvika bygglov om huset placeras nära ett befintligt bostadshus. Förutom exemplen på nästa sida går det att ställa tiny houses som “industribyggnader” på jordbruksfastighet eller exempelvis hästgård, men då det inte medger att man bor i dem, samt att en jordbruksfastighet är otillgänglig för gemene man, så har listan fokuserat på vanligare lösningar.

OBS!

Ett standard bygglov behövs alltid för det första bostadshuset på en tomt!

	 Huvudhus (permanentbostad)	 Huvudhus (fritidshus)	 Attefallshus	 Bygglovsbefriad komplementbyggnad	 Friggebod	 Upplag (ex. säsongs-förvarad husvagn)
Max area	Nej (om ej detaljplan anger)	Max tvåfamiljshem	30 m²	Ej dominera över huvudhuset	15 m²	-
Max höjd	Nej (om ej detaljplan anger)	Max två våningar	4 m	Nej	3 m	-
Bygglov	Ja	Ja	Enklare anmälan	Nej	Nej	Nej. Högst 2 enheter “av säsongskaraktär”
→ Pris	65-155 000 kr* + Konsultarvoden	45-135 000 kr* + Konsultarvoden	~ 20 000 kr*	-	-	-
Får bo i?	Ja	Ja	Ja	Ja	Gråzon	Nej
Energidekl.	Ja, om >50m²	Ja, om >50m²	Nej	Ja, om >50m²	Nej	Nej
Tillgängligt	Ja	Nej	Ja, om permanentbostad. Nej, om fritidshus.	Ja, om permanentbostad. Nej, om fritidshus.	Nej	Nej.

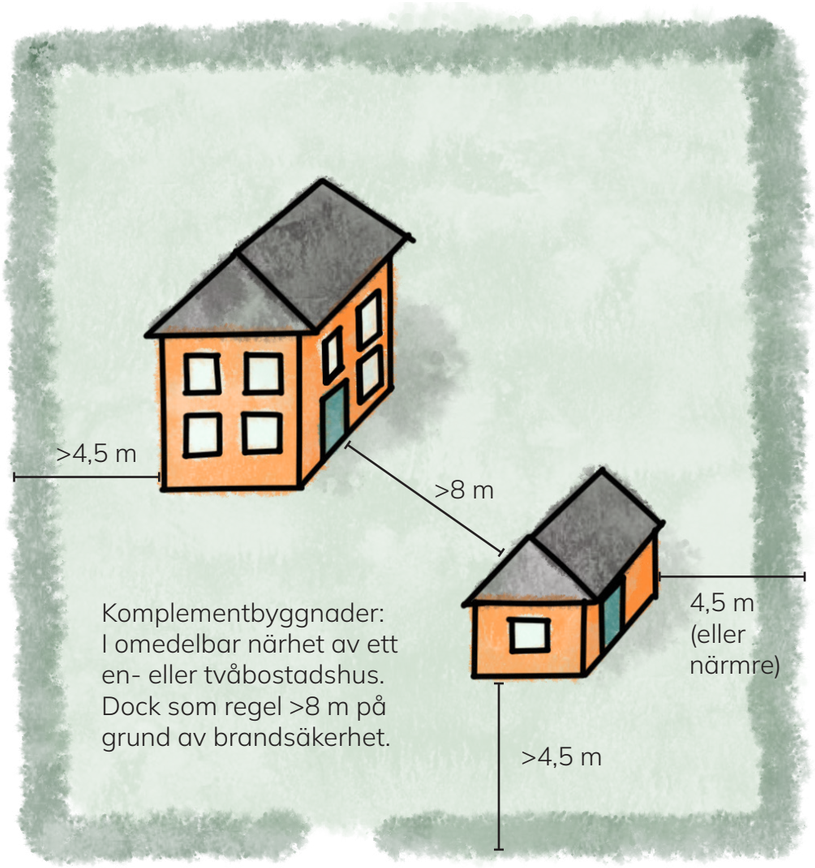
Vill du läsa på mer? På Boverkets hemsida finns alla regler samlade!

*Prisuppskattningar enligt Byggahus.se (2025)

Bygglovsbefriad komplement-byggnad endast möjlig utanför “sammanhållen bebyggelse” (dvs. avskilt område med max 10-20 hus) som saknar detaljplan.

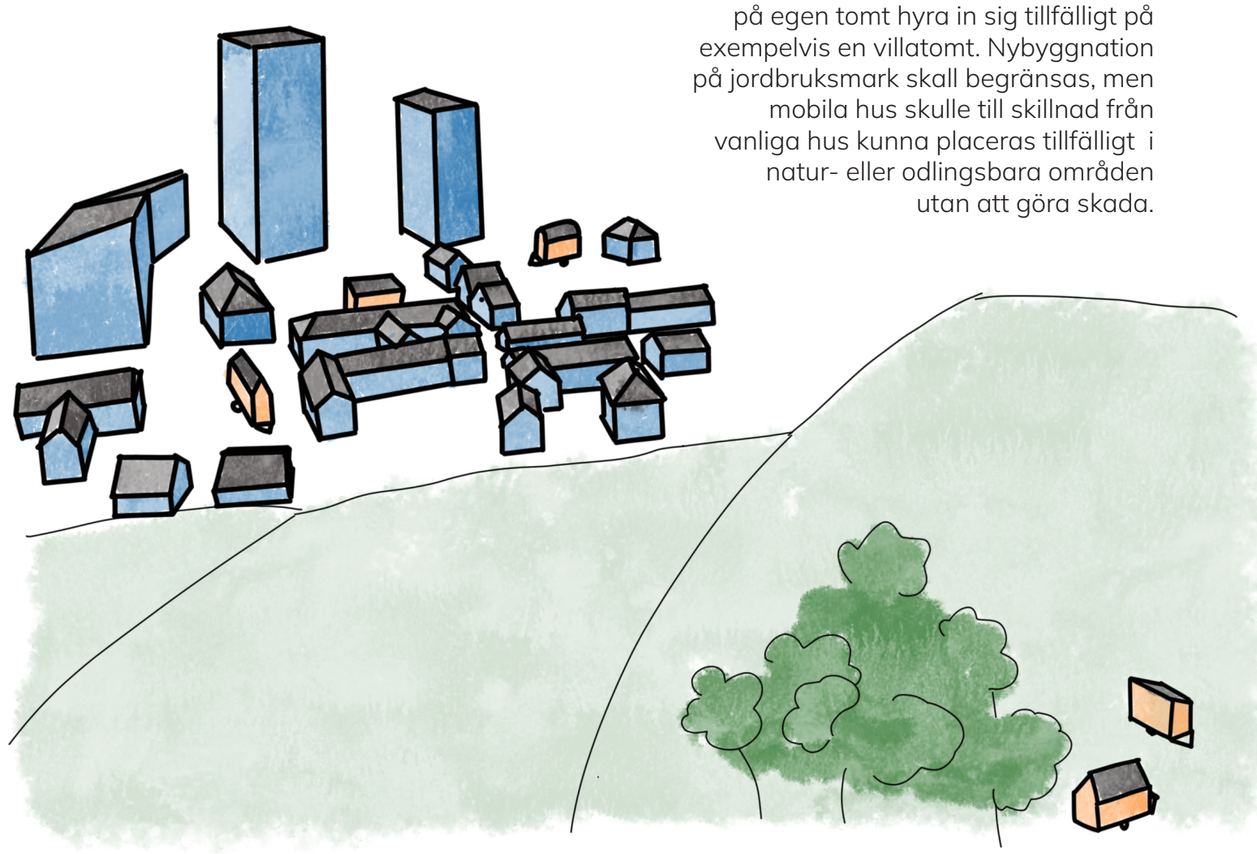
“Upplag” är inte definierat i PBL, men syftar till en tillfällig förvaringsplats för ex. material, container eller en husvagn. Skulle man bo i upplaget ses det som en byggnad.

Placering på tomten



4,5 m från tomtgräns mot granne. Kan få dispens att bygga närmare om de grannar som berörs ger ett skriftligt medgivande.

4,5 m från tomtgräns mot allmän väg. Kan ej få dispens.



Mobila hus kan förutom att placeras på egen tomt hyra in sig tillfälligt på exempelvis en villatomt. Nybyggnation på jordbruksmark skall begränsas, men mobila hus skulle till skillnad från vanliga hus kunna placeras tillfälligt i natur- eller odlingsbara områden utan att göra skada.

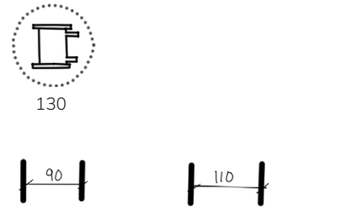
Tillgänglighet

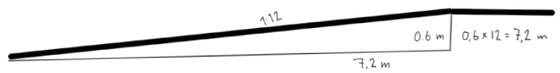
Tillgänglighetskraven i BBR styr utformningen i och omkring bostaden för att göra den tillgänglig för människor med nedsatt rörelse- syn- eller hörselförmåga (BBR 3:112, 3:121). Alla byggnader klassade som permanentbostäder skall uppfylla kraven. Reglerna gäller inte bara för huvudhus utan också för komplementbyggnader som ämnas användas som bostäder.

Riktlinjerna för bostadsutformning finns till för att garantera en hög kvallitet och levnadsstandard för alla medborgare. Tillgänglighetsreglerna gör speciellt nytta i allmänna lokaler och den storskaliga bostadsproduktionen, där personer med nedsatt rörelse- eller orienteringsförmåga förr ofta varit exkluderade. Hade kraven varit lågt satta finns också risk att det hade utnyttjats av vinstdrivande bolag för att producerade bostäder med allt för låg standard. Det gör också att alla kan bo kvar i sin bostad även om de skulle bli begränsade i sin rörelseförmåga.

Att låta dem som behöver mest plats sätta minimistandarden gör dock att det blir olagligt att bo mindre. Att detaljstyra arkitekters arbete med utformning av planlösningar gör också att bostadsproduktionen blir väldigt homogen, och omfattande lagar gör det svårt för självbyggare att uppfylla kraven. Speciellt små bostäder kan bli svåra att få till bra, där exempelvis badrummet kan ta en orimligt stor del av ytan. Skall man söka bygglov som permanentbostad behöver tillgänglighetskraven uppfyllas. De presenteras därför här. Måtten kan också vara bra att ha sett, då många standardlösningar följer dessa mått (om man exempelvis vill köpa ett begagnat kök). På näst-nästa uppslag presenteras dock sett att undvika tillgänglighetsreglerna, eftersom de är omöjliga att följa till punkt och pricka i ett tiny house.

I tillgänglighetsanpassade hus skall rum, balkonger och terrasser vara tillgängliga för rullstolsburna personer. (BBR 3:146) och dörrar vara dimensionerade för att en rullstol skall kunna passera. På tomten innebär det bland annat att en väg fram till byggnaden behöver göras plan och att ramper skall installeras där det finns lutningar (minsta vinkel 1:12) (BBR 3:1221, 3:1222). Rumshöjden skall vara minst 2,4 m, enl. BBR 3:3111. Delar av ett rum får dock ha lägre takhöjd, dock lägst 2,1 m under horisontellt tak och 1,9 under snedtak.

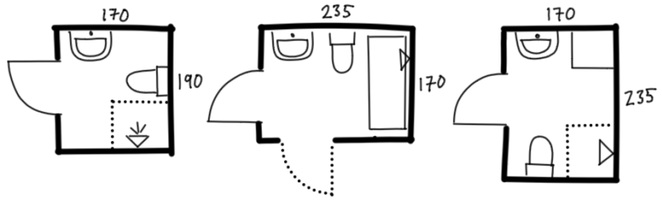




Exempel entreramp. Minsta vinkel 1:12 ger en längd på 7,2 m för en 60 cm hög entre.

Se nästa sida för minimimått på olika funktioner

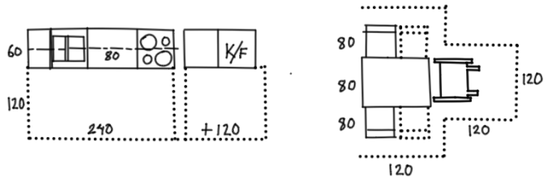
Toaletten skall kunna användas av person i rullstol med plats för medhjälpare (BBR 3:146). Om det saknas gemensam tvättstuga skall det finnas tvättmaskin och torkmöjlighet i bostaden.



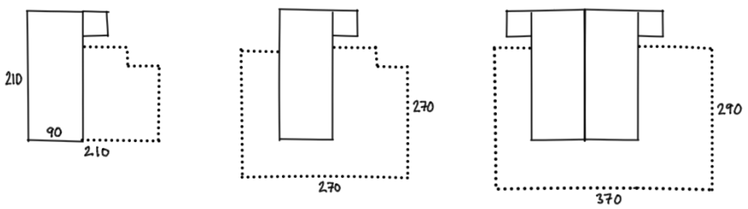
Med badkar

Med tvättmaskin

Minsta köksuppställning och matplats för bostad för en person (för fler personer se Svensk standard)

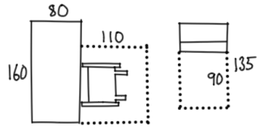


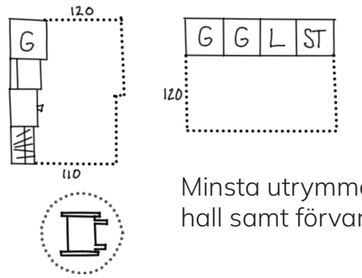
Säng skall ha fri yta omkring sig omkring sig för att undlätta städ. Säng skall kunna dras ut från vägg för att bli rullstolstillgänglig på ena sidan och ha plats för hjälpare på andra.



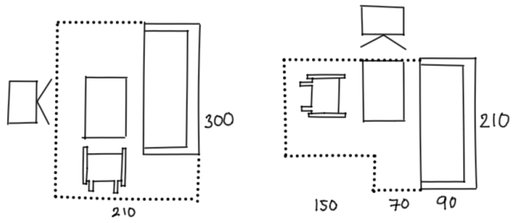
För två personer

Minsta utrymme för hemarbete.





Minsta utrymme i hall samt förvaring.



Minsta utrymme för samvaro.

Tillgänglighet

Alla gällande minimimått kan läsas om i ”Svensk standard” - SS 91 42 21 (normalnivån). Här för bostad avsedd för en person.

BBR 3:22 ” Allmänt om utformning av bostäder” beskriver hur en normal bostad skall disponeras. Det förklaras att det i bostaden skall finnas plats för sömn, daglig samvaro och matlagning, men att alla de tre funktionerna får finnas i samma rum utan att vara avskiljbara om bostaden är under 35 m^2 (BBR 3:224). En bäddsoffa räcker som sovplats. Det går också bra att arbeta och äta vid samma bord. Det skall utöver detta finnas ett avskiljbart badrum med utrustning för personhygien. Det skall finnas ett entréutrymme med plats för ytterkläder samt plats för förvaring i bostaden. Enligt BBR 3:147 skall alla krav uppfyllas på entréplan (ej sovloft).

Undantag från tillgänglighet

Tillgänglighetsreglerna är inte förenliga med mobila eller små bostäder och sätter käppar i hjulet för kreativa lösningar och kombinerade funktioner. Dock finns ett undantag från tillgänglighetsreglerna.

Tillgänglighets- och utformningskraven försvårar byggandet av små hus på hjul. Då ingång ofta är i förhöjd nivå på mobila bostäder skulle entrén kräva byggande av ramp. Med minimum rumshöjd 2,4 m blir det svårt att bygga avskilda rum under sovloft. Ett sovloft kan heller inte räknas som husets sovplats, då alla funktioner skall uppfyllas på nedre plan. Det krävs mycket plats att utforma badrum, kök och gångar så att en rullstol kan manövrera i hela byggnaden. Det går att utforma ett attefallshus enl. kraven (Se bild 1), men på en mindre yta och smalare hus blir uppgiften omöjlig. Det begränsar också möjligheten för kreativa lösningar och individanpassning.

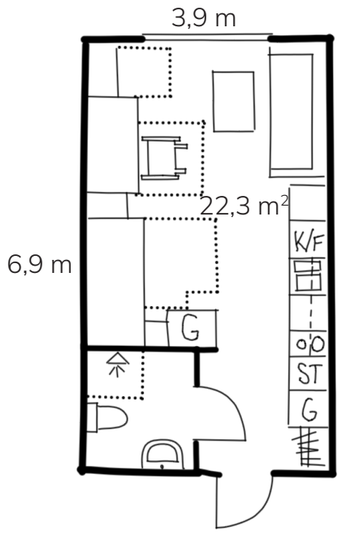
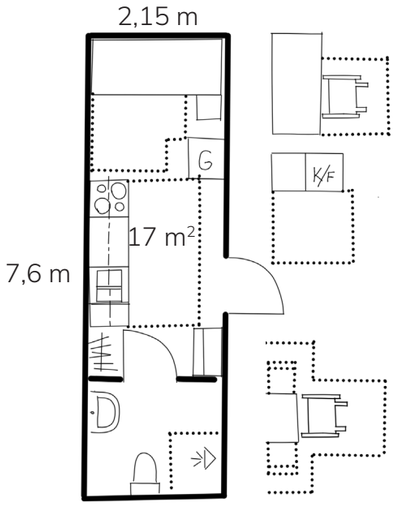


Bild 1: Minsta möjliga area för att uppfylla tillgänglighetsreglerna i en permanentbostad enligt Boverkets konsekvensutredning (2018)



Bostadens funktioner enligt Svensk standard, placerade i ett tiny house på 17 m². Det är mycket som inte får plats!

Fritidsboende

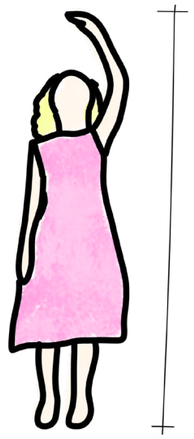
Vill man söka bygglov för sitt mobila småhus är det därför nödvändigt att klassa det som “fritidsboende”. Då gäller BBR föreskrift 3:11: ”Tillgänglighet, bostadsutformning, rumshöjd och driftutrymmen gäller inte för fritidshus med högst två bostäder. (BFS 2017:5).” Det gör att man har större frihet i utformandet. Det är tillåtet att sedan bosätta sig och skriva sig i ett fritidshus som helårsboende.

Kollektivboende

Ett annat sätt att kringgå att ha fullt utrustade kök-och badrum med tillgänglighetsanpassning i ett mobilt småhus registrerat som permanentboende är att gå samman i en kollektiv grupp där man delar på kök och hygienrum. Högst tre enpersons-enheter får dela på ett hygienrum, medan 12 enpersonsbostäder kan dela på ett fullt utrustat kök. Köket skall ”ersätta motsvarande funktioner i de enskilda bostäderna” (BBR 3:227). Lagen är egentligen gjord för kollektivboenden, men kan också användas i detta tillfälle. De enskilda husen behöver då endast uppfylla de krav som inte kollektivt uppfylls, såsom en tillgänglig sovplats.

Definiera dina egna behov!

Utan riktlinjer att gå efter behöver man själv definiera sina behov. Att välja att bo litet innebär ofrånkomligen att man skalar bort onödig plats och onödiga funktioner. Men det är viktigt att ändå uppfylla sina egna behov för att kunna trivas i längden. Rätt gjort kan det leda till frigörande upplevelse och en resa i att lära känna sig själv! Ge dig tid att hitta rätt!



Mät - hur högt tycker du att ett tak behöver vara? Hur långa vänner kan då komma på besök?

OBS!

Uppfyller man inte kraven i BBR är det heller inte garanterat att man kan bo kvar i sin bostad om livet skulle utveckla sig så att ens rörelse-eller orienteringsförmåga skulle begränsas. Definierar man sina egna behov behöver man tänka in en “Plan B”. Vad gör du om du tillfälligt inte kan komma upp på ett sovloft (pga brutet ben, graviditet eller annat)? Kan du inte anordna något inom husets väggar kanske du får vara beredd på att flytta.

Hur mycket rymd behövs för att kunna dansa utan att slå i saker?

Hur mycket plats behövs för att inte stöta i väggen när du duschar?

Vad behöver du i takhöjd för att kunna sitta och läsa en bok bekvämt?

Är köket viktigt eller oviktigt? Behövs bara en micro eller skall köket vara husets hjärta?

Utöver planlösningen innehåller BBR andra bestämmelser, se här!

Brand

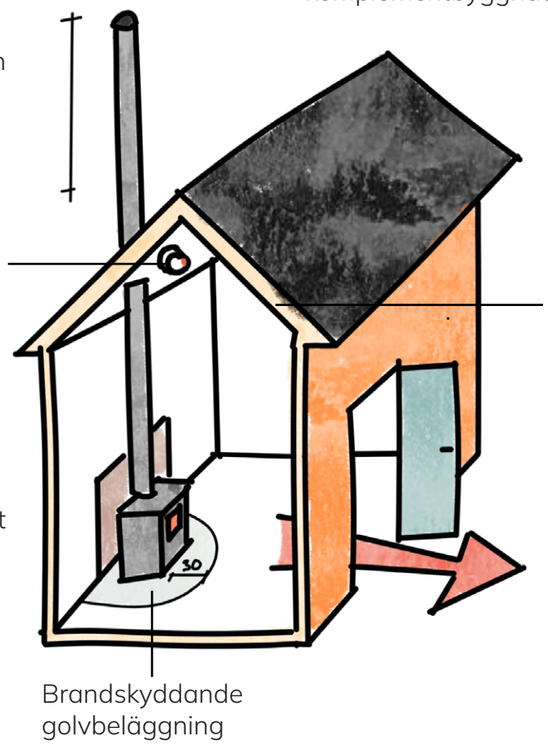
”Byggnader skall utformas med sådant brandskydd att brandsäkerheten blir tillfredsställande.” (BBR 5.1)

För att brand inte skall spridas mellan byggnader skall de placeras med ett avstånd på minst 8 m, enl. BBR 5:61. 5:611 nämns dock att avståndet till komplementbyggnader kan vara mindre.

Skorstenar skall ha en höjd som begränsar risken för brand (BBR 5:4253).

Alla bostäder skall förses med brandvarnare (BBR 5:353)

Kamin: Ha erforderligt avstånd till vägg (0,5 m för oisolerad kamin) eller installera strålningsskydd.



Brandskyddande golvbeläggning

Material i väggar, tak och golv skall vara svårantändliga, inte utvecklar stora mängder gas, inte deformeras eller smälter eller droppar vid brand (BBR 5:521).

Dörren räcker som enda utrymningsväg (BBR 5:322). Fri höjd minst 2 m (BBR 8:34).

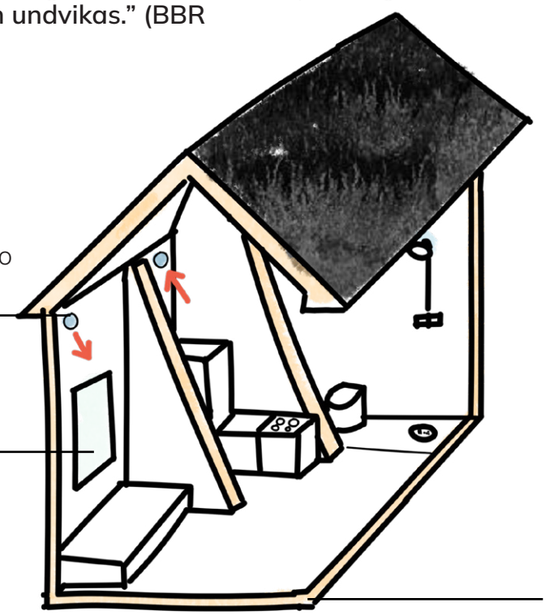
Hygien, hälsa och miljö

”Byggnader och deras installationer ska utformas så att luft- och vattenkvalitet samt ljus-, fukt- temperatur- och hygienförhållanden blir tillfredsställande under byggnadens livslängd och därmed olägenheter för människors hälsa kan undvikas.” (BBR 6.1)

I mindre bostäder krävs inget ventilationssystem, utan ventilationen kan skötas manuellt så länge luftflödeskraven uppfylls (BBR 6:251). Krav: Kontinuerligt luftflöde på 0,35 l/s per m^2 golvarea (BBR 6:21)

Luftkvalitén skall vara god och fri från besvärande lukt (BBR 6:21). Tilluft i rum för vila och social samvaro (BBR 6:2521), avluft från badrum och kök (BBR 6:2524).

I en bostad på under 35 m^2 är det endast krav på ett fönster. Det skall finnas möjlighet för vädring både från sovrum och rum för social samvaro (BBR 6:253).



Drag max 0,15 m/s på vintern och 0,25 övriga året. (BBR 6:42)

Byggnaden skall ha ett behagligt termiskt klimat (BBR 6:41), dvs >18°C i vistelsezonen och >20°C i hygienrum. (BBR 6:42)

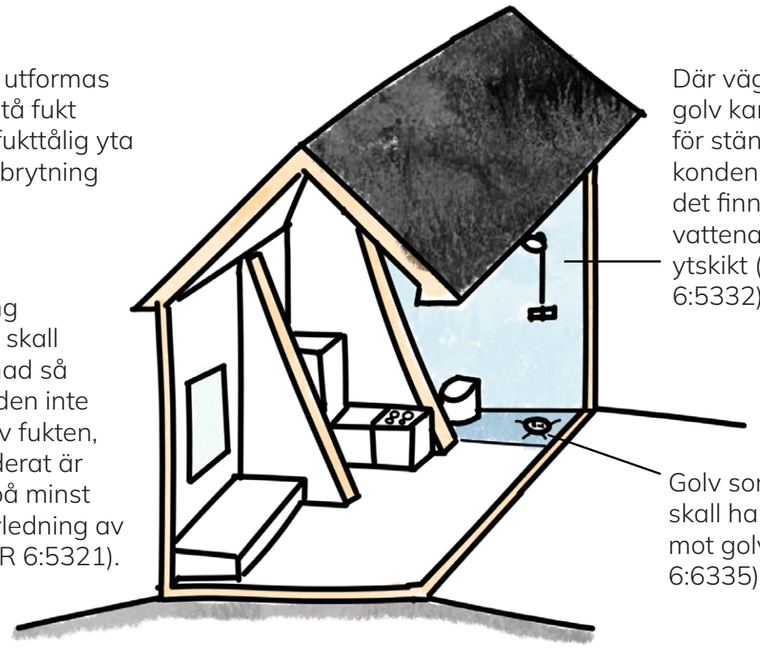
Materialen i huset inte skall vara giftiga (BBR 6:11).

Fukt

”Byggnader ska utformas så att fukt inte orsakar skador, lukt eller mikrobiell växt som kan påverka hygien eller hälsa” (BBR 6:51).

Fasad skall utformas för att motstå fukt genom ex. fukttålig yta och kapillärbrytning (6:5324).

Marken kring byggnaden skall vara utformad så att byggnaden inte tar skada av fukten, rekommenderat är en lutning på minst 1:20 och avledning av vattnet (BBR 6:5321).



Där väggar och golv kan utsättas för stänk eller kondens skall det finnas ett vattenavvisande ytskikt (BBR 6:5332).

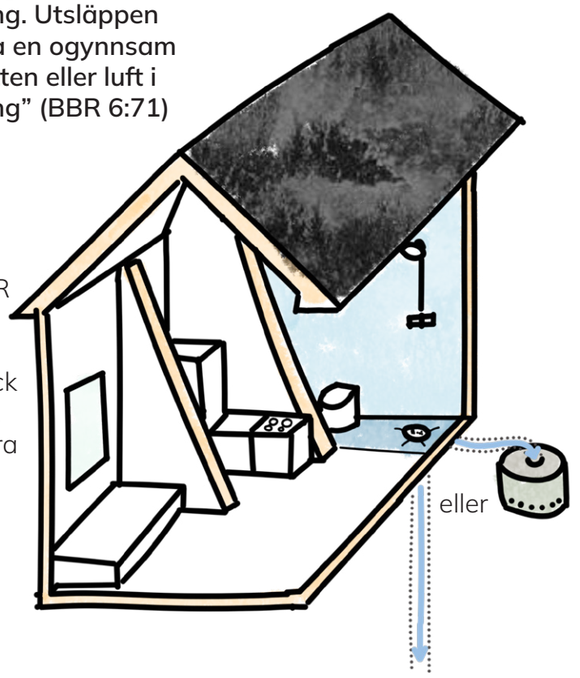
Golv som blir vått skall ha en lutning mot golvbrunn (BBR 6:6335).

Vatten och utsläpp

”Byggnader ska utformas så att det blir möjligt att föra bort föroreningar som uppkommer till följd av byggnadens drift, utan att negativa effekter på hälsa och hygien uppstår för människor som befinner sig i byggnaden eller i byggnadens omgivning. Utsläppen får inte heller medföra en ogynnsam inverkan på mark, vatten eller luft i byggnadens omgivning” (BBR 6:71)

“Byggnader och deras installationer ska utformas så att vattenkvalitet och hygienförhållanden tillfredsställer allmänna hälsokrav” (BBR 6:61).

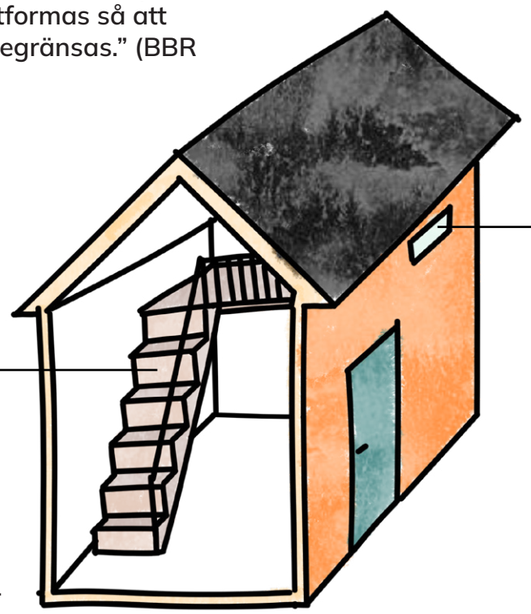
Tappvattnet skall vara hygieniskt och komma i tillräcklig mängd (BBR 6:62). Tappvatten-temperaturen skall gå att få upp till 50°C, dock ej högre är 60°C. (BBR 6:621). För att minimera mikrobiell tillväxt skall varmvatten-cirkulationen ha en temperatur på över 50°C (BBR 6:622).



Avlopp kan föras antingen till allmän VA-anläggning, eller till enskilt avlopp (BBR 6:73) (Se s.90).

Säkerhet

”Byggnader ska utformas så att risken för olyckor såsom fall, sammanstötningar, klämning, brännskador, explosioner, instängning, förgiftningar och elektriska stötar begränsas. Tomter som tas i anspråk för bebyggelse ska utformas så att risken för olycksfall begränsas.” (BBR 8:1)



Fönster högre upp skall ha säkerhetsbeslag eller spärranordningar för att barn inte skall kunna falla ut (BBR 8:231).

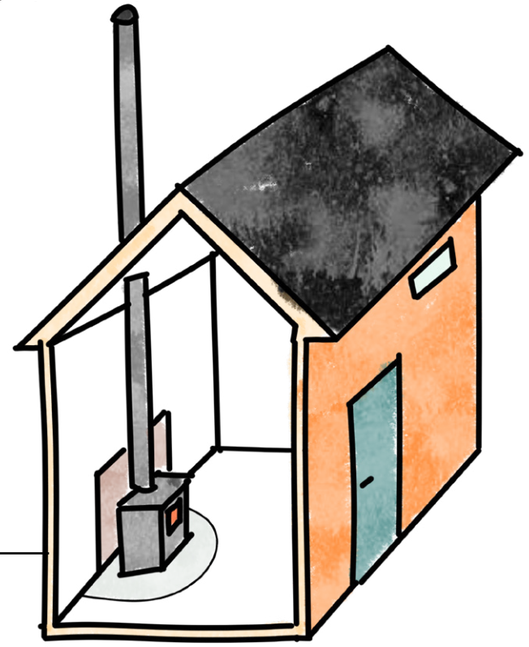
Trappor och balkonger skall utformas så att man säkert kan vistas på dem. (BBR 8:232) Rekommendationen är stegdjup 25 cm, steghöjd 17 cm och öppningar mellan trappsteg max 10 cm.

Trappor och balkonger skall ha räcken som bör vara 0,9 m höga vid våningsplan på under 3 m (BBR 8:2321).

Energi

”Byggnader vara utformade så att energianvändningen begränsas genom låga värmeförluster, lågt kylbehov, effektiv värme- och kylanvändning och effektiv elanvändning.” (BBR 9:1)

För fristående byggnader på under 50 m² behöver ingen energideklaration redovisas. (Förordning (2006:1592) om energideklaration för byggnader 2 §)



För småhus gäller att U-värdet skall vara högst 0,33 W/m² K enl. BBR Tabell 9:2a.

U-värde bestäms främst av tjocklek och typ av isolering samt energiklass på fönster (mer om detta på s.75).

Klimatskärmens genomsnittliga luftläckage vid 50 Pa-tryckskillnad (l/s m²) skall vara 0,6 (enl. BBR Tabell 9:2a).

Hus som håller *för väder, vind och laster*

Hus som håller – en kortkurs i konstruktion

Detta kapitel tar upp:

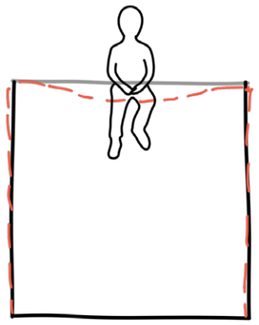
- Kortkurs i laster
- Materialegenskaper
- Takkonstruktioner
- Tyngdpunkt och stabilitet
- Klimatskärm
- Kreativitet under ansvar

En byggnad behöver tåla att användas. Den behöver kunna hantera laster, kunna motstå fukt och hålla värmen. Det finns många vägar att gå för att uppnå det, och därför bra att kunna grunderna i konstruktionslära för att kunna ta välgrundade beslut och använda sin kreativitet.

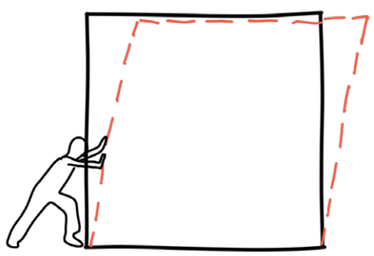
I Boverkets byggregler ställs krav på att byggnader skall utformas så att fukt inte orsakar skador (BBR 6:51, s.48), att energianvändningen begränsas (BBR 9.1, s.51), att luft-, ljus-, fukt- och temperaturförhållanderna blir tillfredsställande (BBR 6.1, s.47) och att man säkert kan använda byggnaden samt att risken för olyckor begränsas (BBR 8.1, s.50).

Laster

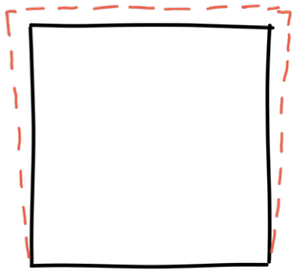
En stabil byggnad behöver kunna stå emot vertikala och horisontella laster, samt hantera temperatur- och fuktlaster.



Exempel på vertikala laster är regn, snö, konstruktionsmaterial, inredning och människor.



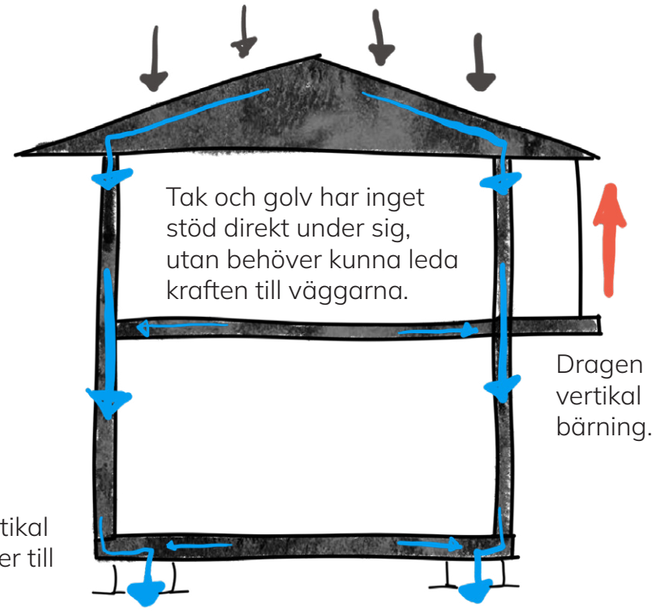
Exempel på horisontella laster är vind och jordbävningar.



Temperatur-och fuktlaster är rörelser i konstruktionen orsakade av expansion och krympning av material.

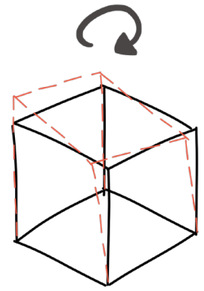
Vertikala laster

Vertikala laster behöver bäras för att konstruktionen inte skall falla rasa ner i marken. För att huset skall stå emot de vertikala lasterna behöver de horisontella ytorna vara stabila. Där det inte finns direkt stöd till stabilt motstånd (marken) behöver kraften föras vidare till andra element som har direkt stöd. Vertikal bärning kan vara tryckt, som i en pelare eller en vägg, eller dragen.

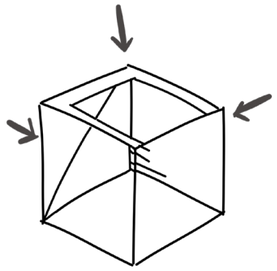


Horisontella laster

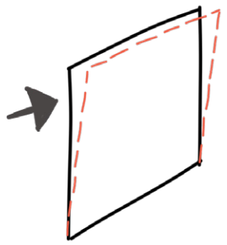
För att huset skall kunna stå emot horisontella laster måste de vertikala strukturerna, det vill säga väggarna, vara stabila. En enkel ram kan inte stå emot tryck från sidan utan att stabiliseras.



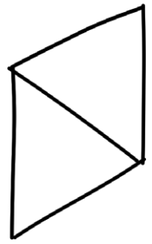
En instabil kub



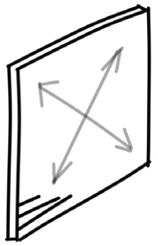
Det behövs 3 stabila sidor för att motverka vridning.



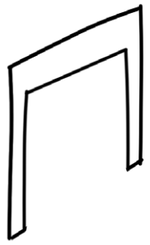
Instabil vertikal struktur



Genom att lägga till en diagonal blir strukturen stabil



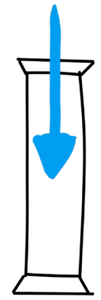
En skiva är stabiliserande i alla ledder



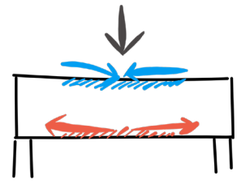
En inbyggd balk fungerar som en mindre skiva

Materialegenskaper

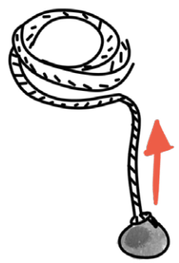
Elementen i en struktur utsätts för antingen tryck, drag eller vridning. För att uppnå stabilitet skall man använda ett material som lämpar sig för uppgiften.



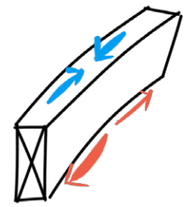
En vägg eller pelare utsätts endast för tryck



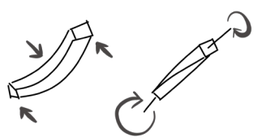
En fritt liggande balk utsätts för tryck på ovansidan och drag på undersidan.

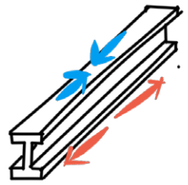


Ett rep bär endast i drag. Det är starkt och lättviktigt.

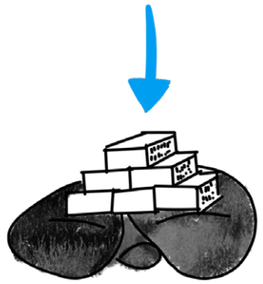


Trä tål både tryck, drag och vridning.





Stål kan klara mer tryck och drag än trä.



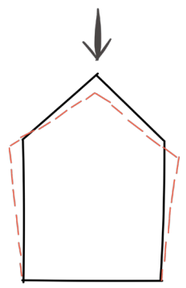
Sten, betong och tegel tål endast tryck.

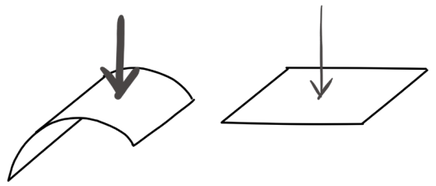
Takkonstruktioner

För att förstå tryck, drag och olika material kan takkonstruktioner ge en god insikt.

OBS!

Med alla uppstickande tak utsätts väggarna för ett tryck utåt, så de kan behöva stabiliseras inåt.

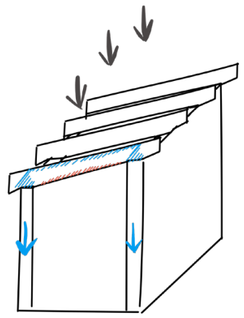




Tips!

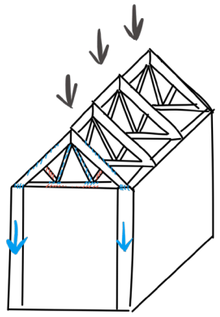
En böjd skiva kan stå emot tryck mycket bättre än en platt skiva!

Pulpettak



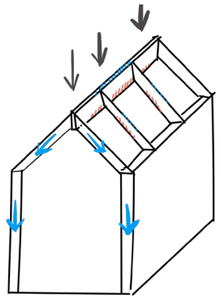
En takbjälke som vilar på två väggar utsätts för tryck på ovansidan och drag på undersidan. Den måste vara tillräckligt hög för att inte bågna!

Sadeltak med takstol



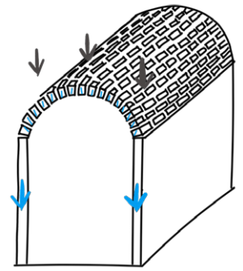
En takstol är en konstruktion som genom diagonala stöd är stabil både vertikalt och horisontellt.

Sadeltak mot takrygg



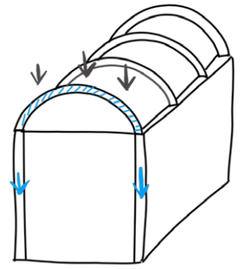
En kraftigt dimensionerad ås går längs med huset, med takbjälkar lutande mot sig. Åsar och bjälkar utsätts för tryck på ovansidan och drag på undersidan.

Välvt tak, murat



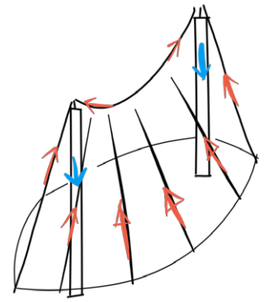
Ett välvt tak är en tryckt konstruktion. Ett murat tak byggs så att det stabiliseras av trycket av sin egentyngd.

Välvt tak



Ett välvt tak ger en mer jämn kraftfördelning än när man använder raka bjälkar.

Hängt tak

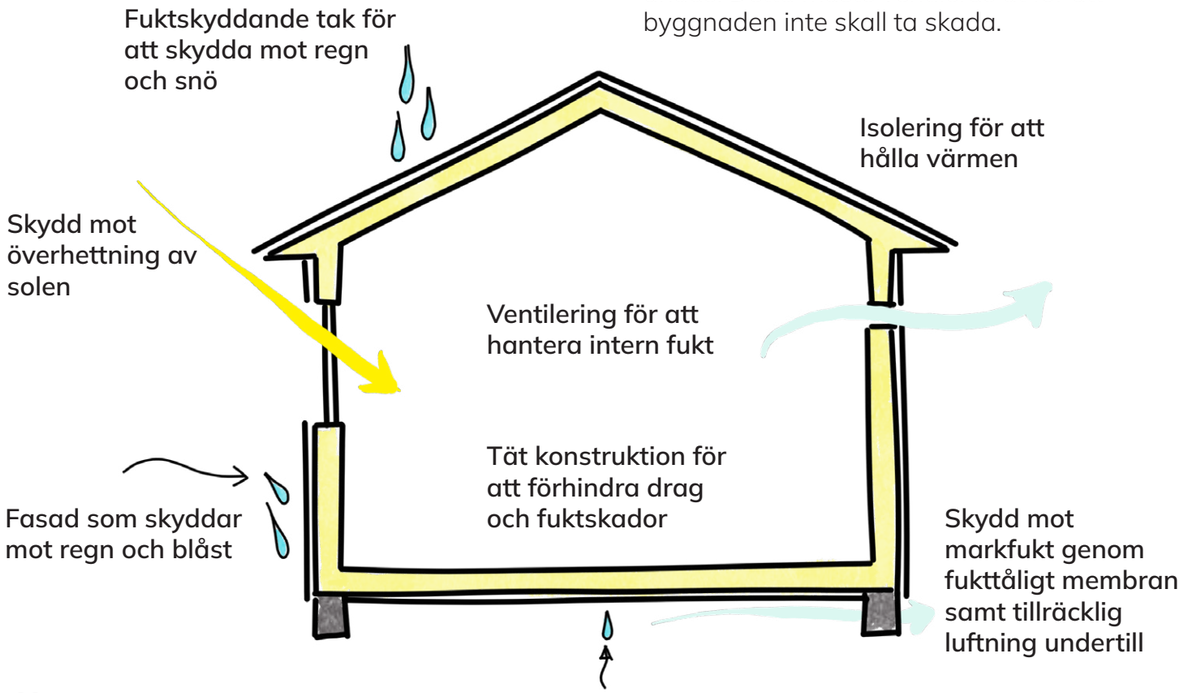


Sportsstadion och tält är två exempel på hängda tak. Det behövs då en pelare eller båge som bär i tryck, samt från den hängande rep eller tyg som bär genom drag.

Klimatskärm

En byggnad skall kunna motstå fukt och ge ett behagligt inomhusklimat genom att kunna hålla värmen och vara tätt för drag.

En byggnads klimatskärm skall skydda huset från fukt som kommer utifrån - från marken, från regn eller snö. När vi använder husen frigörs dessutom vattenånga internt från matlagning, dusch och genom att vi svettas och andas. Detta måste ventileras ut för att byggnaden inte skall ta skada.

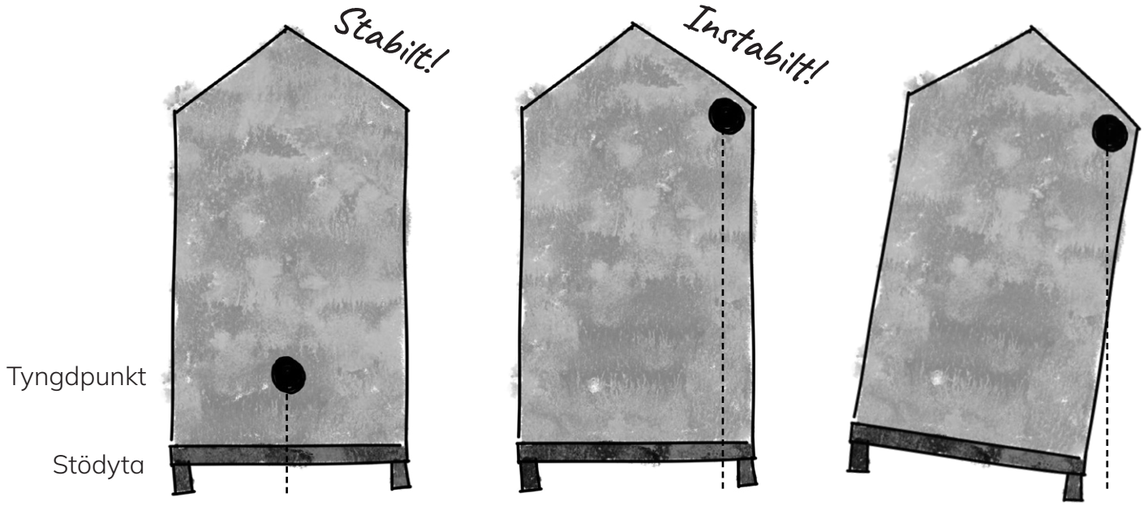


Balans

För att en konstruktion inte skall falla behöver vikten vara balanserad. Det är extra viktigt med hus på hjul, då de utsätts för stora krafter under transport och inte är fästa i marken.

Tyngdpunkten för ett objekt är den punkt kring vilken alla tyngder balanserar. Stödyta är den yta som all vikt fördelas på. Tyngdpunkten behöver vara inom stödytan för att objektet inte skall falla.

Ett hus kan göras mer stabilt genom att tyngdpunkten placeras så lågt som möjligt, samt att stödytan är så stor som möjligt. I ett tiny house kan det handla om att placera vattentankar i golvhöjd och vara uppmärksam på att inte både mycket inredning och stora tunga fönsterpartier hamnar på samma sida av huset.

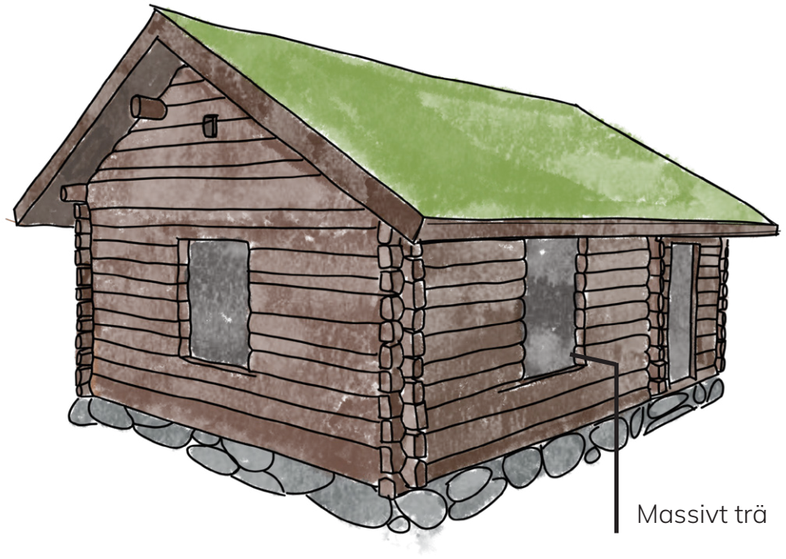


Konstruktion

En stabil, fukttålig och isolerad konstruktion går att få till på många olika sätt. Hur man löser det skiljer sig mellan länder och har ändrat sig genom historien allt efter tillgång på material och ny kunskap.

Traditionell timmerstuga

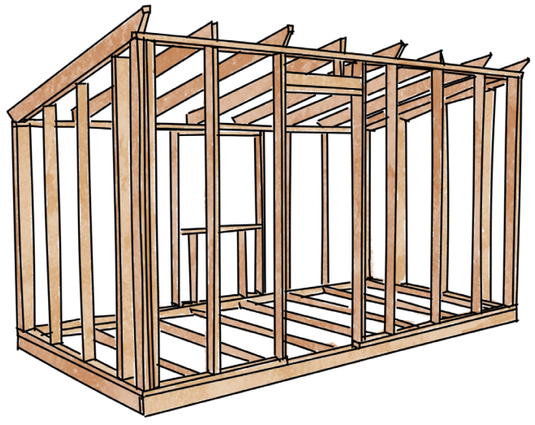
Väggarna i traditionella timmerstugor är allt-i-ett, där stockarna ger både vertikal och horisontell bärning, samt isolering.

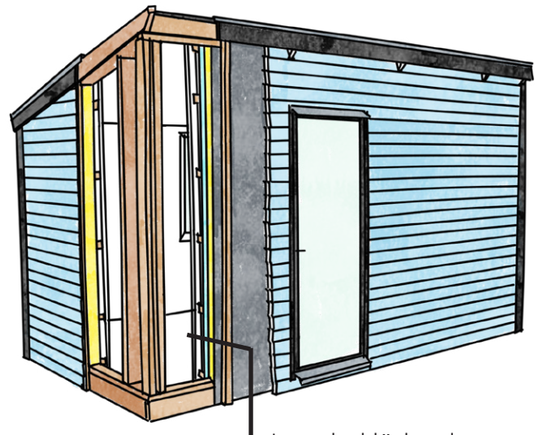


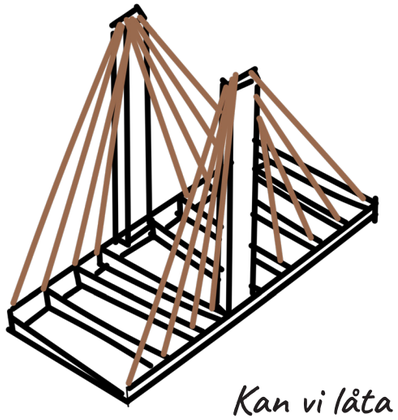
Modernt träbyggeri

Dagens träbyggnader byggs istället i flera olika lager och med en rad olika material. En inre struktur av träreglar hanterar vertikala laster.

Byggnaden kläs därefter med olika lager både invändigt och utvändigt. Isolering läggs mellan reglarna i stommen. Skivor eller panel på väggar, tak och golv hanterar vertikala laster. Ångbroms, vindduk, takpapp och trossbotten hanterar fukt.

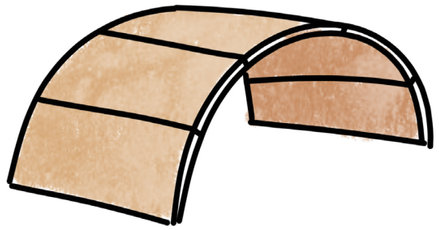


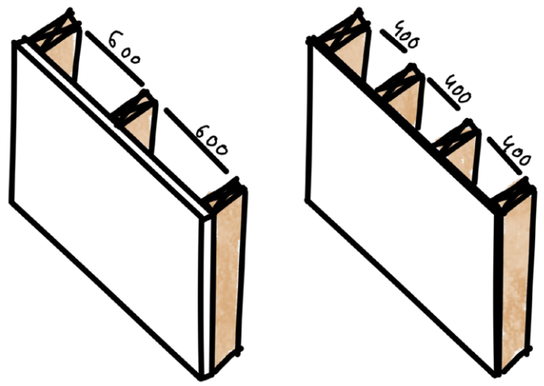




Kan vi låta rep bära för att minska vikten och öka stabiliteten?

Hur tunt kan taket göras om det böjs...?

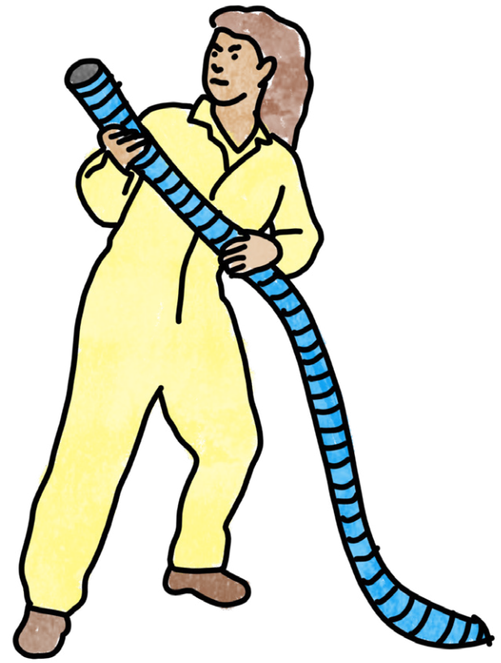




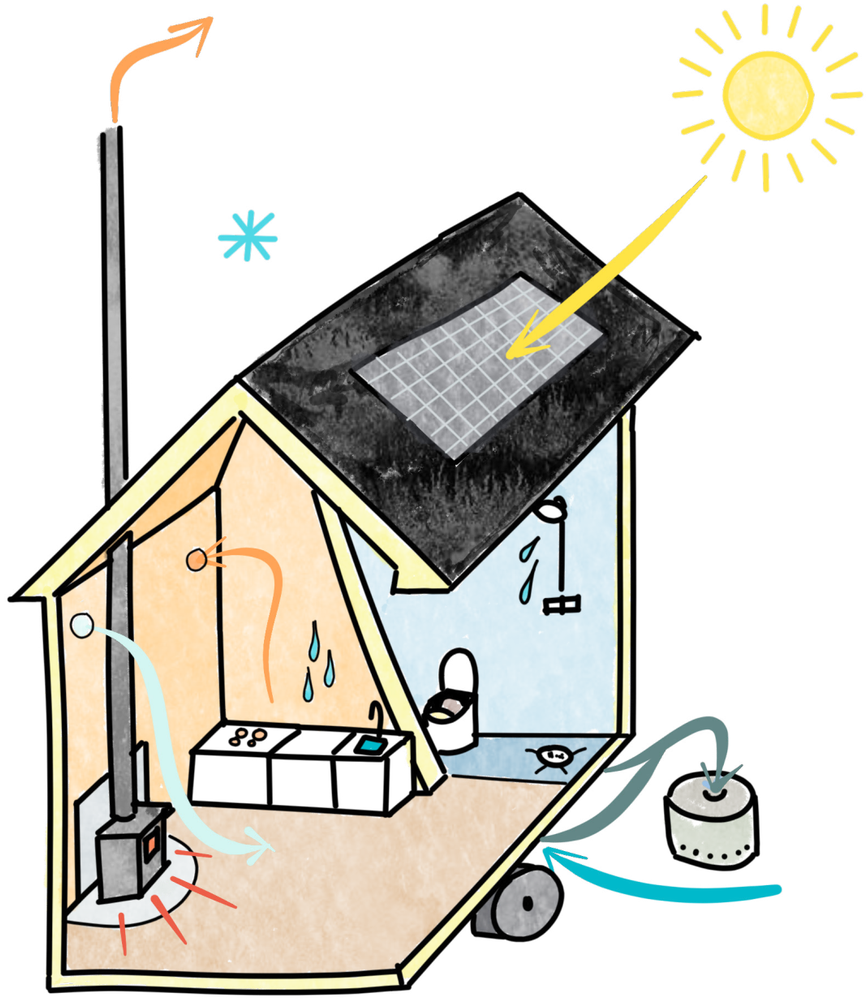
Om jag har tätare mellan reglarna i väggen, kan fasadmaterialet bli lättare?

Låt kreativiteten flöda...

Moderna byggstandarder är i ständig utveckling och man skall inte se sig blind i standardmått och vedertagna arbetssätt. Kreativitet och intuition kan också få lov att styra utformningen. Kanske vill man sänka vikten, eller hitta mer miljöriktiga sätt att bygga. Med grundläggande kunskaper i konstruktion och vetskap om vilka funktioner ett hus skall uppfylla, kan man börja byta ut och experimentera. Genom att utmana och testa kan man som självbyggare vara med och driva utvecklingen framåt.



Fråga dig alltid: "Vad kan man använda den här till?"



Hus som fungerar

Hus som fungerar

Byggbranschen står för 41% av CO_2-utsläppen i Sverige och är därför ett av de områden som drastiskt kommer att behöva minska sin klimatpåverkan. Genom kunskap om energibalans, värmeförluster och olika systemlösningar kan man som självbyggare ta val som gynnar en **hållbar utveckling.**

Om du är nyfiken på att lära dig mer om byggnadsfysik eller energianvändning finns det en del böcker på ämnet, så som: Bygga hus (Strandberg, 2015) och Tillämpad byggnadsfysik (Pettersson, 2008).

Detta kapitel tar upp:

- Energianvändning
- Material
- Värmeförluster
- Fukt
- Ventilation
- Värmesystem
- El
- Solceller
- Vatten och avlopp
- Toalettlösningar

Energianvändning i Sverige

Boverket (2025). Energianvändning.

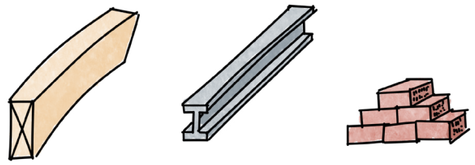
Energianvändning i byggnader

Mathias L. et al. (2016): Byggandets klimatpåverkan

Materialens påverkan

Att samla in, förädla och använda byggmaterial står för ca 50% av byggnadens klimatpåverkan. Genom att använda miljövänliga material kan miljöpåverkan begränsas.

*Berge, B (2009) *The ecology of building materials. Oxford: Esevier*
Henning Larsen (2002). Unboxing carbon, the catalogue



GWP står för Global Warming Potential, vilket är ett sätt att beräkna hur mycket produktion av materialet påverkar växthuseffekten. Ett högre tal är sämre, medan ett minustal betyder att växthuseffekten motverkas genom att koldioxid binds under produktionen. Här presenteras en översikt av vanliga byggmaterial. Som ses i listan är det en fördel att använda träbaserade material och att undvika att använda metall och plast. Att använda återvunna material innebär närmast ingen klimatpåverkan, då inga nya råvaror utvinns eller förädlas.

Material	GWP (kg CO^2e/m^2)*
PiR TP10	68
Aluminium	28
Cellplast s100	22
Stål	12,9
Glas	11,9
Tegel	10,7
Betong	8,5
Hampaisolering	4
Träfiberisolering	1,5
Mineralull	1,17
Trä	-12,7

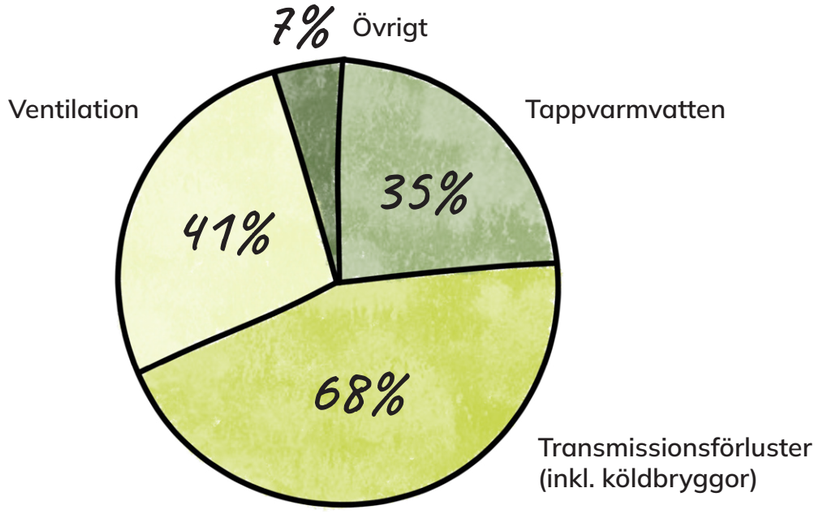
Värmeförluster

Uppvärmningen under en byggnads livstid står för ca 50% av byggnadens klimatpåverkan. Genom att ha ett gott värmeskydd, ett effektivt värmesystem samt genom att begränsa energiförluster kan miljöpåverkan begränsas.

Pettersson, B (2018), Byggnaders klimatskärm. Studentlitteratur.
Pettersson, B (2007), Tillämpad byggnadsfysik. Studentlitteratur.

Energi i form av värme försvinner ut ur byggnaden genom:

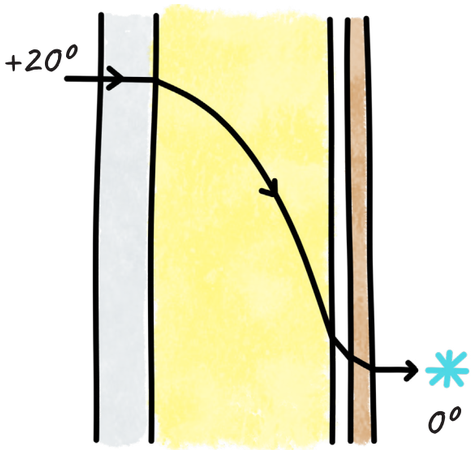
1. Transmission (transport genom klimatskalet)
2. Köldbryggor
3. Ventilation
4. Luftläckage (håligheter)
5. Tappvarmvatten



Transmission

Transmission innebär transport av värme genom material, vilket står för 68% av en byggnads energiförluster. Det kan motverkas genom att isolera väl och genom att undvika köldbryggor.

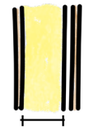
Finns det en temperaturskillnad inomhus och utomhus, kommer värme vandra mot där temperaturen är lägst. Detta går snabbt genom material med hög värmeledningsförmåga, och hindras av material med låg värmeledningsförmåga.



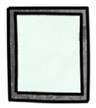
Värmeledningsförmåga har tecknet λ (lambda) och mäts i W/mK. För att räkna ut isolervärdet (u-värdet) för en viss del av huset tar man dess värmeledningsförmåga delat på tjockleken på ens material (i meter). Ju lägre tal, desto bättre.

$$\lambda (W/mK) / d(m) = W/m^2K \text{ (u-värde)}$$

Material	W/mK
Aluminium	258
Stål	50
Rostfritt stål	17
Betong	1,7
Glas	1
Tegel	0,6
Trä	0,14
Halmbalar	0,45-0,85
Mineralull	0,035
Cellplast s100	0,037
Cellulosa	0,038
Träfiberisolering	0,038
Hampaisolering	0,045
Cellplast PiR	0,022



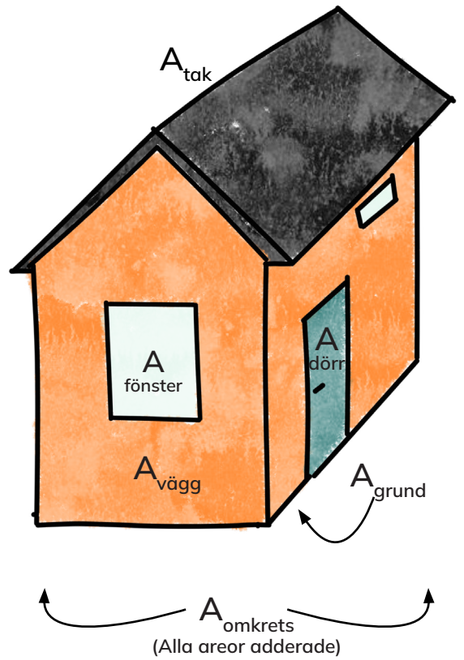
Material	U-värde (Ungefärligt)
Isolering (0,035 W/m*K):	
70 mm	0,5
95 mm	0,37
120 mm	0,3
145 mm	0,24
195 mm	0,18
300 mm	0,11
400 mm	0,08



3-glasfönster	0,7-1,3
2-glasfönster	1,1-1,6
1-glasfönster	2,4-3
Dörr	0,8-1,2

Byggnader på under 50 m^2 uppvärmd yta har krav om genomsnittligt U-värde på lägst 0,33 W/m^2K (BBR Tabell 9:2a). Lite förenklat innebär det isolering på minst 120 mm runt om hela huset.

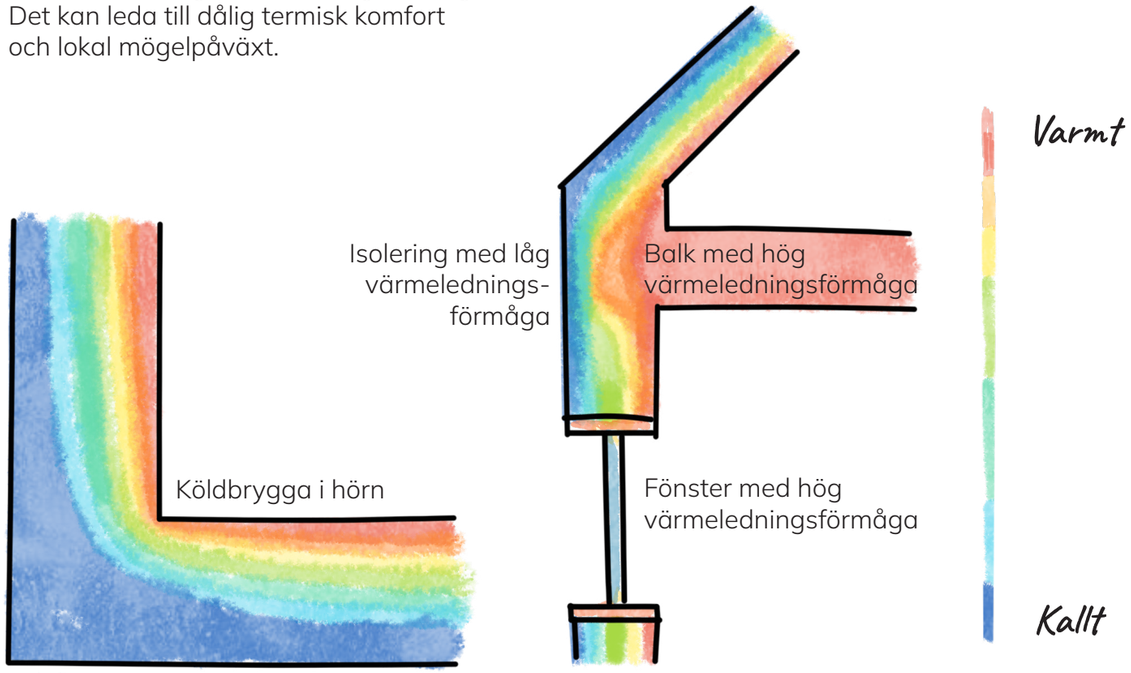
Genomsnittligt U-värde beräknas genom att lägga samman de olika delarnas U-värde och dela på klimatskalets sammanlagda antal m^2.



$$U_{medel} = \frac{(A_{grund} * U_{grund}) + (A_{vägg} * U_{vägg}) + (A_{tak} * U_{tak}) + (A_{fönster} * U_{fönster}) + (A_{dörr} * U_{dörr})}{A_{om}} \quad [W/m^2K]$$

Köldbryggor

Köldbryggor är de delar i en konstruktion som isolerar sämre än resten av konstruktionen. Detta sker generellt i hörn samt om ett material med hög värmeledningsförmåga bryter av ett material med låg värmeledningsförmåga. Det kan leda till dålig termisk komfort och lokal mögelpåväxt.

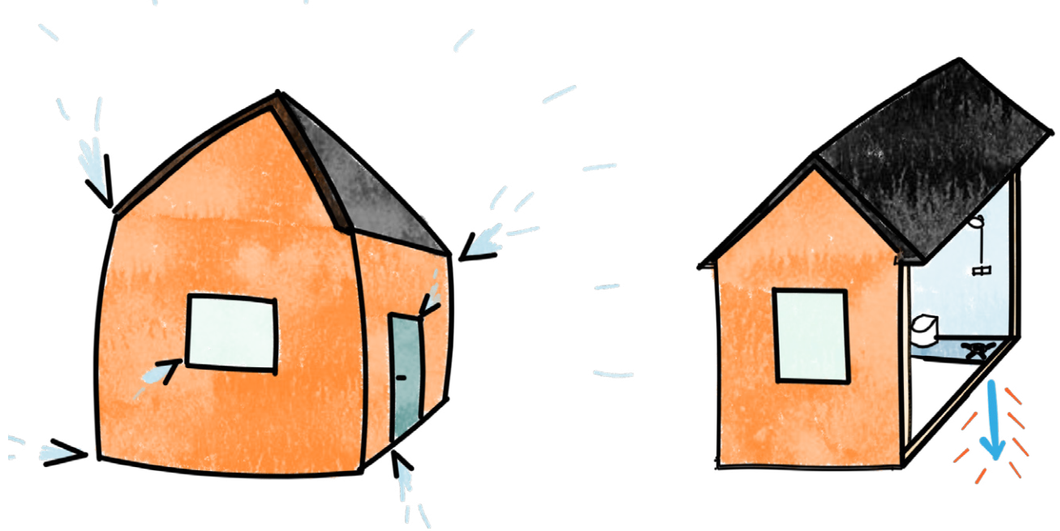


Luftläckage

Luftläckage står för 4% av energiförlusterna i moderna byggnader. Det är ofrivillig luftväxling som sker genom håligheter i konstruktionen. Det kan leda till komfort- och fuktproblem. Det kan motverkas genom att bygga tätt.

Tappvarmvatten

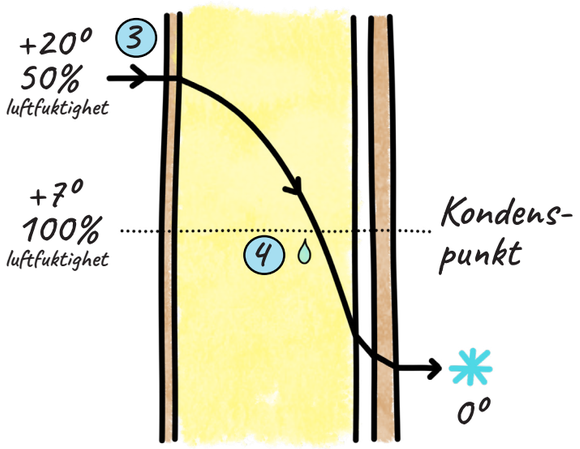
Tappvarmvatten står för 35% av energiförlusterna i en byggnad. Det innebär att varmt vatten från exempelvis badrum och kök kommer ut ur huset utan att värmen först återvinns. Varmvattenåtervinnare är ovanliga, men finns och kan exempelvis kombineras med FTX-system, då tillluften värms av använt varmvatten.



Fukt

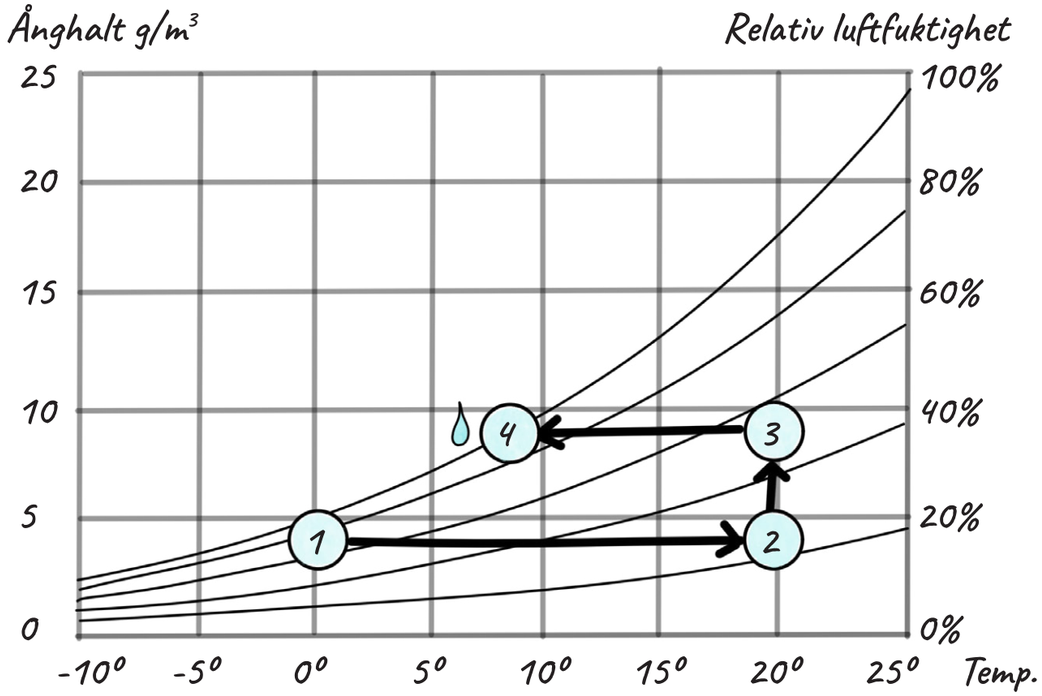
Fukt är en benämning för både is, vatten och ånga. När vi använder hus frigörs vattenånga från matlagning, dusch och genom att vi svettas och andas. Detta måste ventileras ut för att byggnaden inte skall ta skada. När varm, fuktig luft kyls ner kan vatten nämligen kondensera och falla ut som vattendroppar.

Då varm, fuktig luft kommer i kontakt med kalla ytor kan det bildas kondens. Det är vanligt att se på fönster. Sker det i köldbryggor såsom hörn finns stor risk för mögelpåväxt.



Kall luft kan hålla mindre fukt än varm luft. När varm luft kyls ner, faller den fukt som luften inte längre kan bära ut som kondens. Det är det som händer när daggen faller. Om varm, fuktig luft kan

Strandberg, B. (2015) *Bygga hus. (2a uppl.). Studentlitteratur.*



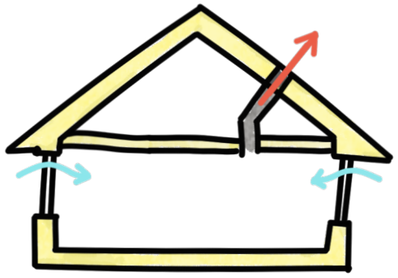
vandra genom en vägg, så kommer den långsamt att kylas ner. Om daggpunkten nås i väggen, kommer fukt att kondensera där. Det kan orsaka stora skador på ett hus! Det kan exempelvis gå till så här:

Kall utomhusluft med 100% luftfuktighet (1) kommer in i ett hus (2). Den blir varm och tar upp mer fukt (3). När den vandrar ut genom väggen blir luftfuktigheten över 100% och fukten faller ut som droppar (4).

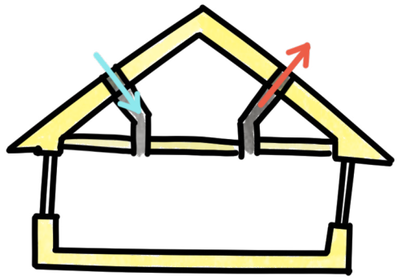
Ventilation

Ventilationsförluster står för 41% av en byggnads energiförluster. Genom ett effektivt ventilationssystem kan förlusterna begränsas.

Strandberg, B. (2015) Bygga hus. (2a uppl.). Studentlitteratur.

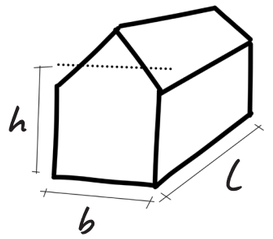


Mekanisk frånluft (F) kräver en elansluten fläkt och en kanaldragning. Genom att blåsa ut luft skapas ett undertryck i byggnaden som gör att ny, frisk utomhusluft sugs in.

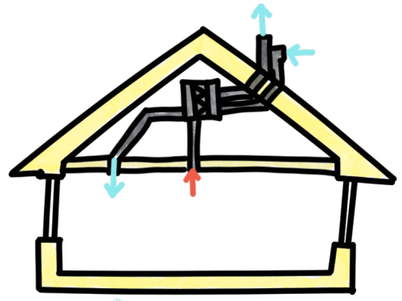


Från- och tilluft (FT) kräver två elanslutna fläktar och två kanaldragningar. Fläktsystemet både förser och blåser ut luft ur byggnaden.

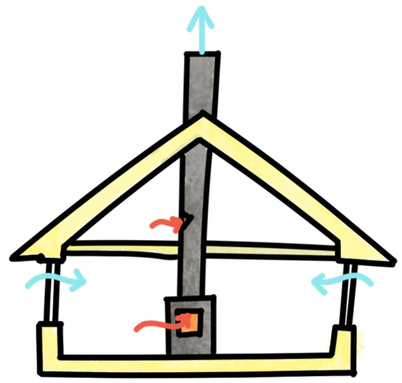
Krav på ventilationsflöde enligt BBR: 0,35 l/s per m^3. Beräkna ventilations-behovet för ditt hus och se till att den fläkt du skaffar uppfyller husets krav.



h*b*l*0,35 = l/s
(längdmått i m)



Från- och tilluft med värmeåtervinning (FTX) kräver två elanslutna fläktar, flera kanaldragningar samt ett värme-återvinningssystem. Det är dyrare och mer komplicerat, men upp till 85% av värmen kan återvinnas genom att tilluften värms av frånluften.

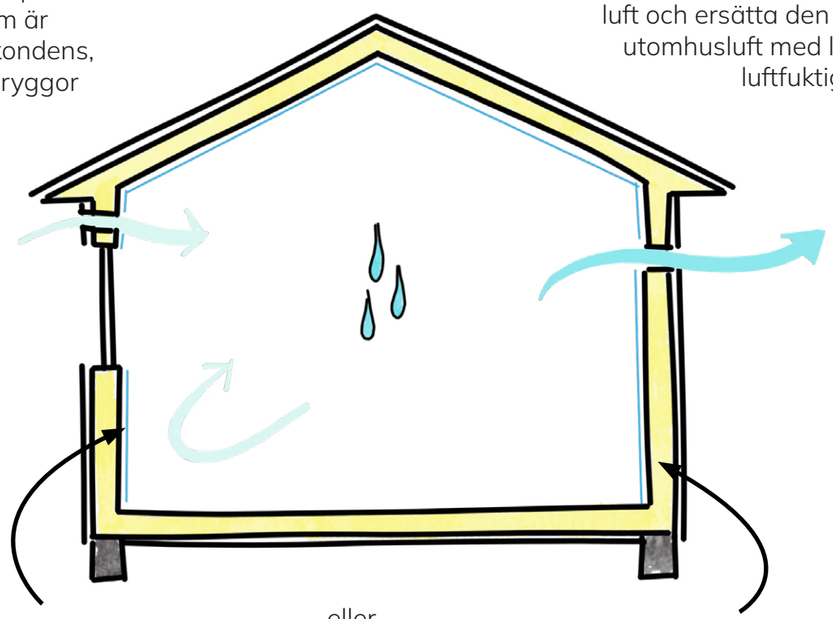


Självdragsventilation är en passiv ventilationsmetod som drar nytta av skorstensverkan, det vill säga att varm luft stiger. Det är ett enkelt system som går utan el, men som endast fungerar för byggnader som har skorsten (eller är höga).

Sätt att hantera intern fukt

Det är viktigt att luften kan cirkulera, speciellt på ställen som är känsliga för kondens, så som köldbryggor i hörnen.

Tillräcklig ventilation är viktigt för att föra ut fuktig luft och ersätta den med utomhusluft med lägre luftfuktighet.



eller

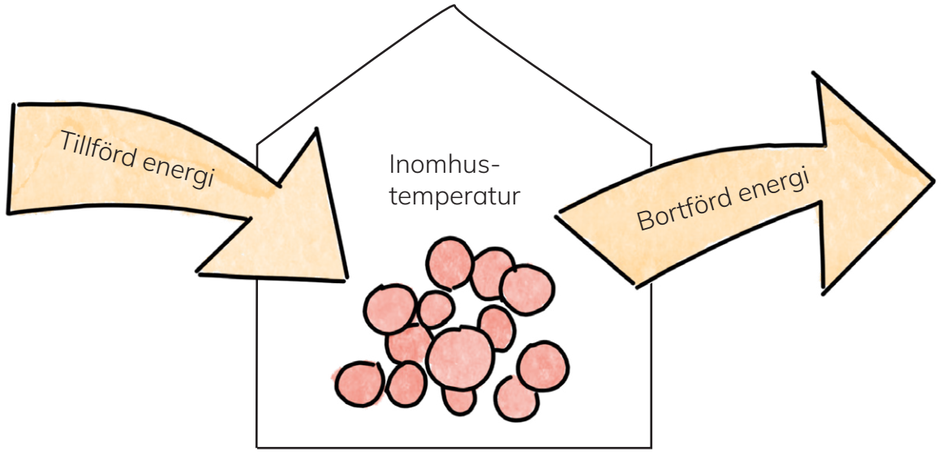
Att bygga lufttätt är ett sätt att hindra fuktig luft att vandra ut i väggen. Genom att använda en ångspärr eller ångbroms invändigt stoppas luften. Skulle det gå hål på ångbromsen finns dock stor risk för fuktskador i väggen!

Använda material som kan hantera varierande fuktlaster. Exempelvis träfiberisolering kan hålla vatten vid högre luftfuktighet, och släppa ifrån sig det igen när luftfuktigheten sänks utan att ta skada. Då behöver man inte ångspärr. En annan taktik är cellplast, som inte skadas eller påverkas av fukt.

Värmesystem

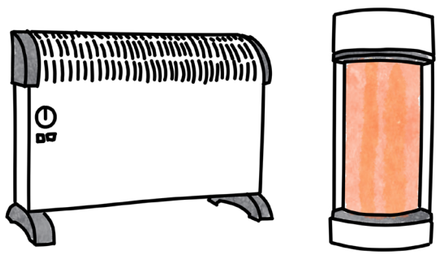
Uppvärmningen under en byggnads livstid står för ca 50% av byggnadens klimatpåverkan. Genom att ha ett gott värmeskydd, ett effektivt värmesystem samt genom att begränsa energiförluster kan miljöpåverkan begränsas.

Värmeskydd är knutet till förväntningar om komfort och en hälsosam inomhusmiljö. Ett gott värmeskydd uppnås genom att använda material som isolerar effektivt i tillräckliga dimensioner. För att göra uppvärmningen av huset effektiv är det dessutom viktigt med en effektiv värmekälla.



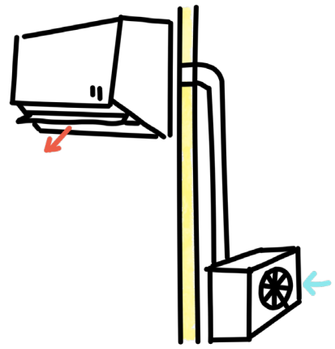
Energibalans

Direktverkande el



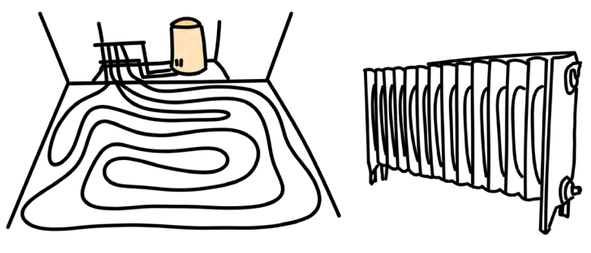
Direktverkande el som värmekälla är ett relativt ineffektivt system där 1 kW el blir till 1 kW värme. Det kräver uppkoppling på el-nätet eller en generator. Det är enkelt och billigt att installera och kräver inget underhåll. Direktverkande el kan verka antingen genom att värma upp luften (en radiator eller exempelvis golvvärme), eller genom att skicka ut värmestrålning som värmer objekten i rummet (en värmestrålare).

Luftburen värme



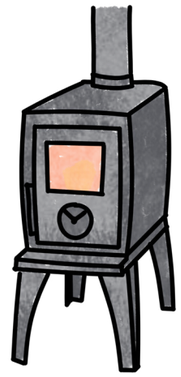
En luft-luftvärmepump tar sin värme ur utomhusluften och blåser varm luft in i huset. Den drivs av el, men är ett mer effektivt system än direktverkande el, då 1 kW el kan bli till 5 kW värme (effektivitet beroende på fabrikat). Den har en inomhusdel och en utomhusdel. Den kräver installation av behörig installatör.

Vattenburen värme



Vattenburen värme kräver en vattentank som värms antingen med el, pellets, ved eller solvärmare. Vattnet leds ut antingen i radiatorer eller genom golvvärme. Det är ett flexibelt system som kan drivas både on- och off-grid, men som ökar på vikten och kräver en professionell installation. Golvvärme ger en mer jämn temperaturfördelning, men kräver mer tid för att värma upp ett rum än en radiator och bör installeras av en behörig installatör.

Kamin



En kamin drivs med ved alternativt pellets vilket ger möjlighet att leva OFF-grid. Det ger strålvärme som snabbt kan värma upp ett rum, men det kan vara svårt att reglera värmen och att få en jämn temperatur över dygnet. Den går att koppla till ett vattenburet värmesystem. Den kräver möjlighet till förråd av ved. En kamin behöver installeras korrekt och regelbundet kontrolleras av sotare.

Elsystem

El används till att driva mycket i vår vardag. Det är dock livsfarligt och skall installeras av någon med rätt kunskap. Alla regler gällande el finns samlade på https://www.elsakerhetsverket.se/

El är livsfarligt. Rätt kunskap och försiktighet är oerhört viktigt vid allt arbete med elektricitet. En felaktig hantering av el kan leda till brand och skador – och i värsta fall till döden.

Elektriskt arbete på fordon omfattas inte av elsäkerhetslagen (Elsäkerhetslagen (2016:723) (Proposition 2015/16:163 s. 20 ff). Istället är det transportstyrelsen som ansvarar för elinstallationer i fordon. Oavsett detta skall installationen vara säker och skall alltid utföras av personer med rätt kunskap. Är du det minsta osäker ska du alltid låta ett elinstallationsföretag göra jobbet.

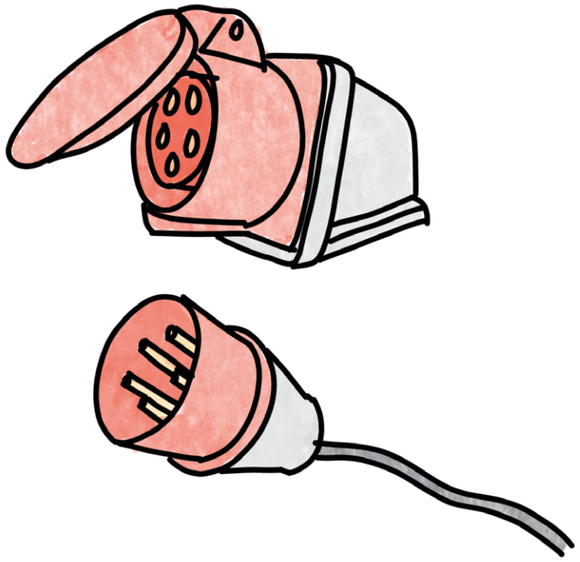
Vad du får göra själv

- Byta ut trasiga lampor och lysrör.
- Byta ut fast installerad armatur, dock ej i badrum.
- Byta proppar och säkringar.
- Montera skarvsladdar och reparera eller byta ut delar i trasiga skarvsladdar och apparatsladdar.
- Byta befintlig strömbrytare för högst 16A som är placerad i en egen kapsling eller dosa
- Byta befintligt vägguttag för högst 16A som är placerat i en egen kapsling eller dosa.

Du får också arbeta med elektriska system under 50V, med en högsta effekt på 200VA och med ström begränsad av säkring högst 10A eller annat överströmsskydd med motsvarande skyddsverkan. Med andra ord får vissa 12V-system installeras själv, så länge det är “fackmannamässigt utfört”. För att få utföra dessa arbeten måste du ha kunskap om hur du gör. Arbetet ska även kunna kontrolleras på ett korrekt sätt.

Husets elsystem kan vara antingen ON-, eller OFF-grid. Ett ON-grid hus kopplas på det befintliga nätet och har därmed 230V i uttagen. Det innebär att de flesta hushållsapparater är gjorda för 230V.

Ett OFF-grid-system drivs av solceller och generator, och är ofta 12V eller 24V. Även om man har ett OFF-gridsystem kan det vara fördelaktigt att konvertera 12V DC till 230V AC, fast det innebär en energiförlust på ca 15%. Annars behöver man köpa kylskåp och liknande som är anpassade till båtar eller husbilar.



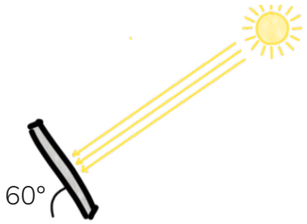
En kabelanslutning på 16A eller 32A är vanlig för att koppla ON-grid tiny houses till extern el.

Solceller

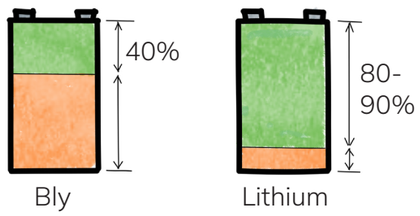
Du kan köpa solpaneler själv, men du får inte lov att installera dem. Allt arbete med el måste en behörig elektriker utföra.

Vill man satsa på OFF-grid elektricitet behöver solenergisystemet i Sverige kompletteras på vintern med exempelvis en bensindriven generator. Man får också räkna med att vänja sig vid att leva mer återhållsamt vad gäller elanvändning och ändra livsstil därefter. Att investera i solceller kan vara ett hållbart val - efter 3 års användning av solpaneler är systemet “carbon-neutral”.

Ett solcellspaket med 400W solceller och 3600Wh batteri kan köpas från omkring 40 000 kr. Köper man delar till ett likvärdigt system själv kan man få ner kostnaden till omkring 15 000 kr. Vill man bara ha ett mindre “backup”-system är en portabel kraftstation och en portabel solcell ett enkelt alternativ som får användas utan professionell installation. 100W solceller med ett 250Wh-batteri kostar från 2000 kr.

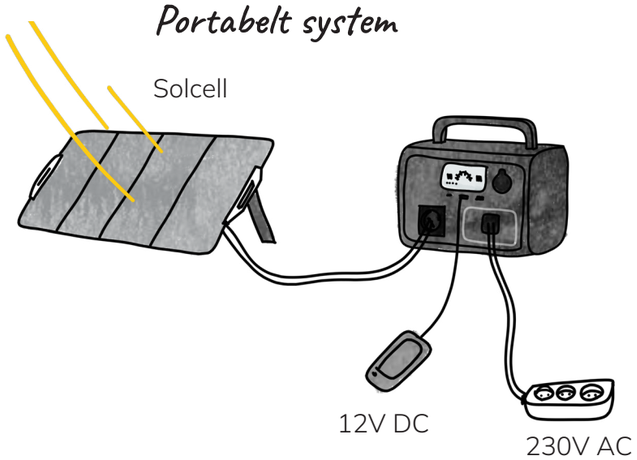


Solpaneler finns i många olika utföranden, vissa är till och med böjbara! Ungefär 60 grader är en optimal vinkel för solceller under höst/vår/vinter.



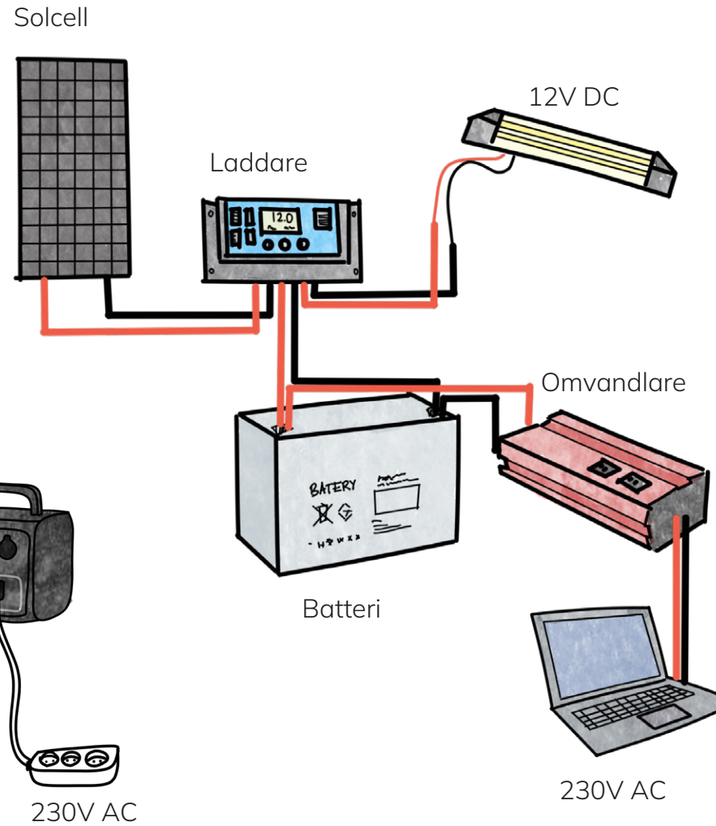
Blybatterier har en mindre förbruknings-kapacitet än litiumbatterier. Det gör att man behöver fler för att få ut lika många kWh. Bly är dock mer effektiv i kalla temperaturer.

Portabelt system



Vill man ha ett lite enklare system med mindre el vid resa eller vid elavbrott, kan man köpa en portabel kraftstation som har laddare, batteri och omvandlare i ett.

Stationärt system



Ett större, ofta stationärt solenergisystem innehåller solcellspaneler, laddare, batterier och omvandlare.

Vatten och avlopp

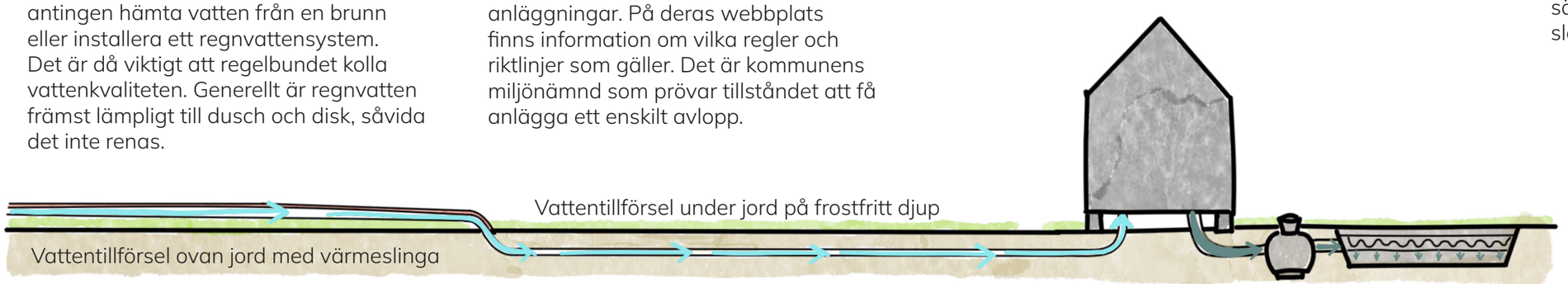
Ett hus behöver förses med färskvatten och på ett säkert sätt göra sig av med avlopp.

Färskvatten kan tillföras en byggnad ON-grid genom en slang från befintligt vattennät. Viktigt att tänka på är att vattentillförsel behöver skyddas från kyla på vintern för att inte frysa. Den kan förses med värmekabel, men det kostar mycket el i drift. Ett passivt sätt att hindra frostskador är att gräva ner slangen till frostfritt djup.

OFF-grid finns möjligheterna att antingen hämta vatten från en brunn eller installera ett regnvattensystem. Det är då viktigt att regelbundet kolla vattenkvaliteten. Generellt är regnvatten främst lämpligt till dusch och disk, såvida det inte renas.

Avloppsvatten innehåller smittämnen och föroreningar. Utsläppen i form av grå-eller svartvatten får inte skada omkringliggande natur. Genom att hantera avloppsvatten undviker man problem såsom övergödning i sjöar och hav och förgiftning av grundvatten. Avloppet behöver därför tas om hand antingen genom att föras till kommunalt avlopp eller hanteras i ett så kallat enskilt avlopp. Ett enskilt avlopp är ett fristående system som normalt grävs ner i jorden utanför en byggnad.

Det är Havs- och vattenmyndigheten som ansvarar för små avlopps-anläggningar. På deras webbplats finns information om vilka regler och riktlinjer som gäller. Det är kommunens miljönämnd som prövar tillståndet att få anlägga ett enskilt avlopp.



BDT-avlopp

BDT-avlopp (bad- disk- och tvättvatten) innehåller inte lika mycket smittämnen som avlopp från toalett och behöver därför inte lika omfattande rening. Enligt miljöbalken krävs anmälan för BDT-anläggning men det skiljer sig lite från kommun till kommun hur strikt det är. Kontakta därför din kommun för att höra vad som gäller.

Det finns bland annat:

- Infiltrationer och markbäddar
- Biomoduler / Kompaktfilter
- BDT-filter
- Minireningsverk
- Stenkista

BDT+WC

BDT + WC-avlopp innehåller mycket smittämnen vilket innebär ett högre krav på rening. Det är förbjudet att utan tillstånd inrätta avloppsanläggningar för vattentoalett. Det betyder att du behöver ansöka om tillstånd innan du beställer produkter. Då mobila bostäder generellt inte har vattentoalett, är denna lösning oftast inte relevant.

Inget avlopp

Har du ett system utan rördragning där vatten endast bärs in i huset i små mängder så behövs inget avlopp eller särskild rening. Det är upp till dig att inte släppa ut smittämnen och föroreningar.

BTD-avlopp med slamavskiljare och markbädd.

Toalettlösningar

De flesta toaletter i Sverige är vattenspolande och anslutna till det kommunala avloppet för rening. Det finns dock flera mobila alternativ på marknaden.

Rese/campingtoalett

Campingtoaletter är de minsta och mest portabla toalettlösningarna. De är ofta vattenspolande, och har en tank på omkring 20 l. som kan tömmas med urin, avföring och vatten blandat. Den kräver varken extern tank, vatten, avlopp eller ventilation.

Energianvändning: -
Ca. pris: 1000-2000 kr
Exempel märken: Porta Potti, Seaflo

Priser och info hämtade från byggvaru-butiker och fabrikanternas hemsidor (2025)

Torrtoalett

Torrtoaletter separerar urin och avföring. Detta minimerar obehaglig lukt och gör tömning och kompostering mer effektiv. Avföringen samlas i en tank och urinen samlas antingen i tank eller förs ut till avlopp. Vissa har roterande hinkar och torksystem för urin, medan andra är enklare. De kräver varken extern tank eller vattentillförsel. De behöver dock rördragning för ventilation. De går ofta på både 12V och 230V. Det finns både lite större och lite mindre modeller.

Energianvändning: 0,04 kWh per dygn.
Ca. pris: 5000-10 000 kr
Exempel märken: Separett, Sanitoa, Biolan, Ecolet, Harvest Moon, Mulltoa.

Frystoalett

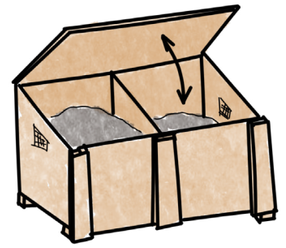
En frystoalett fungerar som en effektiv frys, som genast kyler ner avföringen till under fryspunkten för att undvika mikrobiell tillväxt och lukt. Den kräver varken tank, vatten, avlopp eller ventilation.

Energianvändning: 0,36 kWh per dygn.
Ca. pris: 10 000-25 000 kr
Exempel märken: Separett, Ecohytte, Biolan

Förbränningstoalett

En förbränningstoalett bränner upp både avföring och urin och lämnar endast aska kvar att tömma. Den kräver varken tank, vatten eller avlopp. Den behöver dock rördragning för ventilation.

Energianvändning: 1 kWh per förbränning.
Ca. pris: 35 000 kr
Exempel märken: Separett, Purolett, Cinderella



Hämtning och kompostering

Campingtoaletten kan tömmas på de flesta campingplatser. Både torr- och frystoaletten kräver att latrinet hämtas eller komposteras. För att du ska få ta hand om ditt eget latrinavfall måste du anmäla detta till miljö- och hälsoskyddskontoret. Anmälan ska göras minst en månad innan anläggningen ska tas i bruk.

Latrinkomposten får byggas själv men ska uppfylla följande grundkrav:

- Komposten ska bestå av två behållare för växelvis användning.
- Kompostering/lagring av latrinet ska ske minst 6 månader innan det kan användas för odling pga. smittrisk.
- Behållarna bör vara tillräckligt stora för 6 månaders användning (250-500 l).
- Komposten ska placeras så att den inte står nära någon vattentäkt eller så att närboende grannar störs.
- Komposten skall vara utformad så att regn och vatten inte kan rinna in.
- Sidor, lock samt botten skall vara täta.

Drömmer du om ett tiny house?

Det finns många frågor att sätta sig in i för den som drömmer om att skapa ett eget tiny house. Hur ska man tänka när man designar små bostäder, vad finns det för mobila toalettlösningar och måste man ha bygglov när man bygger på hjul? Denna handbok går igenom all den teori en blivande självbyggare behöver känna till inför planeringen och bygget av sitt eget tiny house.

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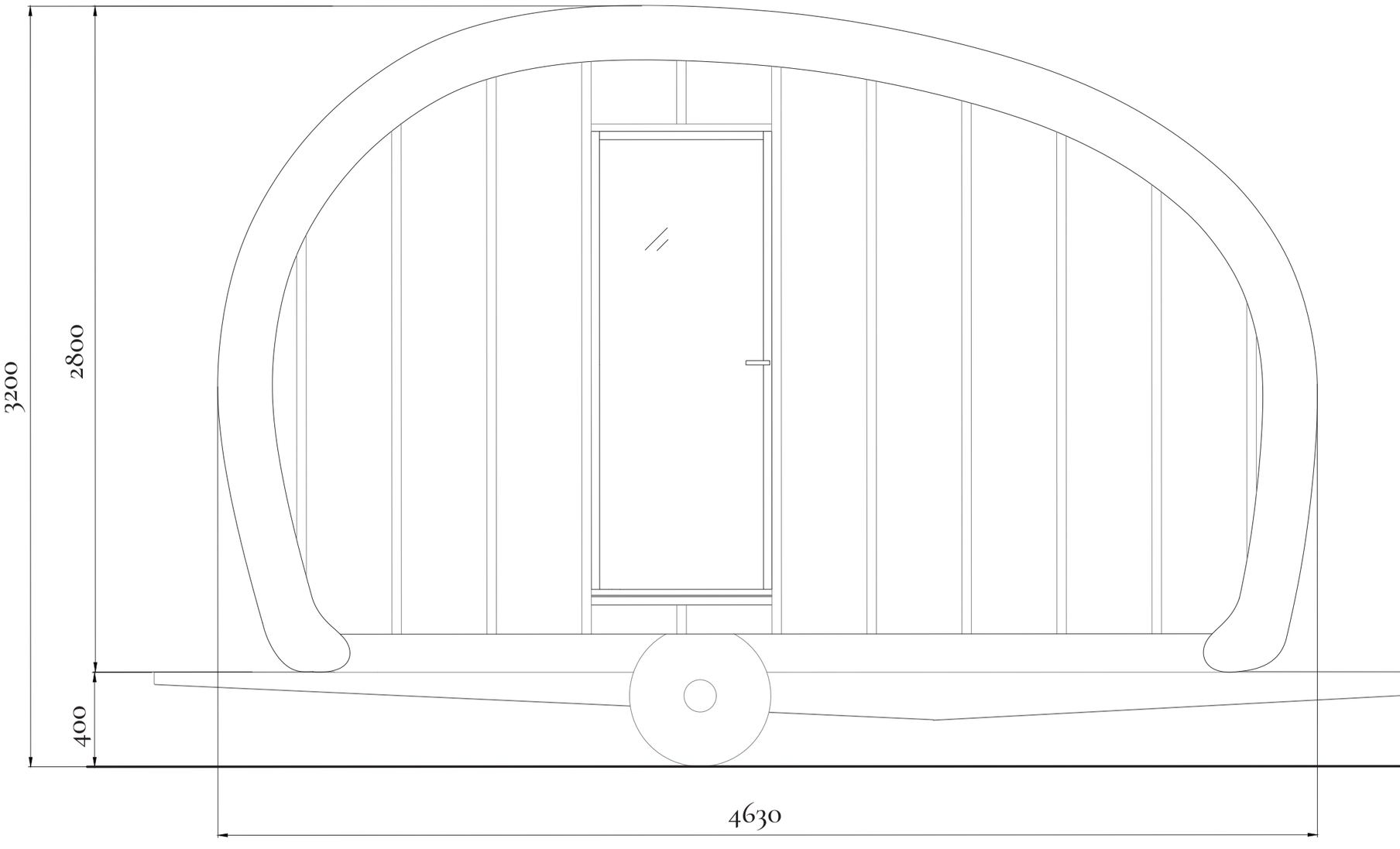
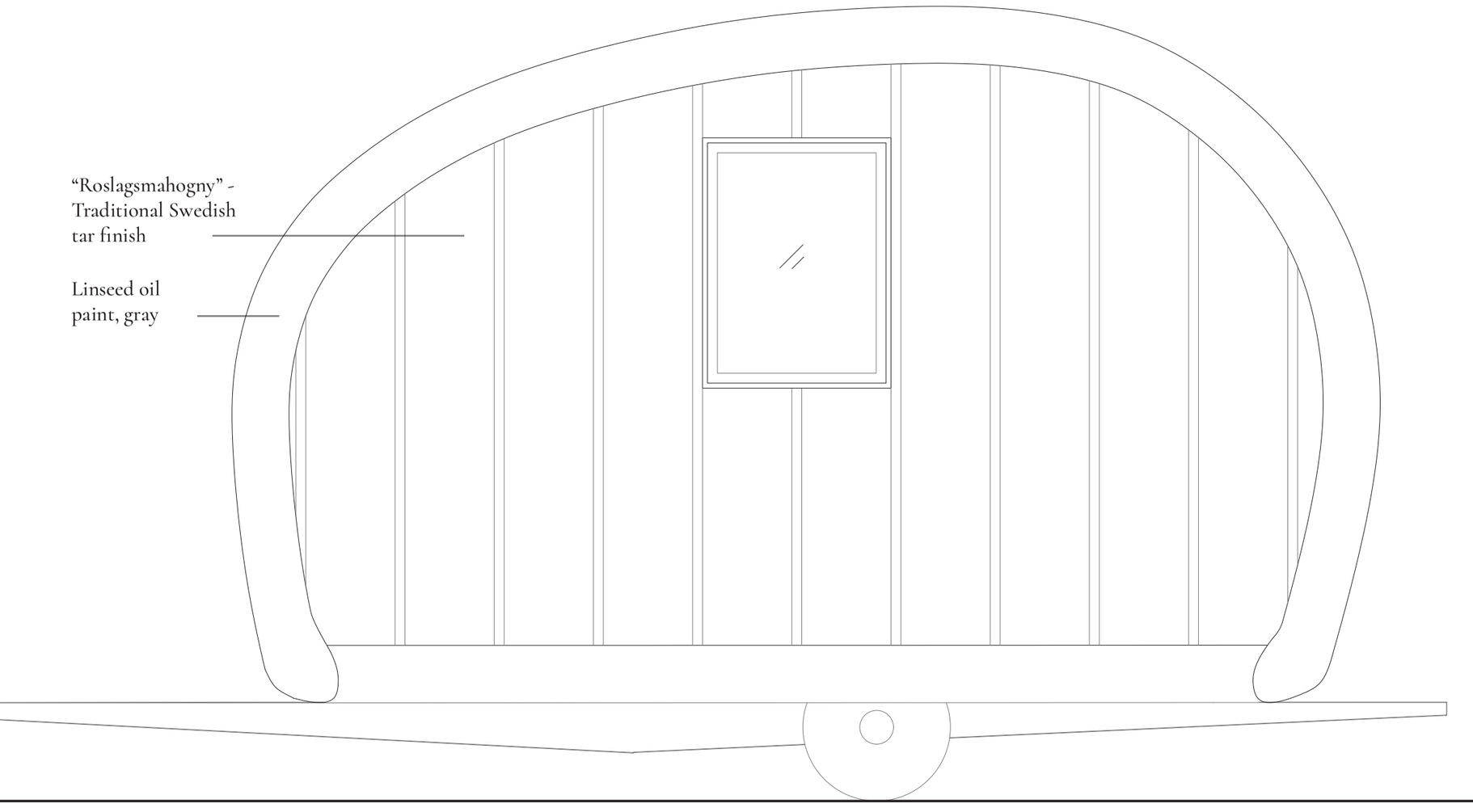
Skapad som del av masteruppsatsen “A tiny revolution”
i arkitektur på Chalmers tekniska Högskola
Göteborg, 2025

Appendix 2:

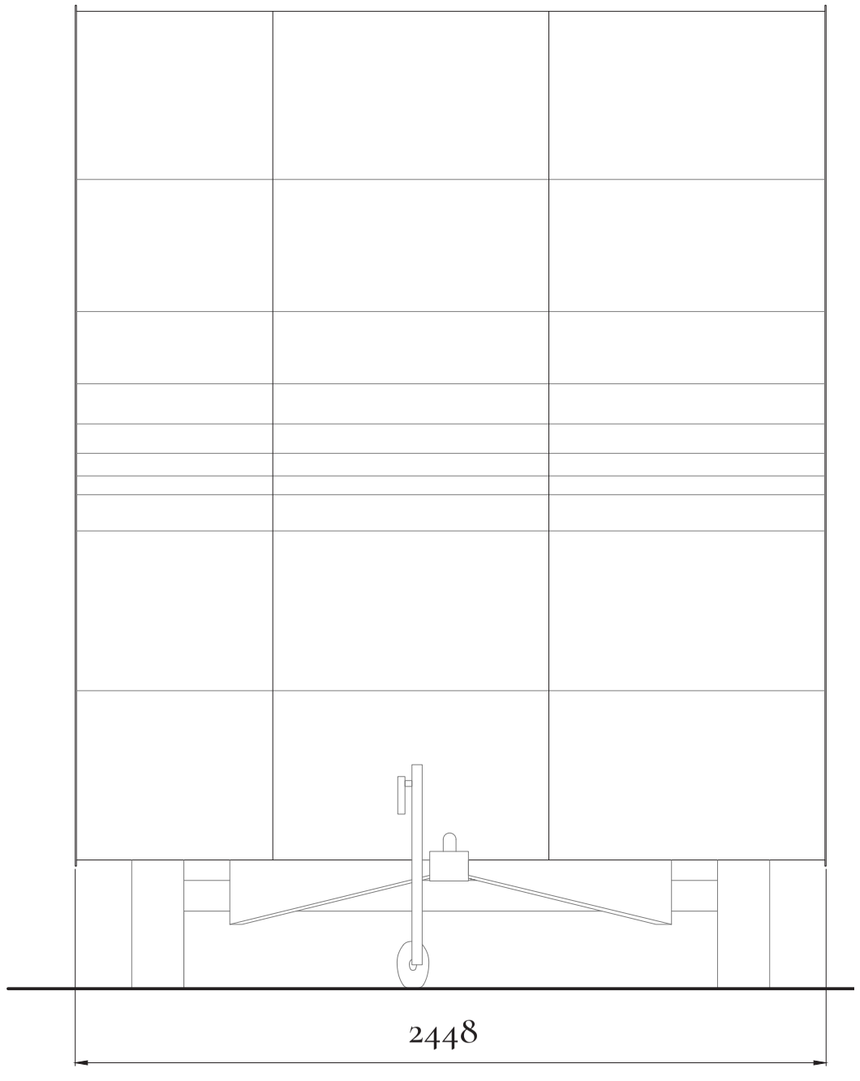
Drawings



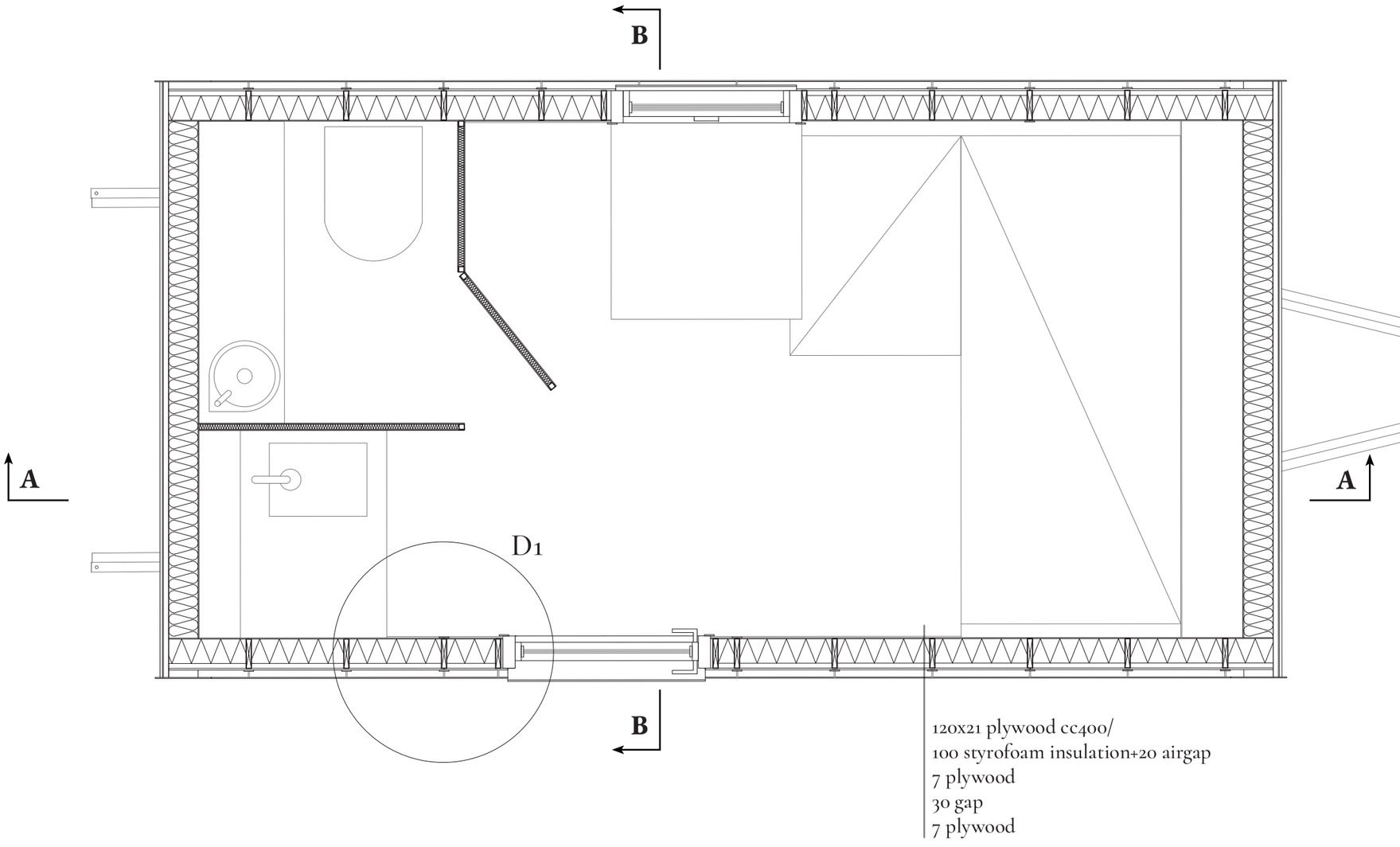
ELEVATION, RIGHT 1:20 (A4)



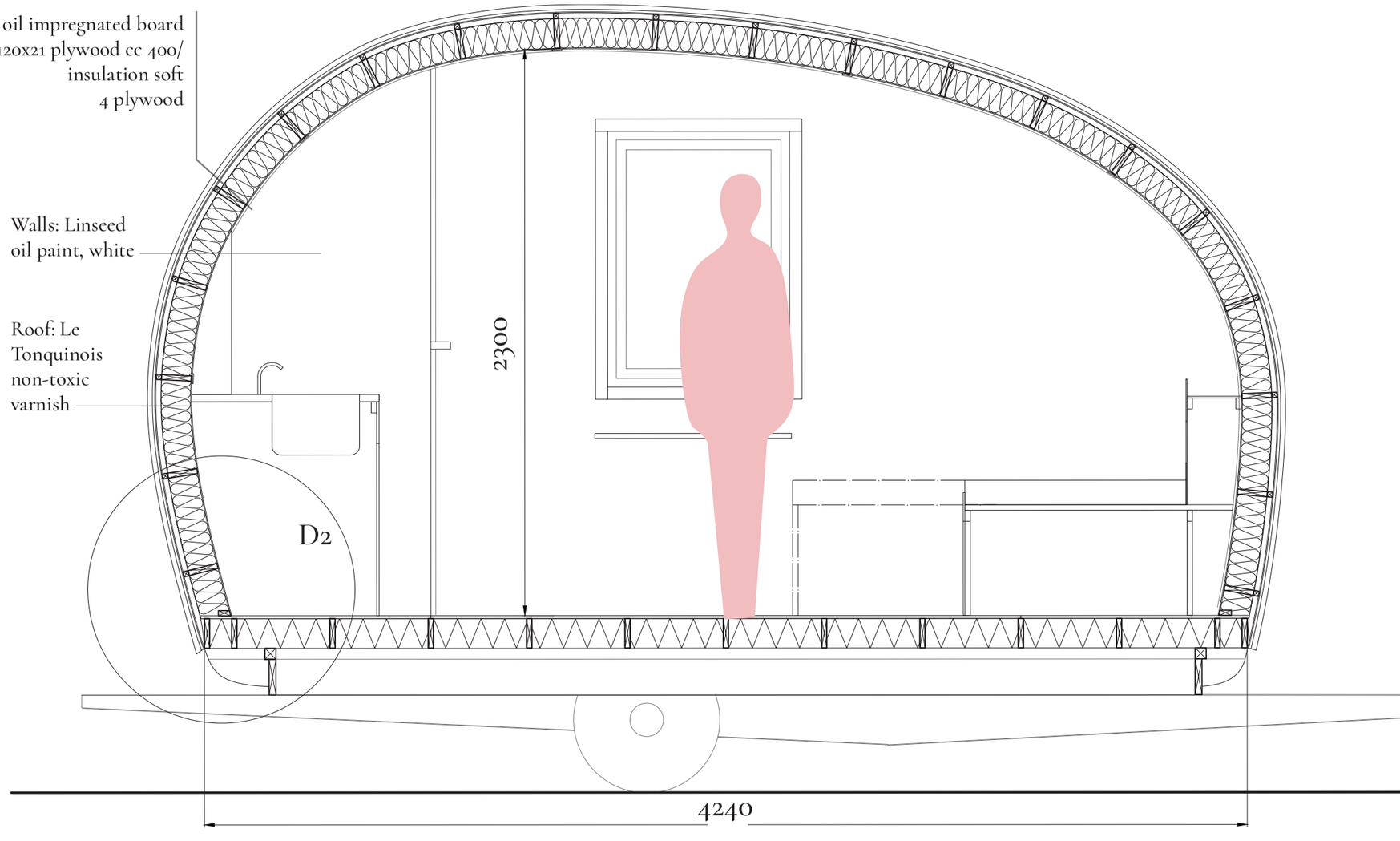
ELEVATION, LEFT 1:20 (A4)



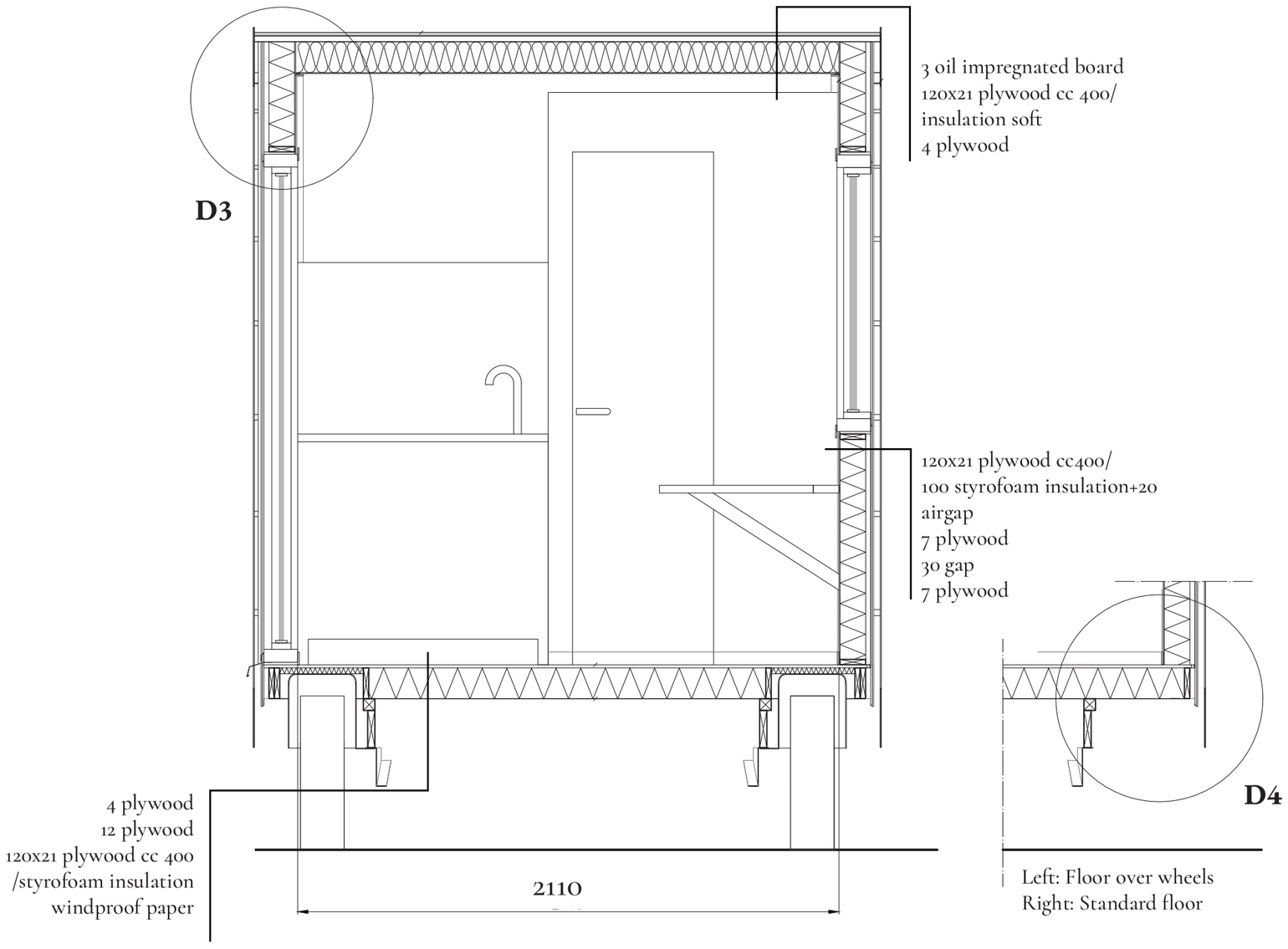
ELEVATION FRONT 1:20 (A4)



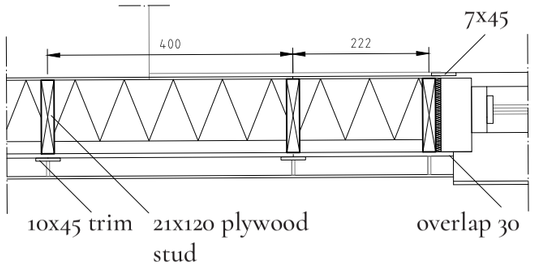
PLAN 1:20 (A4)



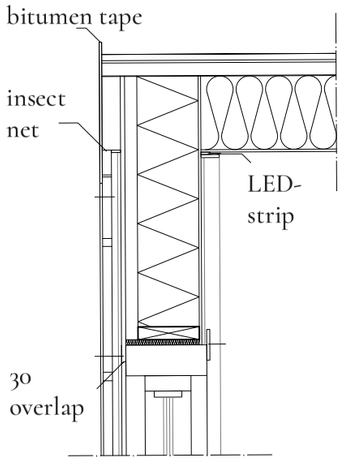
SECTION A-A 1:20 (A4)



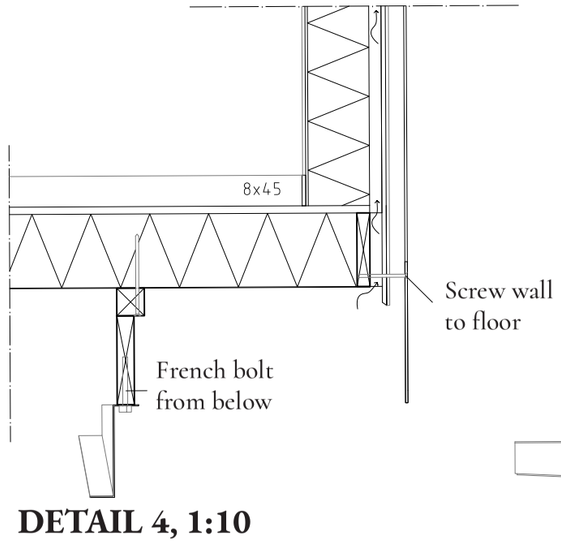
SECTION B-B 1:20 (A4)



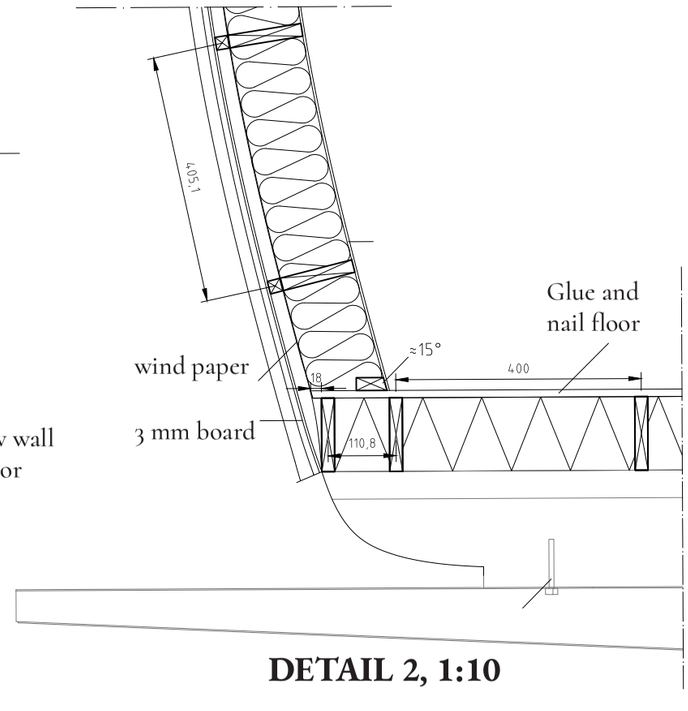
DETAIL 1, 1:10



DETAIL 3, 1:10

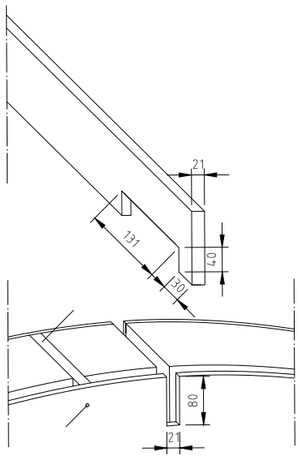


DETAIL 4, 1:10

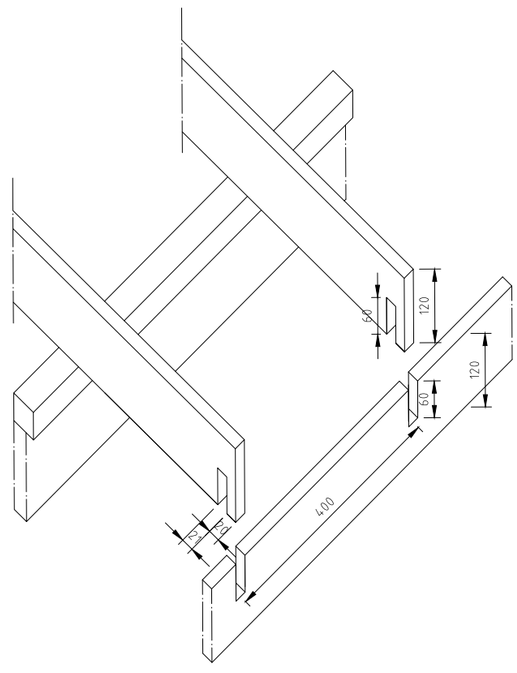


DETAIL 2, 1:10

DETAILS 1:10 (A4)



Click-system wall/roof



Click-system floor

CONSTRUCTION AXO (No scale))

Appendix 3:

The step-by-step guide

The step-by-step guide was originally printed as a 21x21 cm booklet. In order to include it as an appendix, the following pages showcase the guide in standard A4 size (210x297 mm). For original size, follow the qr-code on p.117. Note that the guide showcases the construction as thought before the course. During the process of building, several steps were made in a different way, and not all of them have been updated in the guide.

Steg 1: Trailer

Det första steget i bygget är att förbereda trailern. För att slippa hjulhus som sticker upp genom golvet och i väggen bygges en ram av tryckimpregnerat virke som lyfter upp huset. Nederst en trall 28x145, ovan en regel 45x45.

1.1 Ev: Skrapa bort rost och ta bort gamla skruvar med en vinkelslip.

1.2 För att göra resten av bygget enklare är det bra att ställa trailern i våg från början. Det gör man genom att för hand eller med en domkraft lyfta upp i de olika hörnen och kontrollera med ett vattenpass så att hela trailern ligger plant.

2.4 Formsåga trallen till ramen i kanterna efter mall med en sticksåg.

2.5 Fäst trallen i trailern med hjälp av franska skruvar underifrån. Mät först ut och förborra.

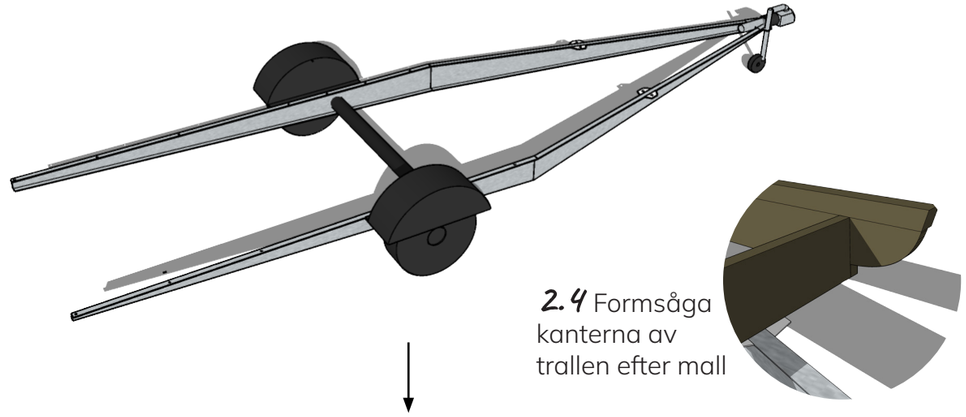
2.6 Fäst en 45x45-regel ovanpå trallen genom skruvar ovanifrån. Den skall sticka ut 17mm åt yttersidan.

Material

Trailer	1 st
Stöd/uppklossning	5 st
Tryckimpr. trall 28x45	9,8 m
Tryckimpr. regel 45x45	8,4 m
Franska skruvar 8x80	14 st
Träskruv 5x140	30 st

Verktyg

Ev: Vinkelslip
Ev: Domkraft (om ej för hand)
Vattenpass
Sticksåg
Skruvdragare
Skiftnyckel



Steg 2: Golvbjälklag

Golvbjälklaget är byggt av reglar gjorda av plywood eller klyvt trä. Centrummått 400mm gör att ett tunnare golv kan användas. Detta sänker vikten jämfört med att använda standardlösningar.

2.1 Såga ut reglarna till ramen. Detta görs enklast med en justersåg/bordcirkelsåg. Skär först 120 mm breda strimlor. Såga sedan up inhack, aningen med justersåg eller sticksåg. Se ritningar för mått.

2.2 Sätt ihop ramen genom att haka i de längsgående med de tvärgående reglarna. Slå ihop med hammare.

2.3 Skruva ihop mittdelen.

2.4 Mät diagonalen på golvbjälklaget för att se att det är vinkelrätt. Fäst några tvärslå så att ramen hålls stabil.

2.5 Vänd på golvbjälklaget. Lägg ut vindpappen, vik över kanterna och häfta fast pappen på sidorna av bjälklaget. Skär ut och fäst en extra bit vindpapp över hjulhusen med åldersbeständig tejp.

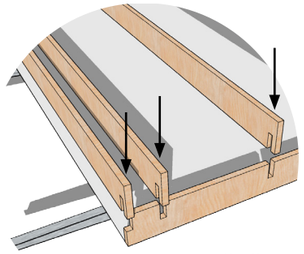
2.6 Fäst golvbjälklaget i ramen genom att skruva underifrån genom 45x45-regeln i varje tvärgående regel.

Material

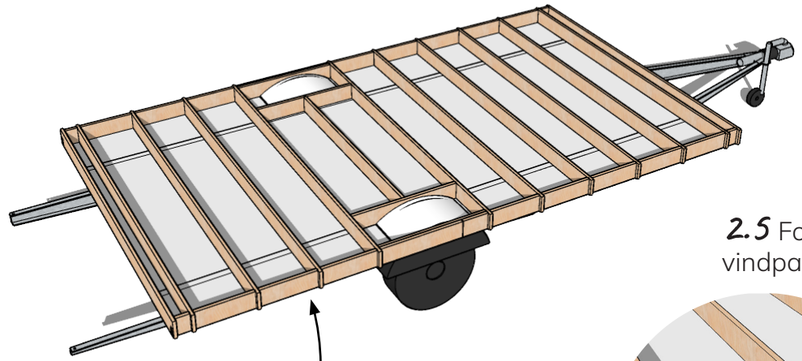
Plywood 21mm:	
Tvärgående 120x2366	12 st
Längsgående 120x1921	2 st
Längsgående 120x2921	2 st
Mitt längs 120x779	4 st
Mitt tvärs 120x1506	1 st
Vindpapp 1275 bred	4,5 m
Åldersbeständig tejp	
Häftklamrar	
Skruv 5x140	24 st
Skruv 5x80	18 st
Skruv 5x40	30 st

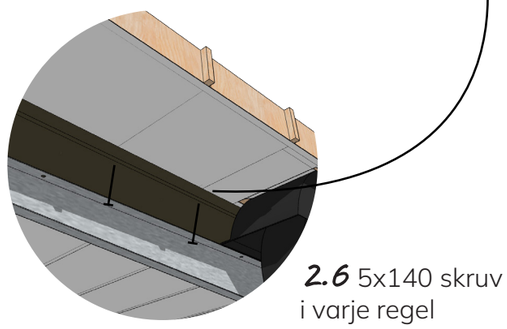
Verktyg

Justersåg/bordcirkelsåg
Kap och gersåg
Hammare
Skruvdragare
Häftpistol



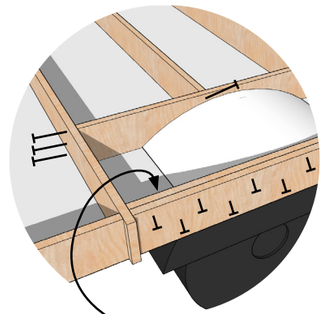
2.2 När reglarna väl är sågade kan de sättas ihop utan skruv





2.6 5x140 skruv i varje regel

2.5 Formpassad vindpapp över hjulhus



Steg 3: Isolering och golv

Golvbjälklaget isoleras med återbrukad cellplast (eller annan hård isolering). Golvet består av 12 mm plywood.

3.1 Skär isoleringen i rätt bredd med en cirkelsåg/sänksåg med skena eller i en justersåg. Placera i facken.

3.2 Skär isoleringen med handsåg för de böjda bitarna över hjulhus. Använd eventuellt mer effektiv isolering såsom PiR där det är som tunnast.

3.3 Mät och såga ut golvskivorna (plywood) till rätt storlek (mät eller se ritningar).

3.4 Lägg på golvskivorna. Den ska gå kant i kant med de yttre reglarna. Gör markeringar för var det går att spika (ovan reglarna) med hjälp av en snörslå.

3.5 Ta bort en skiva i taget och lägg trälim på golvbjälklaget.

3.6 Lägg tillbaka skivan och skruva fast den längs kanten. Skruva längs med snörslå-linjerna. Gör det samma med övriga skivor.

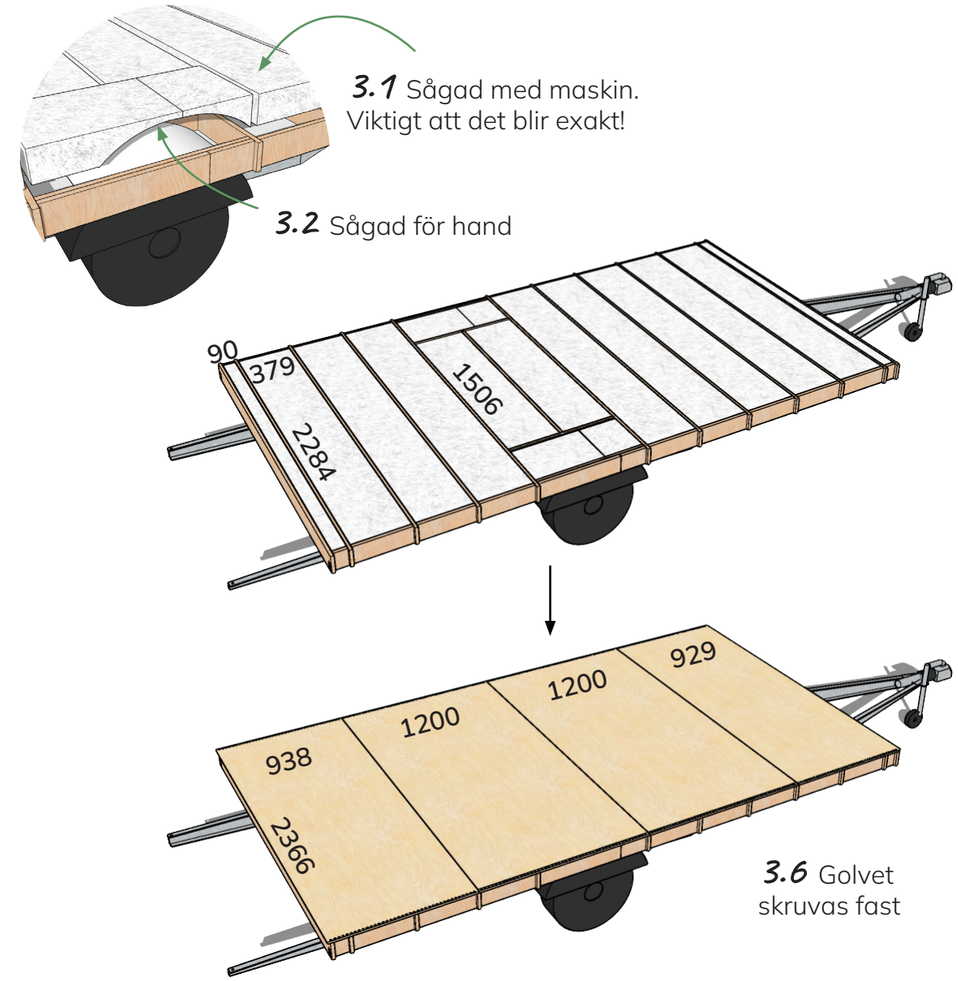
3.7 Fäst insektsnät på långsidorna med en häftpistol.

Material

Cellplast isolering	10 st
Ev: PiR isolering	0,5 m²
Plywood 12 mm	4 skivor
Trälim	
Skruv 5x80	40 st
Spik	150 st
Insektsnät	

Verktyg

Cirkelsåg/sänksåg med skena
Ev: Justersåg
Kap och gersåg
Snörslå
Skruvdragare
Hammare eller spikpistol
Hålsåg/borr/överhandsfräs
Häftpistol



Steg 4: Såga ut väggen

Väggen byggs som ett sandwich-element där alla delar sätts ihop innan de reses. Både reglar och inner-och ytterbeklädnaden är i plywood.

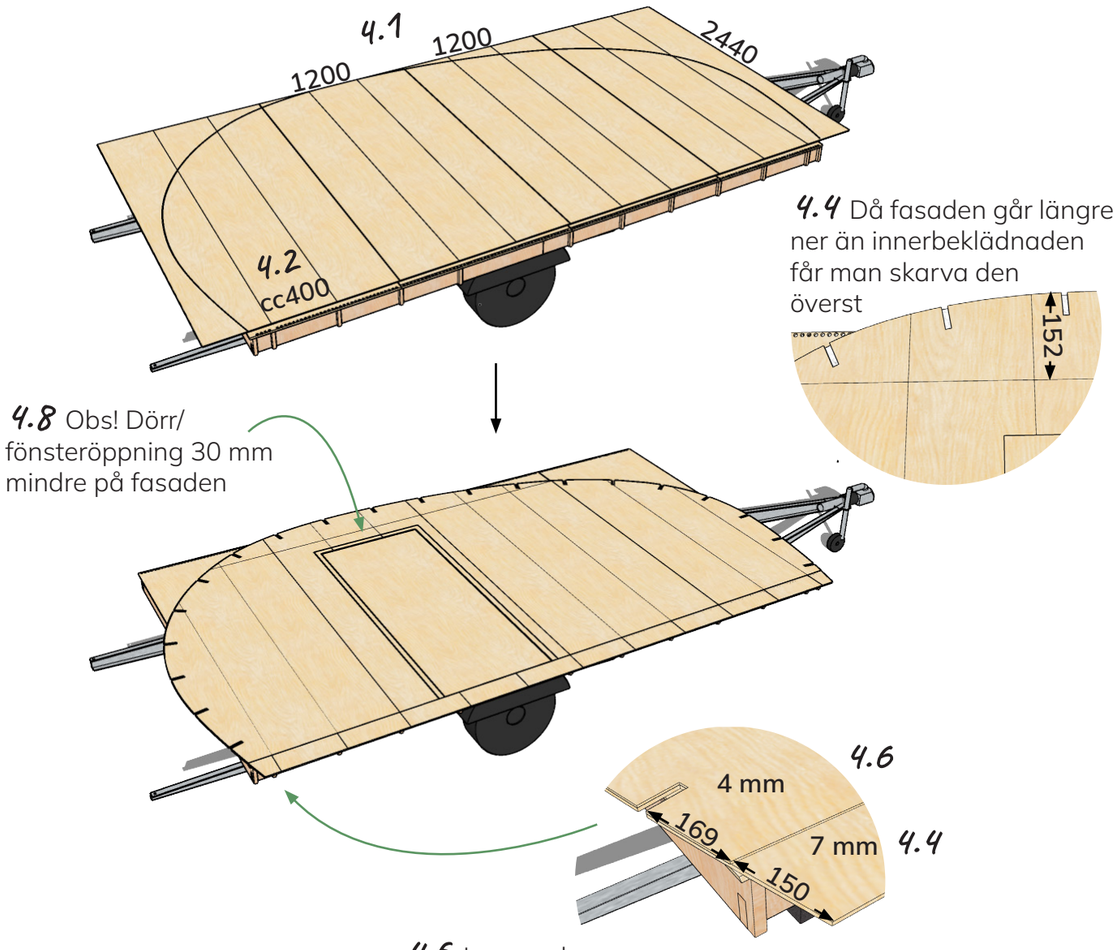
4.1 Klyv bredden till 1200 på de två mittersta skivorna (om de är 1220).
4.2 Markera med en snörslå cc400 på baksidan av 4 mm-skivorna.
4.3 Lägg ut 4 st 4 mm-plywoodskivor. Rita ut formen som skall byggas. Den kan se ut hur som helst, halvcirkel eller fri form, så länge den hela tiden böjer konvext.
4.4 När formen är utritad kan alla skivor till fasad och innerväggsbeklädnad sågas samtidigt (4 st). Lägg därför två 7-mm skivor och två 4-mm skivor ovanpå varandra. En 7-mm-skiva skall ha fina sidan uppåt, en skall ha den nedåt, och samma sak med 4-mm skivorna. Lägg de skivor med markeringen överst. 7-mm skivorna skall sticka ner 150 mm i underkant (och skarvas överst).
4.5 Spänn ihop med tvingar och såga alla skivorna på samma gång med sticksåg.
4.6 Mät nu upp var inhacken skall vara med ett böjbart måttband. Centrumavstånd skall vara 405 mm.
4.7 Använd en vinkel eller en utsågad mallkloss (21x80 mm plywood) för att rita inhacken. Bredd 21 och djup 80 mm. Såga ut inhacken med en sticksåg. Testa så det går att få in mallbiten.
4.8 Mät och såga eventuellt ut för dörr och fönster (se ritning för mått).
4.9 Borra skruvhål genom alla 4 skivor längs med snörslålinjerna var 20'e cm.

Material

Plywood 4 mm	4 skivor per vägg (x2)
Plywood 7 mm	4 skivor per vägg (x2)

Verktyg

Justersåg/bordcirkelsåg
Snörslå
Måttband
Sticksåg
Vinkel



Steg 5: Såga ut ramen

5.1 Lägg ut kraftpapper att rita upp formen på. Det behövs en ruta på 4,7 x 2,9 m. Behövs det skarvas så tejpa ihop ordentligt så det inte kan röra sig.

5.2 Lägg fasaden på kraftpappret och rita av längs med kanten. Ignorera inhack. Rita nederkant 110 mm längre ner (ramen är större än fasaden).

5.3 Rita nu en linje som går 40 mm längre ut än linjen från fasaden. Använd gärna en kloss eller annat för att hålla ett jämnt avstånd. Rita en till linje som går 175mm längre in än linjen från fasaden. Totalbredd på bågen blir således 215mm.

5.4 Klipp ut papp-bågen som mall.

5.5 Lägg mallen på en 7 mm-plywoodskiva. Rita av var det skall sågas på plywooden. Det spelar ingen roll var skarvarna ligger.

5.6 Såga ut en ram till framsidan och en spegelvänd ram till baksidan med en sticksåg. Slipa kanterna.

5.6 Det går också att skippa mallen om man är flera som hjälps år genom att hålla upp en skiva mot den färdiga väggen och rita längs med kanten av taket.

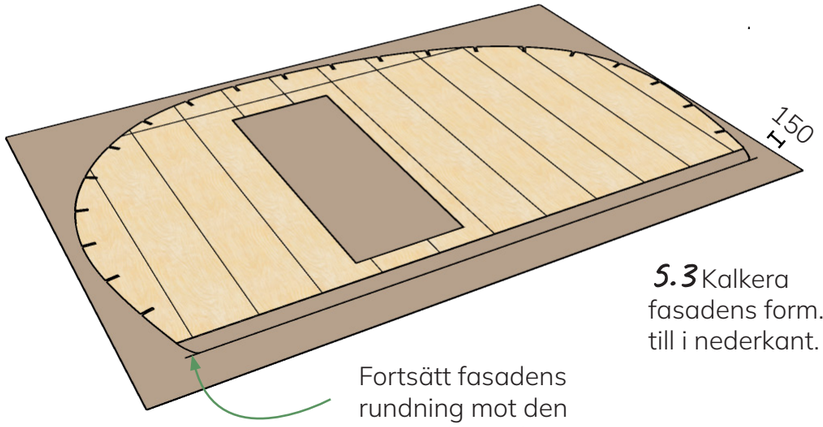
En ram skall sitta ytterst runt om hela kanten på fasaden. En mall behöver göras så att bågen följer väggens form.

Material

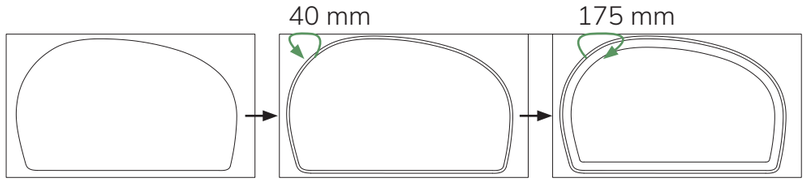
Plywood 7 mm	5 skivor
Kraftpapper	4,7x2,9 m

Verktyg

Tejp
Penna
Sax
Sticksåg



5.3 Kalkera fasadens form. Lägg till i nederkant.



5.3 Grundlinjen förskjuts utåt och innåt

5.5 Exempel på hur bågen kan sågas ut. Använd materialet så effektivt som möjligt och spara alla restbitar inför bygget av inredningen!

Steg 6: Bygg väggarna

Väggen byggs som ett element och alla delar sätts ihop innan de reses. Återbrukad cellplast 100mm används som isolering mellan 120mm plywoodreglar. Mellanrummet fungerar som luftspalt utan behov av vindspärr och läkt.

6.1 Klyv 21mm-plywood till 120mm breda reglar, eller använd trä i samma dimension.

6.2 Kapa reglarna till korrekta längder. I vissa fall kan det vara lättast att lägga på dem och mäta. Överlappar de ett inhack, kapa nedanför inhacket.

6.3 Limma och placera reglarna på innerväggen på de markerade linjerna, cc 400. Skruva underifrån genom att dra ut väggen från bordet. Arbeta i 4 sektioner och sätt ihop alla delar tillsist.

6.4 Skär isoleringen och placera i facken. Skruva löpande fast från sidan. Såga för hand längs med bågen.

6.5 Lägg trälim på reglarna och lägg på fasadskivorna. Fäst med spik i de förborrade hålen.

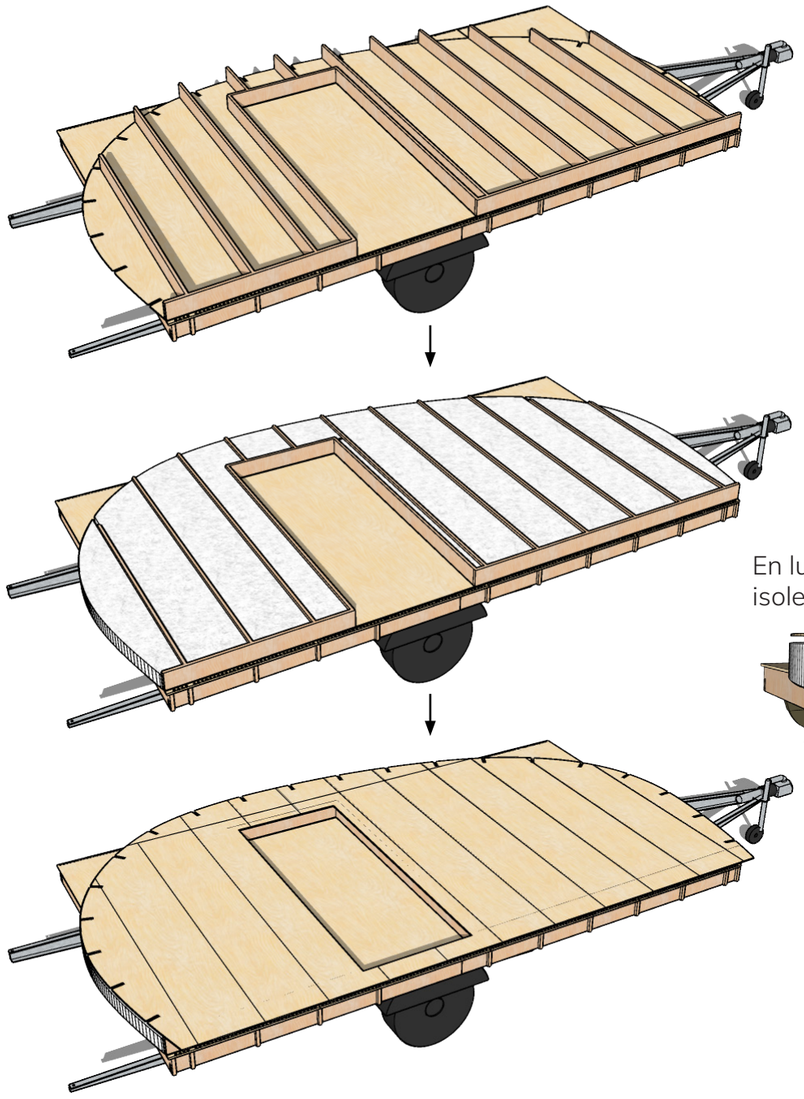
6.6 Såga ur isoleringen ur inhacken med en handsåg och stämjärn eller skruvmejsel.

Material

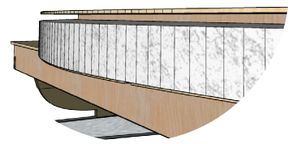
Reglar 21x120	54 m
Cellplast s100 100mm	15x2 m²
Trälim	

Verktyg

Justersåg/bordcirkelsåg
Kap och gersåg
Fogsvans
Hammare eller spikpistol
Stämjärn eller skruvmejsel



En luftspalt bildas mellan isoleringen och fasaden



Steg 7: Väggresning och takbygge

De färdiga väggarna reses och och hålls på plats av takreglarna. Enligt tradition skall man hålla taklagsfest när arbetet är färdigt!

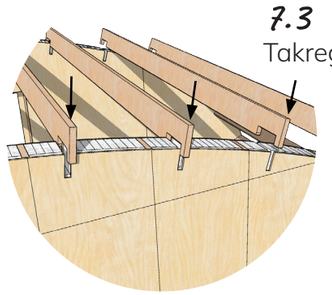
7.1 Klyv 21 mm-plywood till 120 mm breda reglar. Skär ut 40 mm djupa inhack i var sida enligt ritning.
7.2 Res väggarna. Placera så att långsidan av golvet stöter emot innersida av fasad. Limma under och skruva fast genom fasaden eller skråskruva fast med 5x80-skruv från insidan i varje golvregel. Max höjd på skruv från golv 40 mm (så det kan täckas av en fotlist sen).
7.3 Sätt i takreglarna.
7.4 Sätt fast stödreglarna längst ner på varje sida på insidan av taket. Se ritning.
7.5 Håll en stor taklagsfest med alla som hjälpt till!

Material

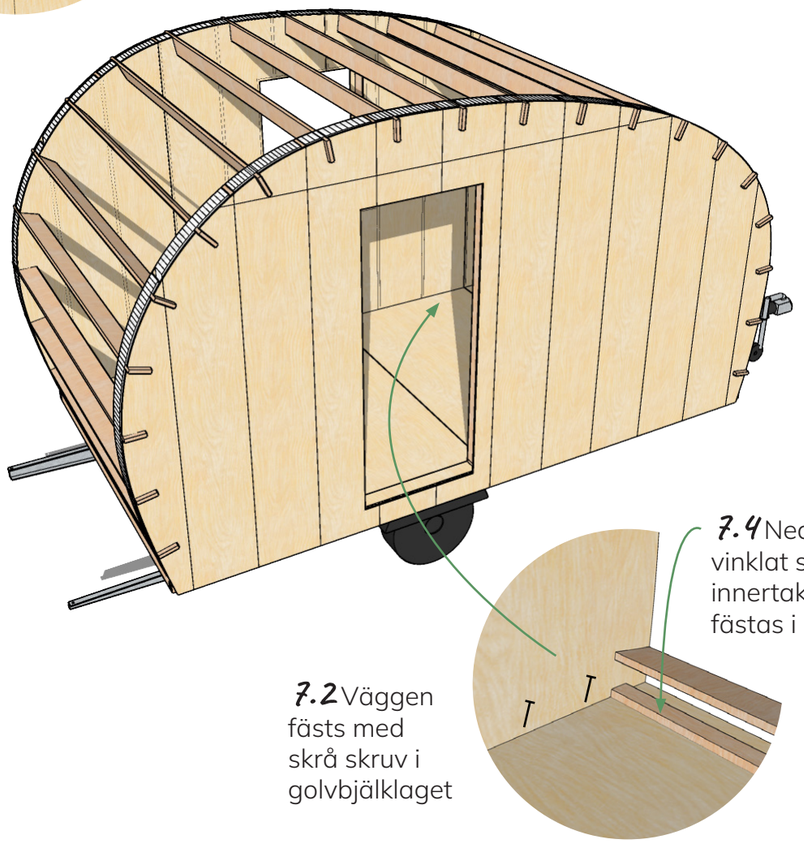
Reglar 21x120x2440 mm	20 st
Stöd 21x50x2110 mm	2 st
Trälim	

Verktyg

Justersåg/bordcirkelsåg
Kap och gersåg
Sticksåg
Fogsvans
Hammare
Skruvdragare



7.3 Takreglarna sätts i



Steg 8: Ytbehandling och innertak

Böjbar 4 mm plywood används som innertak. Plywood fungerar som ångbroms p.g.a. sitt lim, varför det räcker med tätning runt kanter för att ersätta separat ångspärr.

8.1 Väggarna kan målas antingen innan eller efter att de reses. Följ anvisningarna för vald ytbehandling. Slipa innan. Var extra noggrann med måleriarbetet på fuktkänsliga ställen som i fasadens nederkant och runt dörr- och fönsteröppningar!

8.2 Skär 4 mm plywood till rätt dimensioner för att användas som innertak. Liggande skivor borde behöva en längd av ca 2010 mm och en höjd på ca 1143. Mät för varje ny skiva, måtten varierar.

8.3 Håll upp en skiva i taket och markera på båda sidor var takregeln går. Gör en längsgående markering för spikrad.

8.4 Limma och spika på takskivorna, fördelaktigt med spikpistol.

8.5 Täta längs med kanten med silikon för att göra innertaket ångtätt.

8.6 Ytbehandla innertaket och ev. golvet.

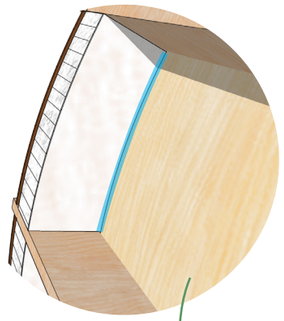
8.7 Täck golvet med papp som skydd.

Material

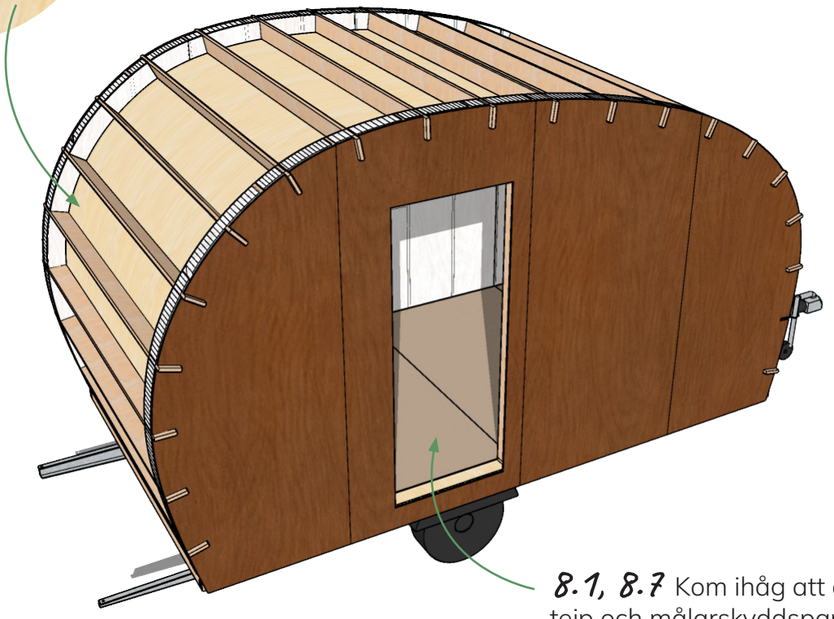
Plywood 4 mm 7 st
Ytbehandling till:
30 m² fasad
30 m² innervägg
15 m² innertak
9 m² golv
Spik
Silikon eller åldersbeständig tejp

Verktyg

Penslar/slip/målartillbehör
Justersåg/bordcirkelsåg eller cirkelsåg/sänksåg med skena
Måttband
Snörslå eller penna
Spikpistol
Ev: Fogspruta



8.5 Silikon tätar i kanten och kan appliceras innifrån



8.1, 8.7 Kom ihåg att använda tejp och målarskyddspapp för att skydda ytor under måleriarbete och fortsatt byggande!

Steg 9: Isolering och luftspalt

Då taket böjer behöver en mjuk form av isolering användas. Glasull är lättviktigt, billigt och vanligt att hitta återvunnet, men också andra typer av mjuk isolering fungerar.

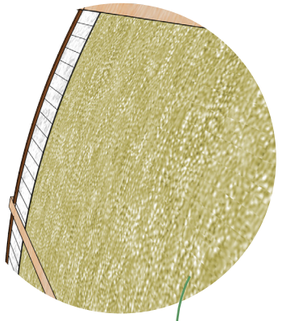
9.1 Skär isoleringen till lagom bredd med exempelvis en hobbykniv. Använd handskar, skyddande kläder och munskydd om du arbetar med glasull!
9.2 Placera isoleringen i facken.
9.3 Tillverka materialet till luftspalten genom att klyva plywood eller läkter.
9.4 Placera vindpappen över taket.
9.5 Fäst vindpappen genom att skruva på luftspalten. Den skall ligga längs med alla takreglar från kant till kant.
9.6 Klipp, vik ner och häfta fast vindpappen mot fasaden, ca 5 cm ner.

Material

Mjuk isolering	22 m²
Vindpapp 1275 bred	9 m
Plywoodläkt 21x21x2440	20 st
Skruv 5x60	250 st

Verktyg

Hobbykniv
Skyddande kläder
Justersåg/bordcirkelsåg
Skruvdragare.



9.2 Mjuk isolering placeras på det böjda taket och täcks av vindpapp

9.5 Luftspalt 21x21x2440 placeras längs med takreglarna

Steg 10: Detaljer fasad

För att färdigställa fasaden behöver den göras vattenresistent genom lister, regnskydd och ytbehandling.

10.1 Skär en 1 cm bred remsa av 4 mm plywood och fäst med spik längs med nederkanten av takreglarna, närmast fasaden. Detta skyddar vertikalt regn från att tränga in.

10.2 Fäst insektsnät med en häftpistol längs innerkant takreglar.

10.3 Spika på stående lister på fasaden, en över varje regel (cc400). Listerna skall gå hela vägen ner till nederkant fasad och upp mot insektsnätet i överkant.

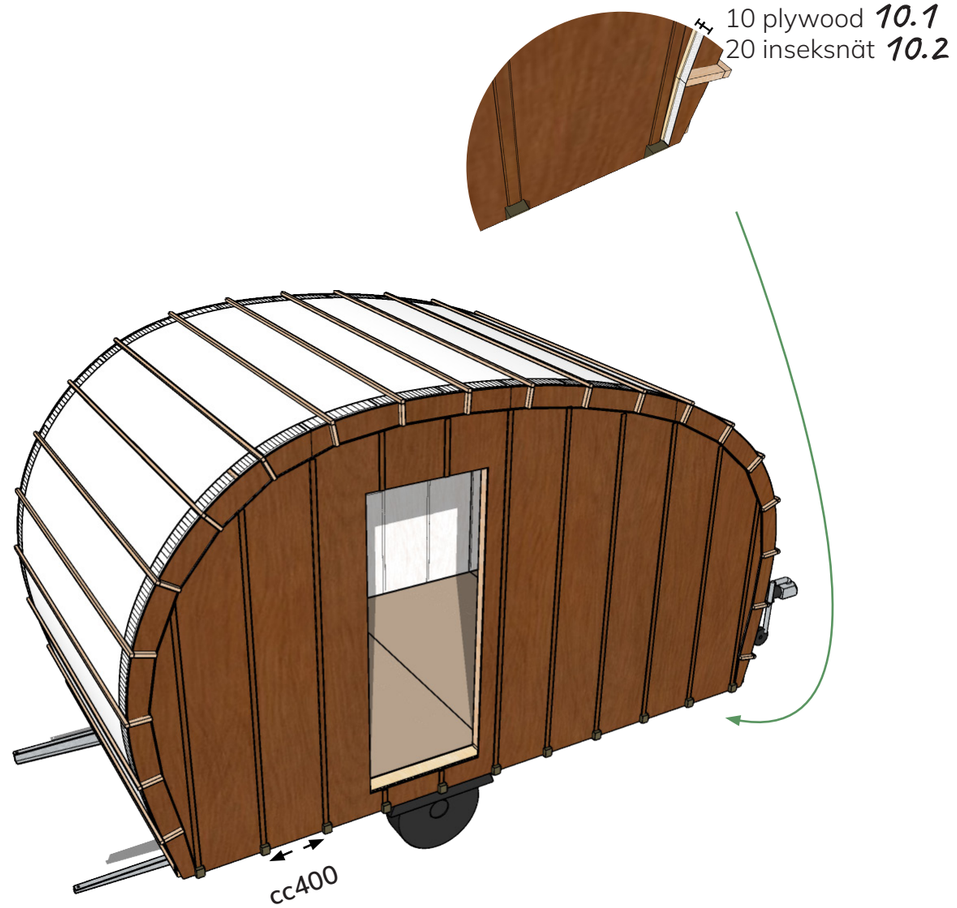
10.4 Lister och regnskydd ytbehandlas på samma sätt som fasaden.

Material

Plywood remsa 4x10 mm	7,5 m
Insektsnät remsa 25 mm	7,5 m
Tryckimpr. ribba 28x45x100	22 st
List 5x40	40 m
Ytbehandling till detaljer	

Verktyg

Justersåg/bordcirkelsåg eller cirkelsåg/sänksåg med skena
Spikpistol
Häftpistol
Kap och gersåg
Skruvdragare
Målartillbehör



Steg 11: Plywood på tak och kanter

Normalt krävs kraftigare dimensioner på skivmaterialet på taket för att klara snölaster, men då plywood blir starkare då det böjs behöver skivorna endast vara 4mm, vilket sparar mycket vikt.

11.1 Mät avståndet mellan takreglarna och såga ev. till plywoodskivorna så de passar. Både längden och höjden bör dock passa okapade (2440x1200mm).

11.2 Håll upp en skiva på taket och markera på båda sidor var takregeln går. Gör en längsgående markering med snörslå.

11.3 Limma och spika på takskivorna med skruv och spikpistol. Börja innerst och gå utåt, uppåt och nedåt for att undvika bulor.

11.4 Fäst bågen på takreglarna och de nedre stöden med två skruv i varje. Bågen ska sticka upp 20mm över tak-plywooden och sticka ner 56mm under takreglar. Skarvar skall ligga tätt men behöver inte stabiliseras - det görs i nästa steg.

Material

Plywood 4mm	7 st
Trälim	

Verktyg

Justersåg/bordcirkelsåg eller cirkelsåg/sänksåg med skena
Snörslå
Spikpistol
Sticksåg
Skruvdragare

11.4 Stöd i nederkant

Steg 12: Ramen

För att hålla ihop plywood-bågen samt göra den vattenresistent behandlas den med epoxilaminat och glasfiberväv, samt målas. Det skall vara minst 10°, gärna 20°C i rummet under arbetet.

12.1 Slipa och torka av bågen som skall behandlas.

12.2 Använd “byggtejp”, det vill säga bitumen-baserad tejp som fäster väl på trä och som är beständig mot väta, och tejpa längs med övre kanten av ramen. Böj ned tejpen 1,5 cm mot fasaden, och resten mot taket. Tejpen skall ligga tätt och skall kläppas på ordentligt.

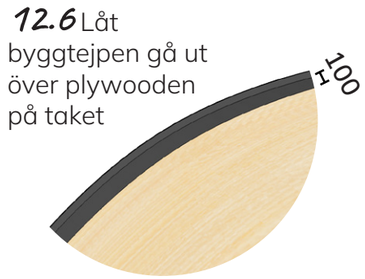
12.3 Måla ramen (kan också göras innan)

Material

Byggtejp (ex. Mataki)	20 m
Färg till ca 5 m^2	

Verktyg

Pensel
Sax
Slip
Målartillbehör



12.6 Låt byggtejpen gå ut över plywooden på taket

Steg 13: Takläggning

13.1 Markera från vänster till höger ovan varje luftspaltsläkt (där det går att spika).

13.2 Starta takläggningen från vänster. Lägg ut en remsa takpapp med klistersidan nedåt åt vänster. När den ligger korrekt kloss an mot kanten åt vänster, rulla upp den och applicera rikligt med asfaltklister 10 cm längs med hela vänsterkanten av taket med en spruta eller skrapa. Dra av plasten från takpappen och lägg tillbaka takpappen så den klistras fast.

13.3 I de fall takpappen behöver skarvas görs detta över en luftspaltsläkt. En ny remsa läggs under den första med ett överlapp av 10 cm. Den understa remsan spikas fast i luftspalten. Rikligt med tjärklister appliceras innan bitarna pressas ihop.

13.4 Spika fast takpappen på höger sida (genom plastremsan och det uppåtriktade limmet) med två skruv/spik i varje luftspaltsläkt.

13.5 Lägg på nästa remsa takpapp så att den överlappar den första remsan 10 cm och med dess limkant nedåt. Låt plasten sitta kvar medan du hittar rätt placeing. Rulla sedan upp, dra bort plasten bå båda bitarna, rulla ner och limma fast. Spika fast den på höger sida på samma sätt som första rullen.

13.6 Mät rätt bredd på den sista rullen takpapp genom att mäta från högerkanten och 10 cm in över klisterkanten på remsan till vänster. Skär av den sidan som har klister uppåt.

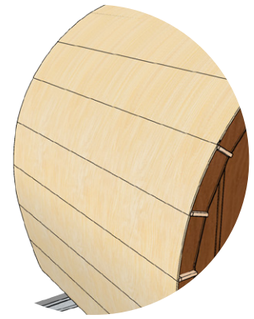
13.7 Fäst åt vänster på samma sätt som rulle 2. Fäst åt höger genom rikligt med asfaltklister.

Material

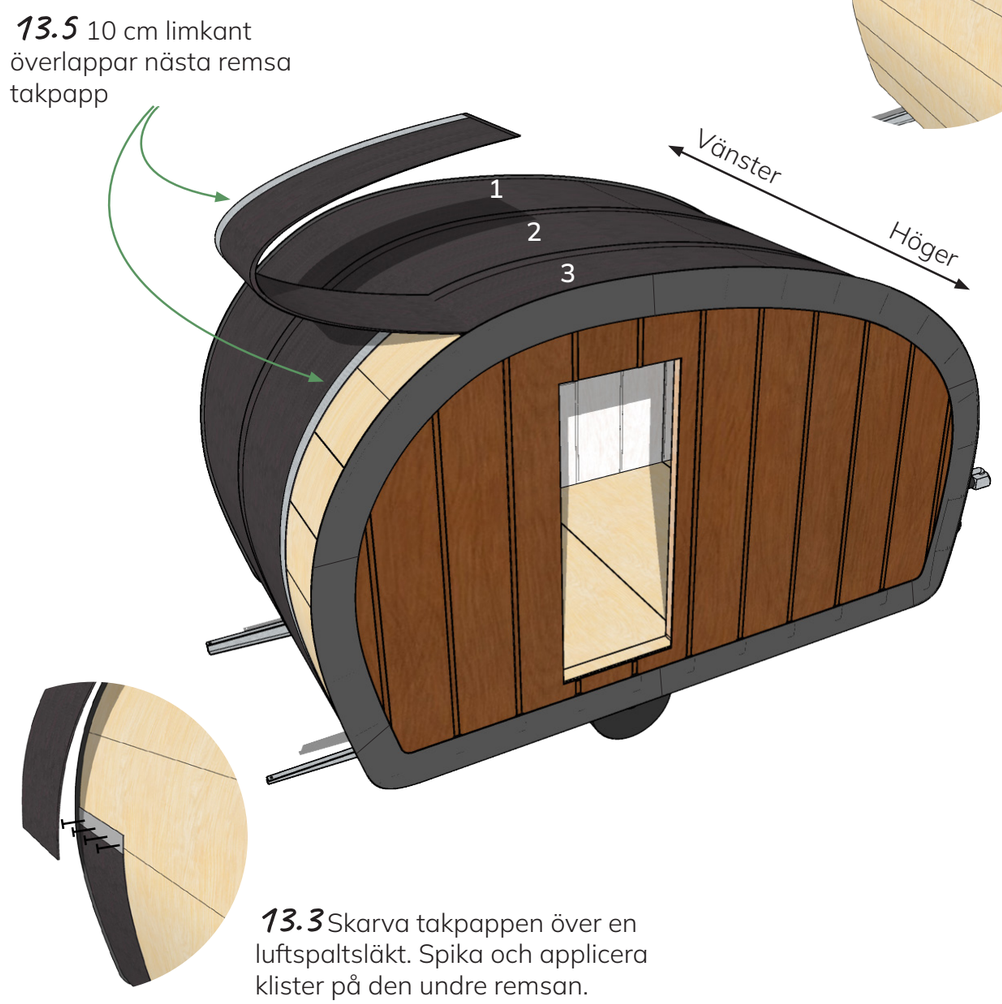
Takpapp 1x8 m	4 rulllar
Tjärklister	
Spik eller skruv	

Verktyg

Hobbykniv
Måttstock/måttband
Alliceringsverktyg för klister
Hammare eller skruvdragare



13.1 Markera från vänster till höger ovan varje luftspaltsläkt (där det går att spika).



13.3 Skarva takpappen över en luftspaltsläkt. Spika och applicera klister på den undre remsan.

Steg 14: Dörrar och fönster

Fönster och dörrar finns ofta tillgängliga som återbruk. Då kan man behöva måla om innan montering. Genom att dörr och fönster fästs direkt mot baksida fasad behövs ingen plåt över, men endast under.

Material

Dörr	1 st
Fönster	1 st
Drev	9 m

Verktyg

Ev slip och målarverktyg
Tumstock
Vattenpass
Skruvdragare
Spikpistol eller hammare

14.1 Om återbruk: Skrapa och slipa av befintlig färg. Torka rent. Måla och ev kitta om i lämplig färg.

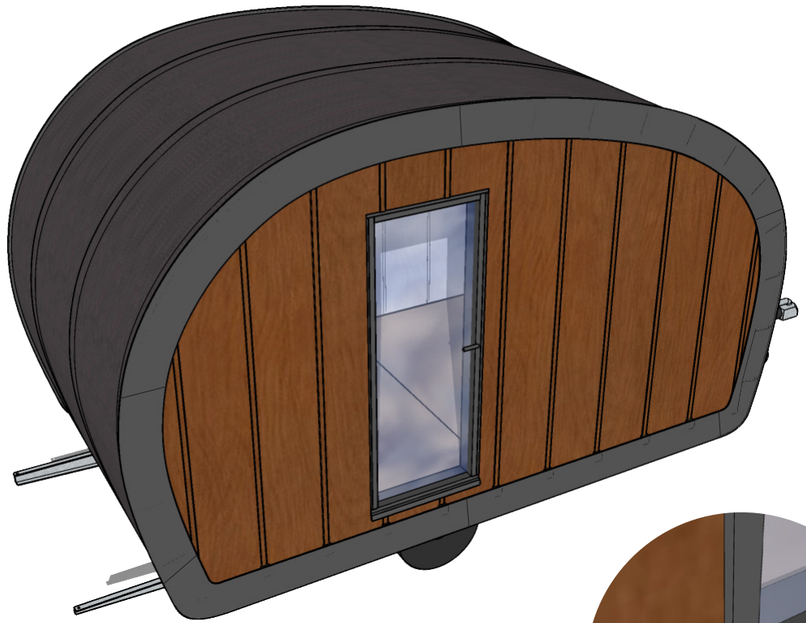
14.2 Sätt i dörr och fönster. De sätts i från insidan och skall ligga kloss an pressade mot insidan av fasaden. Viktigt att de placeras så att kanten sticker ut lika mycket på varje sida. Man kan använda klossar för att hitta rätt balans innan man skruvar i.

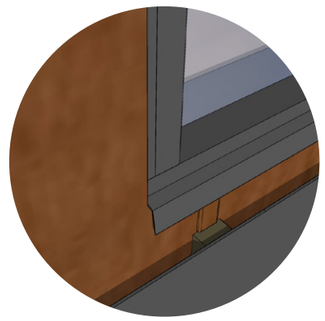
14.3 Skruva fast fönster och dörr i ramen med skruv eller karmskruv. Spika fast fasaden i karmen utifrån.

14.4 Täta hålet mellan karm och ram med drev från insidan. Avsluta med smygar och eventuella lister invändigt.

14.5 Fäst plåtar på undersida dörr och fönster.

14.2 Viktigt att fönstret och dörren placeras så att plywooden täcker karmen jämnt på alla sidor





14.5 Sätt fast plåtar under dörr och fönster

Appendix 4:

4a: Budget calculation my design

4b: Budget calculation standard construction

The budget calculations showcases the estimated weight and price of my design as well as of a same-size house with conventional construction (for comparison). The price and weight of the different materials have been found researching the web sites of construction warehouses in Sweden 2024 and 2025. The documents can be accesed as Excel-files in the online appendices (link on p.117).

Appendix 4a

Byggkalkyl

Projekt: The Bug

Pris-och viktberäkningar

Namn: Andrea Ottander

Mängder och ytor:		Tjocklek (m)	U-värde	lambda:	0,035
Längd på byggnad:	4,2				
Bredd på byggnad:	2,4				
Ytterväggsyta exkl öppningar:	15	0,095	0,368		
Innerväggsyta exkl öppningar:	14,86				
Golvyta ytter:	9,66	0,12	0,292		
Takyta (ytter):	19	0,12	0,292		
Takyta (Inner):	14,6				
Fönsterarea:	0,88		1,100		
Dörrarea:	1,6		1,200		
		u-värde genomsnitt:	0,364		

1. Golvbjälklag och golv j

Byggnadsdel	Beskrivning:	Dimension:	Antal:	Enhet:	À pris (kr):	Summa pris	À vikt:	Summa vikt
Golvreglar	Konstruktionsplywood	21 mm	4,03	m2	177,0	713	11,00	44,3
Trossbotten	Vindduk	1x2750 mm	10	m2	23,5	235	0,08	0,8
Isolering	Cellplast s100	120 mm	8,7	m2		600	2,04	17,7
PIR isolering	PiR	50 mm	0,81	m2		0	1,44	1,2
Golv	Plywood	12 mm	9,64	m2	177,5	1711	5,64	54,4
Fingolv	Plywood	4 mm	8	m2	167,0	1336	2,60	20,8
DELSUMMA Bjälklag och golv						4596		139,2
				Pris/vikt per m2:		476		14,4

2. Väggar

Byggnadsdel	Beskrivning:	Dimension:	Antal:	Enhet:	À pris (kr):	Summa pris	À vikt:	Summa vikt
Reglar	Konstruktionsplywood	21 mm	28,8	m	69,9	2013	2,50	72,0
Invändig beklädnad	Plywood	4 mm	14,86	m2	167,0	2482	2,60	38,6
Utvändig beklädnad	Plywood	7 mm	15	m2	246,3	3694	4,61	69,2
Båge	Plywood	7 mm	3,8	m2	246,0	935	4,61	17,5
Isolering återbruk	Cellplast s100	100 mm	14,8	m2	-	600	1,70	25,2
Isolering ny	Cellplast s100	100 mm	2	st	450,0	900	6,12	12,2
DELSUMMA Väggar						10624		234,7
				Pris/vikt per m2:		708		15,6

3. Tak

Byggnadsdel	Beskrivning:	Dimension:	Antal:	Enhet:	À pris (kr):	Summa pris	À vikt:	Summa vikt
Takbalkar	Konstruktionsplywood	21 mm	48,8	m	85,4	4170	3,00	146,4
Invändig beklädnad	Plywood	4 mm	14,6	m2	167,0	2438	2,60	38,0
Vindduk		2,7x12,5	18	m2	23,4	421	0,22	3,9
Luftspalt	Läkt	22x45	48,8	m	7,9	386	0,56	27,3
Utvändig skiva	Oljehärdad board	3 mm	19	m2	76,3	1450	2,97	56,4
Ytpapp		1 m bred, rulle	19	m2	93,6	1779	4,13	78,4
Asfaltklister			4	st	99,0	396	0,50	2,0
Isolering	Glasull	120 mm	16,9	m2	70,0	1182	2,00	33,8
Takfot			5	st	89,0	445	1,00	2,0
DELSUMMA Tak						12667		388,1
				Pris/vikt per m2:		667		20,4

4. Fönster och dörrar

Byggnadsdel	Beskrivning:	Dimension:	Antal:	Enhet:	À pris (kr):	Summa pris	À vikt:	Summa vikt
Dörr		20x8	1	st	7100,0	7100	48,00	48,0
Fönster	Återbruk	8x11M	1	st	600,0	600	28,16	28,2
DELSUMMA Fönster och dörrar						7700		76,2

5. Snickerier och infästning

Byggnadsdel	Beskrivning:	Dimension:	Antal:	Enhet:	À pris (kr):	Summa pris	À vikt:	Summa vikt
Fotplåt dörr			1	m	89,0	89	0,50	0,5
Fönsterbleck			0,8	m	89,0	71	0,50	0,4
Foder, drev och lister	Återburk		0	m	0,0	0		5,0
Silikon			2	st	89,0	178	0,30	5,0
Limfog			2	st	89,0	178	0,30	5,0
Trälim			3	st	129,0	387	0,30	5,0
Tillbehör: vinklar, bits etc			1	st	600,0	600	0,00	5,0
Skruv golv, vägg och tak	Träskruv	4,5x50	3	st	229,0	687	0,66	2,0
Spik	Spik till spikpistol	1 pkt à 2500 st	1	st	90,0	90	0,50	0,5
DELSUMMA Snickerier och infästning						2280		28,4

6. Fast inredning

Byggnadsdel	Beskrivning:	Dimension:	Antal:	Enhet:	À pris (kr):	Summa pris	À vikt:	Summa vikt
Sängram	läkt	12 mm	26	m	7,9	205	0,58	15,1
Säng front	Plywood	7 mm	1	m2	246,0	246	4,61	4,6
Hylla säng	Plywood	4 mm	2	m2	167,0	334	2,60	5,2
Bordskiva	Plywood	7+7 mm	0,64	m2	174,9	112	3,18	2,0
Bordstöd	Spikläkt	22x45	3	m	7,9	24	0,58	1,7
Badrumsväggar ytterbeklädnad	Plywood	4 mm	7,82	m2	167,0	1306	2,60	20,3
Badrumsväggar innerbekl.	Plywood	4 mm	7,82	m2	167,0	1306	2,60	20,3
Badrumsväggar läkt	Läkt	22x45	10	m	6,0	60	0,40	4,0
Våtrumsmålning	Flugger Primer+täckfär	3,91 m2 (2,1*1	1	st	1798,0	1798	3,00	3,0
Våtrumsgolv + tillbehör	Plastmatta	2 m bred rulle	2	m2	359,0	718	2,40	4,8
Badrumshylla	Plywood	10 mm	2	m2	280,0	560	6,40	12,8
Köksbänk	Plywood	7+7 mm	2	m2	280,0	560	6,40	12,8
Köksbänksskiva	Plywood	7+7 mm	0,85	m2	280,0	238	6,40	5,4
Ram kök och badrumshyllor	Läkt	22x45	15	m	7,9	119	0,58	8,7
Diskho + vattenlås			1	st	799,0	799	2,70	2,7
Handfat bad + vattenlås	Återbruk		1	st	0,0	0	1,00	1,0
Draperi kök, badrum, hyllor	Tyg		3	m	199,0	597	1,00	3,0
Minikylskåp			1	st	300,0	300	1,00	1,0
DELSUMMA Snickerier och infästning						9281		128,6

7. System

	Byggnadsdel	Beskrivning:	Dimension:	Antal:	Enhet:	À pris (kr):	Summa pris	À vikt:	Summa vikt
VA	Vattendunk	20 l Biltema	32x36x25	2	st	199,0	398	0,50	1,0
	Kran Badrum och kök	Kopparrör + böjare	12 mm	1	st	329,0	329	2,00	2,0
	Avloppsrör		40 mm	3	m	29,0	87	1,00	3,0
	Fotpump vatten	Återbruk båtskroten		2	st	150,0	300	0,10	0,2
	Drickvattenslang	pkt om 5 m	12,00	1	st	139,0	139	1,00	1,0
	Slangklämma 13 mm	pkt om 2		3	st	29,0	87	0,05	0,2
	Komposttoalett	Återbruk		1	st	0,0	0	8,00	8,0
El	Byggcentral	Återbruk	23Amp	1	st	300,0	300	1,50	1,5
	Skarvsladd 23-16Amp			1	st	129,0	129	0,50	0,5
	Grenuttag	Återbruk		2	st	60,0	120	0,50	1,0
	Grenuttag nya	Kök, bad, bord, sov, ute/tak		3	st	129,0	387	0,10	0,3
	Lampor	Tak, säng, badrum, kök, ute		2	st	300,0	600	1,00	2,0
	LED-strip x 4 inne och ute			4	st	500,0	2000	0,50	2,0
	Värmematta			1	st	2495,0	2495	3,30	3,3
	Fläkt badrum	Solcelldriven		1	st	669,0	669	1,00	1,0
	Rör + ytterskydd fläkt			1	st	159,0	159	0,50	0,5
	Induktionsplatta	Återbruk		1	st	0,0	0	1,00	1,0
	DELSUMMA System						8199		28,5

8. Trailer och övrigt

Byggnadsdel	Beskrivning:	Dimension:	Antal:	Enhet:	À pris (kr):	Summa pris	À vikt:	Summa vikt
Trailer	Husvagnsunderrede	6,5 m	1	st	1500,0	1500	250,00	250,0
Stödhjul	Nytt stödhjul + hållare		1	st	369,0	369	5,00	5,0
Blinkers + bakljus			1	st	499,0	499	1,00	1,0
Reflexer + tillbehör			8	st	19,0	152	0,00	0,0
Trall ram tryckim.	Tryckimpreg. trall	28x145	9,9	m	30,0	297	3,36	33,3
Läkt tryckim.	Tryckimpreg. läkt	25x50	9,9	m	9,9	98	1,12	11,1
Franska skruvar			12	st	17,0	203	0,01	0,1
Trappa			1	st	300,0	300	10,00	10,0
DELSUMMA Fönster och dörrar						3418		310,5

9. Färg

Byggnadsdel	Beskrivning:	Dimension:	Antal:	Enhet:	À pris (kr):	Summa pris	À vikt:	Summa vikt
Golvlack	Le tonquinouis	3 lager	2	st	800,0	1600	0,50	1,0
Färg - ytter	Båtsmörja tjärfärg	2 lager=30 m2	2	st	380,0	760	0,50	1,0
Färg - inner	Vit linoljefärg	2 lager	2	st	229,0	458	0,50	1,0

Färg - bågen	Grå linoljefärg	2 lager	1	m2	229,0	229	0,50	0,5
Spackel och slippapper			5	st	100,0	500	0,50	2,5
Tillbehör måleri	Olja, tejp etc		1	st	800,0	800	0,00	5,0
DELSUMMA Färg						4347		11,0

SUMMA total		
Delsummor:	Summa pris (kr)	Sum vikt (kg)
DELSUMMA Bjälklag och golv	4596	139,24
2. Väggar	10624	234,75
3. Tak	12667	388,11
4. Fönster och dörrar	7700	76,16
5. Snickerier och infästning	2280	28,38
6. Fast inredning	9281	128,62
7. System	8199	28,45
8. Trailer och övrigt	3418	310,47
9. Färg	4347	11,00
Spill 10%	1,1	
SUMMA total	69423	1345
Per m2 BOA:	8265	133,45

Totala priset är inklusive hus, system och fast inredning, men exklusive lösa föremål såsom kuddar och stolar.
Även sådant som inte hann bli byggt under kursen (vattensäkring badrum och ventilation) är medräknat.

Appendix 4b

Byggkalkyl referens

Projekt: Konventionellt

Pris-och viktberäkningar

Namn: Andrea Ottander

1. Golvbjälklag och golv j

Byggnadsdel	Beskrivning:	Dimension:	Antal:	Enhet:	À pris (kr):	Summa pris	À vikt:	Summa vikt	Kommentar
Golvreglar	Regel	45x120	26	m	40,0	1039	2,48	64,5	
Trossbotten	Masonit	3,00	10,08	m2	50,0	504	3,00	30,2	
Trossbotten ram	Läkt	22x45	52	m	7,9	411	0,56	29,1	
Isolering	Glasull	120,00	10	m2	95,0	950	1,70	17,0	
Golv	Massivt trägolv	25x165	8,4	m2	479,0	4024	8,00	67,2	
DELSUMMA Bjälklag och golv						6927		208,0	
					Pris /vikt per m2:	717		21,5	

2. Väggar

Byggnadsdel	Beskrivning:	Dimension:	Antal:	Enhet:	À pris (kr):	Summa pris	À vikt:	Summa vikt	Kommentar
Reglar	Regel	45x95	80,8	m	45,0	3636	1,90	153,5	
Läkt luftspalt	Läkt	22x45	60	m	7,9	474	0,56	33,3	
Läkt installation	Läkt	22x45	54	m	7,9	427	0,56	30,0	
Invändig beklädnad	Panel	12x95	27	m2	222,2	6000	9,28	250,6	
Utvändig beklädnad	Fjällpanel	22x120	29,8	m2	270,0	8046	11,60	345,7	
Ångspärr	Plast	0,0011x2,7x25	37	m2	10,0	369	0,02	0,7	
Åldersbeständig tejp			1	st	229,0	229	0,50	0,5	
Vindduk	Vindduk	0,001x2,7x25	29,8	m2	23,5	700	0,08	2,4	
Isolering	Glasull	95 mm	27	m2	89,0	2403	1,22	32,9	
DELSUMMA Väggar						22284		849,6	
					Pris /vikt per m2:	748		28,5	

3. Tak

Byggnadsdel	Beskrivning:	Dimension:	Antal:	Enhet:	À pris (kr):	Summa pris	À vikt:	Summa vikt	Kommentar
Takbalkar	Regel	45x120	20	m	40,0	800	2,48	49,6	
Invändig beklädnad	Gips	12,00	14	m2	47,4	663	8,70	121,7	
Utvändig skiva	OSB	15,00	16	m2	166,3	2661	5,00	80,0	
Luftspalt	Läkt	22x45	20	m	7,9	158	0,56	11,2	
Oljehärdad board		3 mm	16	m2	76,0	1216	2,97	47,5	
Ytpapp	1 m bred, rulle på 8 m		16	m2	93,6	1498	4,13	66,0	
Underlagspapp			16	m2	43,0	688	2,20	35,2	
Takpappsklister			4	st	89,0	356		0,0	
Isolering	Glasull	95 mm	14	m2	89,0	1246	1,22	17,0	
Takfot			5	st	89,0	445	1,00	2,0	
DELSUMMA Tak						9732		430,3	
					Pris /vikt per m2:	608		26,9	

Appendix 5:
Field diaries

5a: Bobini + Angereds folkhögskola:
Learn to build tiny houses

5b: Egnahemsfabriken + Länsstyrelsen:
Build a mobile hen-house

5c: My course

Appendix 5a: Bobini

Lär dig bygga tiny house och småhus / Learn to build tiny houses and small houses

Type:	On-site
Location:	Gunnilse
Application:	Web page of Angereds folkhögskola
Participants:	12 (out of 41 applicants)
Price:	2500 SEK (I went free)
My role:	Participant and teacher in design workshop and SketchUp course
Duration:	Spring 2024 6 weekends 9.30-16 Every fourth weekend starting 3 February

The course was a collaboration between self-building organisation Bobini and Angereds folkhögskola. The duration of the course was 6 weekends (every forth). The course was announced at the webpage of Angereds folkhögskola, where an application form could be filled in, asking for name, phone, address and a few sentences about why you're interested in participating and what your prior knowledge is. The teachers were the ones to choose the applicants according to criteria unknown to me. There were 41 applicants of which 12 got to participate in the course. The course was held in the workshop of self-building organisation Bobini at Lilla Holmen 7, Gunnilse, Gothenburg. On the first day, I informed everyone of my ongoing research and gained permission to take anonymous notes.

3-4 February 2024

First weekend

§ The introduction took place at the old workshop (initially used for fixing cars) used by Bobini. With only workshop-heating, it was really cold. Chairs were placed in a semicircle and a whiteboard with different projects and notes of things to do was placed in front. Present were 7 teachers or tiny house owners and 12 participants.
There was no schedule for the day posted, and people seemed curious and a bit nervous as we started. One of the organizers put us into smaller groups to present ourselves and our ambitions to each other. The teachers took part in the introduction just as the participants. First we discussed two and two, and changed partners twice. Then we were placed in groups of four to do the same. We were told to tell about our expectations and hopes for the course, and if we had any prior experience. Finally we sat down again and did the same thing, with everyone presenting in front of the others in a circle. Everyone presented themselves, their prior knowledge and their aspirations. The long introduction in different steps was a bit repetitive but did make people feel relaxed and helped to demolish any power-relations as the teachers were just as humble and open to learning as the students.

Here are some of the answers to what the student were expecting of the course and what they wanted to learn:
"I want to be able to renovate my old house" "I don't need to be able to do everything by myself, but I want to understand the process and dare to start my own project" "I wanna have fun, learn something new. Dare to try things out without prestige. In the future I would like to build my own house" "I want to get a professional introduction to using heavy machines before buying them myself" "I want to get tips for where and how I can continue to learn after the course" "I want to learn everything that has to do with construction! I want to feel confident. In the future I'd like to live in a tiny house of my own" "I want to become more experienced in construction" "I have some theoretical knowledge but no hands-on experience. I'd like to know more about dimensioning timber and what screws to use"
The teachers then went on to explain the structure of the course. Emphasis was however on the course being for the students, and the students creating the course in collaboration with the teachers. Whatever they wanted to learn, the course would provide. The idea was for the student to partake in the different projects going on around the workshop; The long house, The highrise, The small house and The new house. The different projects were at different stages, meaning different kinds of work, such as outer paneling, inner paneling, insulation, framebuilding, roofing etc. Among the projects is one new project, starting from the ground up and planned to be finished within the timeframe of the course. The owners of the specific houses are there to instruct the students. Once a student feels they know how to do the designated step, they move on to another workstation and change places with those students. One student per workstation however stays and teaches the new students. This is because teaching yourself is such a good way to learn. The teacher calls this pedagogy "Pass it on".

The 10-step program
The teachers also quickly showed the "10-step program" that they use at Bobini to support the planning process of their members. They encouraged the members to start thinking about their planning already. Roughly translated to english, it looks like:

1, Vision Matrix – The matrix is a tool to help develop a vision of the type of building you want. It addresses limitations, functions, and design. It supports creating a clear picture of your desires.
2, Location and Experience – Consider

and find out the specific location and environment where the house will be built.
3, Timeline – Plan the timeline, construction site, and the help you'll need to purchase for the build. NOTE: It's important to understand that self-building with guidance takes significantly more time than expected.
4, Reuse Planning – It is important to plan for collecting reused building and interior materials, their storage, and any upgrades needed. This is also crucial during the design and drawing phase.
5, Design and Drawings – At this stage, you turn steps 1–4 into sketches and drawings of what you want the house to look like, including incorporating reused materials. Use free online tools like Google SketchUp or consult a skilled architect. Creating a scale model can also be helpful.
6, Construction Description – A construction description is a summary of chosen materials and quantities. It's important to plan this with a professional carpenter and any other tradespeople you'll be working with. Get help to make the most environmentally friendly and climate-smart choices, including reuse.
7, Work and Construction Planning – This involves determining how much professional help and guidance will be needed, how much work you will do yourself, and how much time reuse and upgrading will take.
8, House Operating Budget – Includes an overview of: loan repayments, rental of the site, insurance, heating, electricity, ventilation, water, sewage, etc. Summarize everything to estimate the total cost.
9, Total Cost Estimate – Now compile a total cost estimate including building materials, interior fittings, appliances, plumbing, electricity, heating, labor, and professional guidance, etc.
10, Construction Process – Plan your own time, get good craftsmen and guidance for the implementation. It's important to get professional help in the most critical stages to ensure the build is sustainable. Coordinate with your guide or courses from Bobiní and possibly other training.
11, Roof raising party – A proper celebration with all friends and craftsmen is a great morale boost for the entire building project.

I honestly don't really understand the 10 steps (or, 11 steps?). I think many of them are irrelevant or repetitive. No matter how many times I read through the list, I can't seem to get a proper grasp of what the preparatory process looks like. It also doesn't resemble the planning process I went through before building my tiny house. But I hope that the other participants understand it better. I however also don't really understand how they are supposed to work with it, there are no lectures planned explaining it.

Workshop introductions

After the presentation of the course structure the carpenter teachers showed the basics of hammering; different kinds of hammers and how to hit a nail the right way. The same with sawing. The very basics of carpeting! Really interesting and a good base to stand on for further development. The second day was the day for presenting some basic machines. The first day, only those with prior knowledge could use them.
As the project that was supposed to start that first day wasn't properly planned, I helped the owner out with drawing it up in SketchUp. While doing so (in the workshop), there is shown great interest in the program, and we decide to have a day with a SketchUp course at some point. As there are also many questions arising around building permits, and the carpenters know little of it, I'm also thinking about holding such a lecture at some stage.

There wasn't much time to get started before lunch. It takes time to get materials and machines out and figure out how to do stuff. Therefore not many changed groups before lunch (12-13). And it felt like it wasn't long after lunch that it was time for fika (15), and then just an hour left of the day (ending 16). So, not very effective and not a lot of changing groups.

The weather was cold and the workshop was semi-heated, but half the projects were outside. No-one complained though (even though I must say I was on the verge of being too cold).

Another thing initiated by one of the teachers is a "check in" at the start of each day and a "check out" at the end of each day. As I understand it borrows from "sharing circles" and mens group's gatherings. It's a way for everyone to say what they feel like with undivided attention from the rest. The teacher explains that it is as important, if not more important than the actual building. As he usually says; "We don't build houses, we build people". The unique individuals and their journey is very much in focus. So every day was finished with a round of how people liked the day and what they wished for the future. Everyone is happy with the first weekend. The vibe is very familiar, friendly and relaxed.

2-3 March 2024

Second weekend

Starting up at 9.30, there were 7 teachers/house-owners and 6 students present. Just like the first time the structure of the day wasn't presented, or only done so orally as we started. We did a round of "check-in" of how everyone was feeling, what we liked from last time and what our wishes were for this time. As we talked (took 30 mins) a few more people dropped in, until only one student was missing. Meeting everyone again felt great and friendly, the teachers really managed to create a nice and open vibe. The teachers urged the students to change groups more than what they did during the first weekend. As soon as you feel comfortable, you should switch.

The teachers hold a lecture about wood as a material. Again very basic, and very interesting and relevant. I like how they start from the beginning, those parts are so easily overlooked but matter a lot. The lecture however gets too nerdy as one student asked about how to cut planks from wood from different trees, and one carpenter goes into detail and starts telling a long anecdote about carving bows. The rest of the group gets restless and bored and finally asks if we could move on. The lecture takes about 40 minutes, and we start working with the same houses as the previous weekend at 10.40.

I put outer paneling up at "The highrise" and am surprised to hear that it's lunchtime - we had only just gotten started. I think it's both due to the fact that we work slow as there are many new to building, but also perhaps a bit disorganized teaching. We for example only carry out one plank at a time from the storage. Having a pile of planks prepared before the day starts would make the work a lot more efficient. Some people decide to change places after lunch, meaning the progress will go slower as new people will have to learn, but meaning

more people will learn something new. The balance between effective building and effective teaching!

As the person with the newly started house hasn't bought the necessary materials, we do a side project to show how walls and roof are put together, by building two mini-walls (1x1 m). A lot of people join in the discussion for how to make a bent roof, and the teacher points out that thinking is a big part of building. Note to self - how much do you want the students to think of solutions themselves VS to have a finished step-by-step-guide to follow? Both are great ways to learn. Step-by-step and prepared tasks are finished faster and can show many steps in the correct way. But learning how to reach conclusions yourself is a valuable lesson. We finish the day by once again doing a "check-out" of people saying what they learnt and what they wish for the future. Everyone is happy and tells stories of what they found the most interesting. As everyone has attended different stations, you also learn by hearing about the experiences of others.

30-31 Mars 2024

~~Third weekend~~ (I'm sick)

27-28 April 2024

Fourth weekend

The 4th weekend was half-building, half site visits. People drove in their own cars or gave each other a ride to visit two of the teachers' plots. One is a dedicated self-builder, with a massive storage of recycled material. Everyone found it quite impressive with the amount of stuff he's gathered. As he says, when he builds (always with reused material) he wants to have something to choose from. We talked a lot about how time-consuming and storage-demanding it is to build that way. Not everyone has that kind of capacity. He assumes that you need to be collecting materials for at least a year to get enough for one house.

We also visited two tiny houses on the plot, rented out. They were built with a lot of creativity and unusual solutions, often without a drawing to begin with. Practical - perhaps no, but very creative. For example a big round hole in the middle of the second floor in one of them was a cool solution, but decreased the useful space a lot.

It was very inspiring for some of the participants to "see what's possible". Dreams and hope to build something themselves seemed to grow. Being in a self-built house seems to be perceived differently by the participants than being in a conventionally produced house. They seem more aware of the fact that it was built by an actual person - and that they could be that person.

The owners of the tiny houses back in the workshop were not very happy with the site visit. They didn't get much help this weekend. The "New house" that was supposed to be finished within the timeframe of the course hardly hasn't evolved at all due to the owner being very careful, hesitant and wobbly. Materials are often lacking, and sometimes even as we've for example put up one sheet of facade plywood, he later takes it down because he wasn't quite sure. It makes everyone a bit restless and annoyed.

25-26th May 2024

Fifth weekend

Some people seem to have dropped out. No one has heard anything from two of them. One is abroad, two are sick. Only four students attended. Perhaps we need to be sure that those taking the course really want to follow through? Can't be sure, but could do more out of the applicants filling out a questionnaire when applying, so that we can choose the most serious ones.

I tried out holding lectures and workshops this time. The people building houses were a bit unhappy about not getting enough help this weekend due to that. At least we decided to be in a separate house to give them more space to be noisy with their construction, and also so that anyone who didn't want to attend my lecture could build with them. We built a setup with a big table with chairs around it, and a projector showing my presentation against a wall. Having theory before noon both days is very well balanced. After sitting for 2h it was nice to move and use your head for something else.

<u>Saturday - theory lecture</u>

The first day I presented a lecture on the history and relevance of tiny houses, as well as most laws regarding tiny houses, and finally design strategies, with my own house an example of how to work with it all. While taking I showed examples several times, such as my own attefalls-building permit, my handbook, and a SketchUp model to show the construction and what a plan and section is.

The participants (4 students and one of the organizers) had a lot of questions continuously. They wanted more details regarding laws, and also what happened if the laws were not met. I need to read up on "jordbruksfastighet" (agricultural property), cleaning of greywater etc. Awesome to learn while teaching! I had one pause for questions planned but it wasn't needed. One feedback I got was however to add more questions to the public here and there, to engage and open up for fluid knowledge sharing. Another feedback was that I should be more objective when explaining about laws such as BBR and PBL (I tend to be quite critical) - Or else one could lose credibility, especially if presenting for a municipality. Be clear about my critique of accessibility dimensions for example being good for disabled people but bad for self-building, mobile and tiny houses. Good point! I felt a bit embarrassed afterwards for not making that clear. Same person (a landscape architect) also requested sources for all my information in the presentation to make it possible to check things up yourself afterwards.

<u>Sunday - design workshop</u>

I wanted to use the second lecture to start the design processes of the participants. I decided to use the 10-step program. It was also mentioned on the first day of the course, during the introduction. I however found many of the steps irrelevant and repetitive, so I tweaked the program a lot and used my version on this day. I've basically remade the whole list, removed most of the text and put the order of things up as I would have done it.

My new version of the 10 steps (that I think could be even more further developed) sounds like:

1. Define your needs and wishes
2. Find reference projects
3. Sketch and model
4. Calculate budget and weight
5. Planera built: where, when and with whom?
6. Learn to build
7. Find new and reused materials
8. Update the design and make a detailed building plan
9. Build and have fun!
10. Live and be happy!

At the end of the first day, I gave everyone a homework assignment to think about step 1; defining their needs. The next day we did a worksop starting with everyone getting 15 minutes to write down their needs. Some struggled a bit, making me consider whether it would have been better to give it as an actual homework assignment instead of just telling them to "think about it". I made it clear to focus on functional needs and not special ideas about those needs. Not "a 180 bed" but "space to sleep for two" = more flexible. We then presented our lists. Sometimes I asked clarifying questions, such as if it wasn't important to be able to close a door, or if openness was more important. But their lists turned out good and personal, and I could see them resulting in different plans. We also talked about the importance of being brutally honest, and not making too many compromises in order to live tiny. If a tiny house is not big enough to fulfill their needs, the person should know that as early as possible to not build a house they are not happy in. This resulted in one person drawing two tiny houses placed next to each other.

Everyone then got to sketch a general layout by hand without scale. Just the functions in relation to each other. It took perhaps 15 min. Finally we drew out a general plan scale 1:200 on paper. The scale thing was unnecessarily difficult, and I should bring some finished rulers next time. Everyone went with a wide tiny house (3.10 exterior = about 2.7 interior) and 5-8 m long. I could prepare papers with the width before? Or some kind of 90 degree ruler with common tiny house width and length? Scale 1:200 was good, but could have been even smaller (1:400). I had cut out small pieces of furniture in scale 1:200, which worked great. People however asked for premade stairs, thinner beds (70), shelves (40), a scale person and a scale dog. The mistake that I had to correct on almost every plan was the distance in front of the kitchen or between furniture. Not that standard 1.2m is necessary, but they often had passages of only 50 cm. That could be fixed with a scale person-circle (minimum and recommended). I'm also thinking about creating a paper with some common dimensions (both standard and minimum) for people to look at and take with them home. Such as a kitchen 60 cm deep, 60 wardrobe (but 40 works great), 1.2m passage (but 90 works great), opening for stair to loft minimum 60x60 (but bigger is nice) and so on.

There was a lot of interest in fold-out solutions, ways to open up one facade toward outside, and to blend outside and inside. Most wanted an open space to hang out with kids or family, but almost everyone had very small bathrooms.

It got clear it was important to work vertically too. With sleeping lofts and windows etc. I'm thinking next time the plan could be step one, and we could thereafter begin to work vertically at the next workshop. Perhaps also including step 3 on the 10-step program, with reference projects to visualize the facade and interior details. This way, we would have one workshop each weekend and slowly work through the 10-step program towards their dream tiny house.

Overall I feel like the lecture and workshop really made people start to think and concretize their dreams and plans. People mentioned going from "a pair of sliding doors could be awesome" to actually getting close to a functioning plan and starting to think about which building permit to go for (or not go for). The new 10 step-program seemed to be very appreciated, also allowing them to continue the work on their own after the course.

We were going to do a SketchUp tutorial, drawing one of the projects, but ran out of time. Decided to postpone it to next weekend. Good, then the plans can sink in too and not too much theory in one go.

For the future, it was also requested with a bit more nerdy theory lectures, on for example ventilation, toilet solutions, different kinds of trailers etc. Could have one every Saturday?

Apart from the lecture and workshop, which took place before noon each day, building continued as usual. On the Long house was put the first layer of the roofing felt. The tiny house outside got interior paneling. The first day with its owner, the next day with only the participants teaching each other. The "pass it on"-thing was working this time (perhaps for the first time?). The new house was supposed to have gotten a roof, but the owner was very uncertain about the angle, and spent the weekend thinking and testing. I learnt how to make a truss and helped out with the roofing.

It was a very relaxed atmosphere the whole weekend. Many of us were stressed or had personal issues, but coming to the course was like a retreat. We had fun, took long breaks, worked slowly and took time listening. During the "check-in" many mentioned being tired or stressed, but during the "check-out" at the end of the day everyone felt better. Both me and the landscape architect had previously been annoyed at the slow phase, especially that of the small house, but today it was as though we realized that the most important thing is not to be productive, but to enjoy the way.

During the many and long breaks we also covered a lot of interesting topics. We've talked about compost toilet solutions, moisture and ventilation and structural strength. The level of the discussions is a lot higher now than in the beginning of the course, as people have gained more knowledge! It's such an asset to be able to hear different innovative solutions and help each other out with whatever we're trying to solve.

I also brought with me a first sketch model of the micro-pod I'm designing as part of my masters' thesis. I discussed it with the two carpenters and got so much great feedback. They also got a lot of new ideas and inspiration. One of them brought his own models, very pedagogically made to explain his plans for an alternatively constructed micro-house step-by-step. Talking around models made so much sense, which is why I'm also thinking about doing a model-workshop next year as part of getting through the 10-step program. It would very much visualize the construction for the participants, and would make it easy to discuss together. Because that's what it's all about, right, to do our best to make these people self-sufficient self-builders, and provide them with as many tools as possible.

The final discussion on Sunday was one of the teachers asking himself "Why are we doing this? Why are you? What's in it for me?". My analysis of the discussions going on, is that there is a general wish for self-sufficiency among self-builders, as a reaction to a society they don't really trust or like. There is lots of talk during breaks about environmental issues and a fear of a societal collapse. People want to know how to build, and they want to live more simply, in a mobile house, to be able to survive in an uncertain future. And in the meanwhile have a space to live that they have created themselves, that saves money so that they can live a harmonious life with less work and more time for family and nature. Apart from this, another often mentioned reason is creativity and freedom. As the other teacher said; "What if artists had to paint according to rules? It wouldn't be art!" Someone answered that perhaps architecture does need some rules so that we wouldn't build useless stuff. The teacher replied "If you're in contact with your actual needs, you do what's right.". But those needs cannot be noticed unless we give ourselves the freedom to explore, learn and live according to them (which is what the modern self-building movement is doing).

8-9 June 2025

Sixth weekend

Not many attending this weekend! Seems like at least 3 have stopped coming without leaving notice. Apart from them, one is still in the USA, two could only attend half-days this weekend due to their dogs, and one couldn't make it due to his kids. Why are people dropping out? We had a quick discussion among us teachers Sunday morning, and were considering whether it got too "boring" with the projects present in the workshop. The owners of both The long house and The new house seem to want to be present in all steps of the build, meaning it's been impossible to divide the work into several groups and actually get something done (for example some insulating, some doing the roof and some preparing the windows simultaneously). Many are walking around not very inspired and kind of have to do interior paneling for the third time in a row due to lack of work. This could definitely be fixed by more top-down organization; having projects that we as teachers have planned and decide over. Us preparing work before the weekend and leading a group each. Having people renting a space and building on their projects is kind of a gamble, the course gets very dependent on their personalities. The new house could for example have been finished within the course of the course, but due to the ambiguity of the owner, it's moving forward very slowly.

The long house finished its roof, which meant we had a Roof-party ("taklagsfest") as a finishing part. People from the study circle also got invited to join. Instead of revising the course, we had a nice chat as friends, and decided to send out a questionnaire afterwards. But some things that were still mentioned was that it would be appreciated with more in-depth knowledge. Not just touching upon ventilation, but actually calculating airflow and looking at different brands of fans. Or getting deep into what to think about when using reused materials - what could potentially be poisonous, how to find materials? I'm thinking a lot more theory could be good, perhaps following the 10-step program. That way their projects could be growing along with the course. We however touched upon when to find the time. People said it was already difficult to dedicate a whole weekend when having kids or pets and working full time. I asked about whether it would be possible to build weekday evenings but we decided it's probably even more difficult. They suggested having a teacher-led course every other Saturday, but with the possibility of joining in on Sunday too to build with the tiny house-owners. We'll really have to look at that for next year.
One idea I got, to not take too much of the weekend for the increased amount of theory, is to have the theory on for example Wednesday evenings on zoom. I have before concluded that having lectures on site is better, but it does take away a lot of building time. And weekday evenings won't do for building, but could work for a 1.5h theory course every other week. It would be kind of a combination of a study circle and a building course.

Based on the discussions, I could imagine something like the following aspects and events to be good to include in a future course:

Introduction:
History - what is a tiny house
Rules and law (transport, dimensions, building permits)

Models and drawing:
Hand Drawing
Physical model
Digital model (sketchup)
Drawing language

10-step program
Workshop 1: Define needs
Workshop 2: Sketch layout 2D
Workshop 2 (part2): 3D / sections
Workshop 3: Building models (SketchUp of physical?)

System:
On/off grid
Electricity
Water and sewage
Ventilation
Moisture

Reused materials (site visit Alf + lecture by Alf or Tony)

Finished building plan (drawings or model) could be developed during the course and presented to each other in the end.

Building a couple of different tiny houses during the course could be interesting. The building should introduce the participants to every step of construction, perhaps following the theory. Meaning that when we arrive at the theoretical part of electricity, we could also do electricity in one of the houses. We could also invite an electrician, for example, to hold some of the lectures. I really see the potential in people following a structure and developing their ideas throughout the course. It would also make discussions more relevant for everyone. In the end they could ACTUALLY know how to start building themselves, designing, building and doing system installations. Best would also be if the handbook I'm planning covered the same things covered in the lectures, so that people can follow along there too.

<u>The hopes and dreams of self-builders</u>
Apart from more insights into how to develop the course, the lunchtime discussion provided insights into the hopes and dreams of the future self builders. Someone spontaneously asked "What do you dream of, what do you want?" and everyone gave a reply. Here are some of the replies, based on my notes and memory from the discussion:

"I want to quit my job, get out of the rat race. Buy a plot of land and grow vegetables, perhaps in Skåne. That's where the tiny house comes in. I want to live cheap so that I can travel during the winter months. But I have a lot of climate anxiety, so no flying. But Europe is available by train."

"I want a workshop so that I can build things and fix my car. I want hens in order to be a bit more self-sufficient. It's about being able to fend for oneself a bit more, not to be so dependent."

"I want to have a garden and grow more vegetables! I would love to organize some kind of ecotourism, and bring people out into the forest. I want hens and perhaps other animals, but I don't want to care for them alone, and I'm having trouble finding others to share them with. There are also legal limitations, I'm not sure it's allowed where I live..."

"I want to travel more, and make a positive difference. I'm thinking about volunteering in rebuilding the coral reef in Indonesia, or perhaps going to Ladakh (Pakistan) for a few months."

"I want to start my own business, not completely sure what. Something with nature, dance - it's about presence. I want to work a reasonable amount of time, so that I have time to chop wood and have small building projects. I want work not to be a 'have to' but to do it less so that it feels inspiring and meaningful."

"It's so insane that so many of us feel like we don't have time to live until after retiring. We need to rethink, and reconsider what we actually need and want. We have this idea that money is what we need, but actually we just need money to buy things we need. But there could be a way to get there without the detour of having to make so much money. We need to dare look in other directions. Not at what the problem is, but at where we want to go. There is no other way to decode old habits and find a more harmonious way to live".

The discussion opened my eyes to how important it is to encourage dreams and reevaluations during the course. It's not just about building, in order to harvest the potentials of the movement it is equally important to encourage new ways of thinking. I'm not sure it should be a workshop as such, but it could be.
It also gave me deeper insights into who is attracted by the tiny house lifestyle. Contrary to findings in for example Mangold and Sczau (2018), most participants here are concerned about the environment and see adopting a tiny house lifestyle as a way to live more in harmony with nature. Everyone wants to work less so that they can follow their dreams and be happier, but it is not only an egoistic drive, but people want to do good for others or for the planet. In other words, it's both to "feel good" and "do good". It's also interesting to notice that in order to do good, they need to work less, because being stuck in the hamster wheel is what is keeping them from leading a truly meaningful life in which they can do good.

16 July 2025

SketchUp online course

As we didn't have time to hold the promised SketchUp course during the weekends, we had to do it after the course had finished. It was super difficult to find a time to do it when everyone could attend (this experience showcased how useful it is with a preset schedule!). I started a poll on facebook and finally decided on a date in July. 4 participants attended and we went through the basic functions in SketchUp and how that could be used in the design of a tiny house. The lecture took 3 hours. Still there was not much time. In the beginning they tried to do what I was doing, but in the end we gave up as it took too much time. Instead I recorded the lecture and uploaded it for them to be able to look back on. I however doubt that they will use it much. With the course being over, I imagine it's more difficult to keep it up. Introducing SketchUp a bit earlier however could be a great tool. Then the participants could use it to develop their own project, and get feedback from the teachers and each other. Some kind of list of commands would also be great to give them to ease the learning for when they try it out for themselves.

Participant evaluation

An anonymous evaluation form was sent out after finishing the course. 5 out of 12 participants replied. A full version can be found as online appendix 5b (participant evaluation). To access, follow the link on p.117.

A summary of the evaluation:
No one who dropped out replied to the survey, so the answers reflect the thoughts of those who seemed to like the course the most. It can therefore be assumed that the ratings would be more negative, had everyone filled out the form. Among those applying, people are generally happy with the course, with an average rating of 4.4 out of 5. It is mentioned in the comments that more structure and planning would have been appreciated. The structure (planning, foresight, communication) is rated 4 out of 5. Someone commented that it would have been better with a bit higher tempo and more to do. Another is disappointed that not everything that was promised on the webpage was part of the course. The balance between theory and practice is rated 3.6 out of 5. More theory is requested, with readymade presentations that can also be made available before and after the lecture. The difficulty level is rated 3.2 with no comments. I'm interpreting the low grade as the course being too easy and not developing enough. The timeplan is rated 3.6 with comments on the difficulty of combining weekend courses with family life. The projects (The long house, the highrise, the New house etc.) were rated 4. There seems to be an agreement that The new house moved forward too slowly, and that the house where the most happened (The long house) was the most fun. The location (workshop) is rated 3, with comments of it being too cold, too small, that some tools posed a threat to the security and that the toilet was below standard. The teachers get a clean 5 out of 5, and are being praised for their pedagogy, patience and knowledge. The study visit also receives a clean 5. The final question is whether they learn what they wished for from the course, and the average rating is 3.6. The participants feel like they got kind of what they asked for, but want more in-depth knowledge and more on design. On "general tips", someone requests a SketchUp course early in the process, so to give them more tools early on to understand the construction and start developing their own designs. Someone else requests getting to build a whole wall or section each, with all the steps from framing to exterior cladding.

Appendix 5b: Egnahemsfabriken

Bygg ett mobilt hönshus/ Build a mobile hen-house

Type:	Online
Location:	-
Application:	Web page of Länsstyrelsen
Participants:	14 (out of 14 applicants)
Price:	500 SEK
My role:	Participant
Duration:	Spring 2024 4 evenings 18-20.30 • 22 Januari • 19 Februari • 4 Mars (moved to 8 April) • 8 April (moved to 26 August)

The course is a collaboration between Egnahemsfabriken, Länsstyrelsen and several interest organizations. It is financed by the European Union and Svenska ägg. The course was published on the web page of Egnahemsfabriken and Länsstyrelsen. Everyone who applied was allowed to attend. The focus of the course was to build a mobile hen-house according to KRAV-standard as a way to encourage small-scale organic hen farming as a means for sustainable development. The design was made by the architects at Egnahemsfabriken in close collaboration with an organic hen-farmer who also attended the course. During 4 online lectures, information and support to start your own project was given. On the first lecture, I informed everyone of my ongoing research and gained permission to take anonymous notes.

22 January 2024

First lecture

My first impression was that the course was logically structured and clear to follow. I appreciated the schedule for what would happen during the day.

First Meeting:

- Introduce the facilitators and the organizations behind it.
- Objectives and program for the course
- Participant introductions
- Drawing review
- Trailer/frame
- Construction cost estimation
- Plan and prepare a construction project
- Materials and tools
- Safety: What to consider?
- Example - Maria's construction

It was planned to take 2.5 hours with a 15 minute (needed!) break in the middle. The whole thing however got 15 minutes delayed due to the presentation round taking up more time than expected. Note to self to give more time to this! Getting to know each other is a great basis for a relaxed and fun course.

Most of the participants lived in the countryside with a few animals such as hens or sheeps, and wanted to expand their number of hens. It wasn't always clear how much building experience they had, but some were very experienced and someone had never tried it (one quoted Pippi Longstocking saying "That I've never tried before so I'm sure I can do it!").

I could sense that Egnahemsfabriken had done many courses before. New with this one was that it was online. A really interesting concept to combine! I'm following the outcome with interest. The introductory explanation and step-by-step guide should make it possible. People are also able to ask for help in between meetings and upload their struggles in pictures and videos on the drive. If everyone really will build, I could imagine you would learn a lot from discussing the mistakes of others. You don't just have one building process to learn from, but many. Having a carpenter in the group gave a lot of extra insight. If it had only been the two architects presenting, some things may have been misunderstood, as I felt they had a little bit more of a professional and "difficult" language.

I sometimes didn't quite get what they meant with a certain step (for example, there was no air gap on the house and I wondered if this was a mistake or meant to be like that), and felt a bit hesitant to ask since it's online and you'd have to interrupt. Several times I also felt like sharing some experience (for example an instance when we talked about trailers), but felt hesitant for the same reason. It was also a bit impractical not being able to point at what you meant and to use gestures. Some people didn't know the meaning of "hammarband"/"top plate" (The horizontal stud on the top wall frame), and the "inside-language" got more difficult to understand without the physical thing in front of you.

The design was made by the architects from Egnahemsfabriken in collaboration with a hen-farmer. It was simple but logical. They also opened up for people to do individual alterations, which I appreciated. Several times alternative materials and solutions were discussed in order to make it more functional (such as the floor needing to be cleanable and where to add a hatch to remove the old chicken poop). This gave insight into how to think when building. It feels better to convey this to a self-builder, than to convey a strict way to do it. Creativity should be flourishing!

Finally, they had prepared and shared excel sheets on a Google drive with materials for anyone to download and fill in according to local prices and personal usage. This is such a great idea and really puts the power in the hand of the one that wants to build. Few would have the time to sit down and do that kind of preparatory

work, but this way it was made easy. Note to self to share the same! Would also be great to share the weight of materials for weight calculations.

They also informed about what stuff could be found second-hand and where (windows, doors and facade cladding). Regarding the trailer, they had contacted the company Tuna trailer beforehand and could present a “special price” for anyone buying the trailer in the dimensions required for the hen-house (about 28 000 SEK).

19 February 2024

Second lecture

The structure of the meeting was clear as before, with a schedule that we followed step by step. Or, at least it would have been clear if we followed the script. However they reorganized a bit due to the fact that not many had started building yet, and instead they decided to talk more about hens. At the end of the lecture there was supposed to be a lecture on what screws and nails to choose, but when we got to that there was no time left and we skipped it. It felt like a bit of disappointment, as you’d seen it on the schedule and waited for it but then didn’t get it. Note to self is that schedules aren’t bad, but that they should be followed or else there can be confusion and frustration.

Not a single one had started building yet! Looking back from meeting 1, out of the 13 participants 2 were planning to build this spring, plus the hen-farmer who’s building process the whole course was going to follow. 6 “wanted to build” but only hoped that they would manage now. The rest were there for inspiration or preparation for a later time. The hen-farmer had postponed the start because she was uncertain about the trailer. After this meeting, it sounded like she decided to buy the one offered through the organizers. As the idea with the course was for people to start and upload their progress on the course drive for everyone to follow, the delay in building made the organizers ask if they should postpone the following meetings. It sounded like one or two projects might get going if they got a little bit more time, so this was decided.

There were a few less participants at the meeting, only about 9, plus the teachers. Although no one had started, we all got to present again where we were at in our process and if we had met any difficulties. This would have made more sense if people had started but was still a nice way to get to know each other a bit more. It’s however difficult to get a real connection with people, as you can’t chit-chat outside the lecture and half the people have their cameras turned off. The teachers however do their best to make everyone talk and ask questions.

8th april (moved from 4th March) 2024

Third lecture

I didn’t attend the third meetup due to me being sick. Before the meeting they however sent an e-mail informing that they will have the delayed lecture on screws and nails, and that the hen-farmer will share more knowledge on hen-farming as well as the bumpy start of her self-building journey. People are reminded to upload their progress, if any, on the course drive. They are also encouraged to share what they would need to develop further, so that this could be integrated into the lecture if possible. Apparently no one had started building at that point, even though the meeting had gotten postponed. Instead they talked more about hen-farming. I would have liked to hear about the screws, but otherwise didn’t mind not attending.

26 August (moved from 8th April) 2024

Fourth lecture

The last meetup got postponed 3 months due to no one having started a project yet. There were only 3 participants present except me, plus an organizer from Länstyrelsen, one from Egnahemsfabriken and the hen-farmer. Why have so many dropped out? The first meeting had 13 participants, so about 75% less than the start. My own guess is that not enough was learnt. Perhaps some also expected to start a project, but failed and therefore stopped attending the course. Starting the course, everyone expected to follow several other projects, learning from different people and getting a lot of new input from the lectures. Most of the actual building instructions were given in meeting 1 and 2, and anyway it was all available online. The 2.5h long lectures were instead filled with a lot of talk about hens or farming.

Also this time, we spent 1h talking with an organic farmer about his business, and I got kind of bored. The fact that the lecture covers dinnertime and most of your evening (18-20.30) also makes you look more at the clock when the conversation isn't very stimulating. The lectures could have been shorter, with a clear schedule from the beginning stating that something interesting was going to be presented at each of the lectures. It's understandable however that the organizers did as they did, as they thought that people would be building. If they had, the later meetups could easily have been filled with quite interesting talk about the participants' progress.

One person had however started building. An organic farmer had after the first meetings calculated on small scale hen-farming as a business, based on the knowledge gained by the lectures of the hen-farmer during the course. He came to the conclusion that he could regain the invested money after 1.5 years if he built 3 hen houses according to the manuals. These would house 150 hens and yield 120 eggs a day. He had little prior building experience. He felt the visual guide was great when buying the tools and materials needed, as he himself hardly knew the names of everything, but could communicate with the people at the hardware store through the images. He simply gave them all the material from the drive (printed) and got just the right stuff with him home without any hustle. Apparently the store appreciated it too. He would however have liked to know exactly what length the wood should have been to avoid waste (a "kaplista" instead of "längdmeter"). He also ordered the recommended trailer. He feels he probably wouldn't have been able to start the project without the help of the course material, stating exactly what was needed from the start. He felt that it was easy to follow the step-by-step guide. If it felt difficult, it only meant it was time for a break and after that a re-read. He made small changes to the design and felt that it was easy enough to do. He would have liked to build next to someone else, sometimes just to be able to lend a hand for difficult steps, but also to learn from each other's projects and "take turns making mistakes". The organizers from Egnahemsfabriken agreed that togetherness would be the ideal situation in any self-building project. He feels the recurring online meetups also pushed him forward. He felt bad if a new meeting was coming up and he hadn't made any progress. He also suggested that he keeps posting images to the drive, and that perhaps we could have a follow-up meeting sometime in the future.

The hen-farmer agreed she would like a follow-up meeting. She had promised to build during the course, but had first been delayed due to hesitation regarding the trailer, and then her greenhouse had broken down and she had been forced to use her time during summer to repair that. She will however start building during the winter. This time she held a short lecture about hen-house ventilation and solar-powered solutions. It was however quite a lot of second-hand knowledge, as she had talked with a farmer who could build solar powered electricity stations from old car batteries, and referred to the conversation without knowing a lot about it herself.

During the reflections of this final meeting the organizers shared that it was the first time this concept was tested and that it was under development. The intention had been to make a self-building course available for those not able to get to Egnahemsfabriken. If they had known that so few were going to build, they would have organized it more as a preparatory course than as a build-along course. One of the biggest challenges according to Egnahemsfabriken had been that it wasn't possible to sense who was struggling with what through the screen. At an on-site course that can be noticed and the participants can be helped past what was holding them back. With the online concept it is a little bit unclear why almost no one started building and why people dropped out. It would perhaps be stronger in combination with physical meetups or at least small groups building together.

One thing I'm asking myself is whether the online concept is mostly suitable as preparatory/inspiring? Or is there a way to make people build along to a higher degree? One of the difficulties raised was that many of the participants were small scale farmers, and spring and summer is the busiest time of the year. Had the course taken place during fall and winter, many more could have had time to build.

They have decided to build a hen house at Egnahemsfabriken during a week in fall. Could be interesting to participate and see what it's like to follow the step-by-step-guide in real life!

27 September 2024

Visiting the construction

Egnahemsfabriken organised an on-site course out of the material shared in the online course. During a week, a group of self-builders built the house. They used the step-by-step guide during the introduction, but later built the house without looking at it and instead according to instructions from the carpenters. They can however still use the step-by-step guide to look back at what they did, should they have forgotten how a certain step was made. I went to visit the construction site on Friday the 27th of September. I arrived at 15.00, but was sad to see the place deserted. Apparently they had just finished for the day. The house was standing, but lacking some of its facade and the interior. Still impressive to have almost-finished it in 5 days.

Appendix 5c: My course

Lär dig bygga tiny house /Learn to build a tiny house

Type:	On-site + online
Location:	Gunnilse
Application:	Web page of Angereds folkhögskola
Participants:	10
Price:	3000 SEK
My role:	Teacher and researcher
Duration:	Spring 2025 7 weekends 9-16 (every third weekend) + 9 online lectures 18-19.15 (every other week)

Fall semester 2024

Start-up

Course planning

The planning of the course went on throughout the fall semester, as I was making the schedule, developing the design, creating the handbook, launching the course and handling the application process.

At the start, the only thing certain was that I would hold a course at Angereds folkhögskola and in the workshop of Bobini, according to a verbal agreement we made half a year before. The school needed to launch the course at the end of September, so early on I needed to decide on a general schedule and direction of the course. The decisions were largely based on my research, what I found working/not working in the courses I had attended myself earlier that year. I knew I wanted to complement the practical building experience with theory on relevant law, construction and architectural design guidelines. It resulted in a combination of on-line lectures and on-site construction. Initially I thought of building two houses, my lightweight design and a house with standard construction entirely built by reused materials. With my design, I wanted to test out a new form of lightweight construction, but what I was arriving at designwise differed quite a lot from standard construction, and was difficult to build in recycled materials (since it's constructed mainly in plywood which is difficult to attain reused). I felt I would be robbing my participants of valuable knowledge for their future house-making if they didn't get to try out standard construction. Likewise I was considering doing some kind of co-design process, as I didn't want them missing out on that. Would they really be happy building what I wanted? In the end the idea of the two houses didn't work, as the carpenter I planned to cooperate with cancelled. He was the one with the big reserve of reused materials. I definitely think it was for the best. I also left the idea of co-design, as it, according to the references I looked at, would take a lot of time, and I wouldn't get to try out my own architectural ideas.

A new carpenter was hired to help me with the course, Andreas. I knew about him from several tiny-house conferences in the last years, and from him being the teacher of a course in building a house-boat. I knew he had mentioned looking for a job, so it was as easy as calling him and asking if he'd be interested, which he was. We had an initial meeting at my place where we discussed my design and my proposed schedule. He felt like a perfect match for the job, providing great support both in the design- and planning processes. In a meeting with the school we decided on 7 building weekends and 9 online lectures. Andreas would receive 15% of a full-time salary (meaning he was paid for the weekends, plus 4h of "preparation" each month). I would receive a 20% salary, giving me a few extra hours per month, as I'm responsible for all the planning. The salary does not even come close to compensating me for the preparation time I put into the project. But that is expected, and I'm happy to even have the possibility of getting a small compensation. One to three of the lectures could be external teachers. So far only one external is rented in (for the third online lecture on building with reused materials) but it feels good that we can find someone in case the students are interested in something other than my expertise, such as solar power or electrics.

Application process

The course was launched on the webpage of Angereds folkhögskola at the end of September. By the deadline the 1st of december it had 44 applicants. Choosing which ones to join was a really difficult process. Based on their short answers of the application questions (why they applied, their previous experience etc) I focused on the ones seeming to have a specific project in mind and the ones seeming the most

motivated. I wanted them to be able to participate in design workshops and the like, so anyone answering "I just want to learn some carpentry skills" didn't quite seem right for the course. I favoured those wanting to build a tiny house before those wanting to build a van (as it's not my expertise). According to guidelines from the school I had to favour those living in Angered and anyone with a non-European name (in order to be inclusive). Only one with a foreign name applied (who also lived in Angered). Unfortunately she wanted to build a van, but I had to accept her anyway.

I also aimed for a fair distribution of age and gender. As 70% of the applicants were female, I wanted to keep the gender ratio to 70/30%. Spreading out the age was difficult, as there were a vast majority of applicants in the group "women 25-30", with only a few women over 35. For the men on the other hand, no one under the age of 33 had applied. Only based on project-ideas and motivation, I would have liked to have more young women joining, but it would be too uneven. Two of the female applicants wrote me an email too, explaining how much they wanted to do the course. It did affect me as it seemed very motivated, but I could only let one of them join as the "quota" of young women then was full.
The final result is a group of young women (age 24-39) and a group of slightly older men (aged 33-52). All 3 men also have more building experience, while many of the women have no experience. I would have liked it more blended, but I did the best with the applications I got.

After sending out the letters of acceptance to the course, one man said no thanks. I therefore had to find a substitute from my long waiting list. The choice was between a 33 year old and a 52 year old. In the end I went with the elder, as there were already a lot of participants aged 30-33. I don't know If i put too much emphasis on age, or if it's worth aiming for a diverse group. It's my experience that it can be very valuable with different experiences and positions in life instead of a homogenous group.

Several people who got a "no" replied, asking if the course was gonna go again, when the new application starts and how much they would have liked to join. It's amazing to see that there is so much interest for a course like this, it shows that the movement is growing. But it's also been heartbreaking to not allow them to pursue that dream. For many days I had doubts on whether or not I had chosen the right ones to join the course.

<u>Handbook</u>
Side to side with the course planning I developed the handbook, which would function as the course material. It is largely based on my own experience of what I know someone needs to know before designing and building a tiny house, but also on the questions asked at the courses I attended. I got hesitant as to whether I had time to make it. A lot of research hours went into finding out everything relevant. Mediating it in a pedagogical way took even more, writing fitting texts and doing illustrations. But I felt like holding a course without such a book would be even more difficult, as I knew the questions would arise. A book like that can also be useful for others in the future.

<u>Design and materials</u>
I also developed the design, communicated through a step-by-step handbook, and was simultaneously looking for reused materials to fit that design. Looking for reused materials turned out to be tedious and very time consuming. I choose to focus on the most expensive materials and that which had the biggest environmental effect if bought new. The trailer and the styrofoam insulation was therefore in focus. Looking for the trailer really stressed me out in the end. No trailer = no project. I got an offer for a new one from the cheapest company I know of (Tunatrailer.se) for 28 000 SEK, meaning nothing I could afford. I had conversations with many sellers on Marketplace and Blocket about different trailers, but in the end something always wasn't right (rust, wrong dimensions etc). In the end I found an old campervan trailer. The wheels were in great condition and it was cheap (1500 kr), only missing its front wheel, and being a bit too long. I also found insulation, finally. Sadly, I got a speeding ticket on the way back, so it got as expensive as new styrofoam, but at least I saved the environment some CO_2-emissions... I've also been looking for windows and doors. I found a window almost the right size, but gave up on the door. Glass doors were almost only available with a handle from the inside, not openable from the outside. Besides there were not many on sale, neither online, nor in recycling shops (Återbruket).

A lot of time also went to buying the necessary tools for the course. It was decided that Angereds folkhögskola would give Bobini 15 000 SEK, of which 10 000 would go to rent and 5000 would be at my disposal for tools. Almost everything was missing, and a good, new tool such as a jigsaw or a screwdriver costs 2000-4000. Again, I was left to keep an eye on Marketplace and Blocket. I finally learnt that Tradera was the best place for tools. I managed to find 2 jigsaws, 1 screwdriver and extra batteries before christmas. I looked and looked for a nail gun, but couldn't find one below 3000 (too much). In the end, I decided to rent one for the weekend it's needed, on a renting app such as "hygglo" or the like. I would also have to lend my own tools, a screwdriver, a jigsaw and a circle saw. It's not ideal, and really if one were to hold a course like this it should be in a fully equipped workshop or with a much higher budget for tools.

I decided to cut up the floor studs before the first building weekend. I was led to believe that we had the tools for it in the workshop, but upon inspection I could see they were no good. Without any time, or budget, to buy a new table circle saw, I decided to do it at Chalmers. I got it done just before christmas, hoping they wouldn't bend before the course started. It was also my intention to finish a model of the house we were going to build during christmas break, but I forgot to prepare an essential part, and so only finished it half-way during the christmas break.

5-10 January 2024

Preparations

It took me about a week to prepare the workshop for the course start. It was in worse shape than I imagined. Sawdust everywhere, broken tools scattered. No specific place for certain tools, so impossible to find what you wanted. At first I felt it was too much to deal with, having so much else to prepare. I was thinking of how to excuse it to the participants, saying I haven't been in the workshop for long, I can't take responsibility etc... But then I decided to call on help. My mother came and in a few hours the whole workshop was clean and organised and 5 sacks of garbage were disposed of. Working with an organisation like Bobini can prove difficult. There are no rules, no one responsible. I'm thinking about printing some big WORKSHOP RULES, both for my course but also for the workshop to run more smoothly in the long run. Cleaning the workshop also showcased how many tools were missing. Except for buying materials for building the first weekend, I needed to spend around 1300 SEK just on basic tools like folding rules, gloves and clamps, seriously putting be back in terms of being able to provide enough tools for the course within the budget (5000 kr from Angereds folkhögskola).

A friend of mine helped drive the trailer into place. It was a day full of icy slush and a bit scary to drive on the almost invisible and slippery roads. The floor of the workshop was wet for a week afterwards from the thaw. He also helped me start to build the frame. I decided to build the slightly difficult start before the course started, as it otherwise could have held everyone back if we run into problems attaching the wheelhouses for example. I was supposed to have done it myself, but there were enough other preparations to do so I'm glad I received some support. I'm also glad we did it before, starting the course confirmed that it was great being able to start on something simple right away.

I spent a day printing materials for the course at Chalmers: the course schedule, the 10-steps for self-builders, the drawings and the step-by-step guide and the handbook I had prepared before. Luckily there were two big whiteboards stowed away at the end of the workshop, so I could display everything and easily take it down and put it up again with the help of magnets. My fellow carpenter Andreas was sick during the week (and anyway wouldn't be able to help with a lot of preparations as his salary only covers the weekends). He however made his way to the workshop one day and we went through the step-by-step guide in detail so that he had full understanding of what we were going to do ahead. It feels great that he takes it so seriously and gives relevant feedback. It relieves some pressure off my shoulders that we're two people responsible for it.

Finally I needed to prepare how to introduce the course, my research and the house for the participants on the day. I wanted to keep it short but still give them all necessary information. It resulted in a talk of about 20 min.

11-12 January 2024

First building weekend

I had slept badly for weeks, just always slightly nervous about starting the course. But the night before the first day, I had a great night's sleep and awoke rested and calm. Leaving my house in the early morning with a backpack full of tools and workwear, I was thinking how great it would be to have a car for projects like this. I realised on the bus that I had given them the wrong name on the bus stop in the Welcome-email. I had mixed up the two nearby stops "Angereds kyrka" and "Gunnilse skola" into "Gunnilse kyrka". It did reintroduce some nervousness. Luckily everyone made it there. It was great seeing everyone in real life. I felt like I already knew them, having given the application process so much time and effort.

They seemed over-enthusiastic of the presentation of the course. Upon asking "is there anything you miss in the planning, something you wanted to learn that isn't here?" everyone shook their heads, and someone said "it's perfect" and "absolutely not" "I'm so happy I didn't apply last year!". Great, makes me feel like I'm on the right track. I presented the structure and the design, and then Andreas took over and gave them a tour of the workshop. They also got to test using the miter saw. Then we divided them into groups of two or three.

One thing I would be more attentive to next time is to mix those with less and more experience when making the groups. The groups with only inexperienced people really struggled and had to ask a lot of questions. Now we know better what level the different participants are on, and can plan according to it. Especially some of the younger girls seem never to have held a screwdriver or a saw.

Andreas was instructing the group using the track saw, while I instructed the 4 other groups on easier tasks; Cutting the thinner styrofoam, balancing the trailer to stand even (attaching the floor studs to each other and finishing the frame of the trailer). The workshop is a little bit small for 10 people. We struggled sometimes with where to put a group, squeezing them in on the floor between the kitchen table and the trailer, or inside the half-finished tiny house that occupied some space and was vacant anyway. Everyone needed to use ear protection most of the time, as a machine was always running somewhere. Perhaps 8 people would have been better.

It was really intense to supervise. People asking about widely different stuff all the time and me having to solve problems and keep it all in my head. The step-by-step guide was an immense help! Andreas liked it too (having held similar courses before without a handbook). It visualised for the students what needed to be done and how things were made. We could have drawn it and explained it on the whiteboard of course, but especially all of those shorter questions would take a lot of time. Now, it was just grabbing the guide and saying "It should be like this. You see? This one meets that one there.".

Me and the carpenter had decided on a daily schedule. Meeting at 9 in the morning, going through the tasks of today. The carpenter likes having a short dance-session in the morning, so he put on music and played 3 songs to warm up and make everyone giggly. Then the music is kept on a bit lower during the rest of the day. At 9.10 we divide into groups. We make sure they are mixed differently each time. We work until 11.30, where we take a break for lunch. It's supposed to last for 30 min, but both days during the first weekend we sat and talked for an hour. I think it's good that it's loose, getting to know each other is important. And learning through talking is good, as many questions about construction come up too. After lunch we change groups and tasks. Working for another 1.5h. Then a fika-break at 13.30 (we bought some fruit, coffee, tea and cookies). Finally we change groups or tasks again, so that everyone

gets to try out everything each day. Finally at 15.30 we clean and gather for a small discussion on what they learnt today.

The first day there was a lot of, as they put it, "FOMO" (Fear Of Missing Out). People were looking over their shoulder if we went through a new step with another group. Many came and suggested that we gave a gathering before lunch too, so that you could hear what the others had done. They wanted to be involved in everything. But we decided to try and trust that it was enough to change groups, and it showed up to be. At the end of the first day when we asked "Is there a station where someone hasn't been, or is there something you felt you missed or didn't understand?", there was nothing. The next day the FOMO was hardly noticeable, people trusted that they would know about everything within time. It feels better that way, interrupting for a discussion before lunch would feel like too much of the day would go to talking. There were some questions however on why we do certain stuff. For example they asked why I built the raised frame on the trailer before building the floor frame, and I explained that the wheel houses would penetrate the walls and floor otherwise. They also asked whether we couldn't cut the styrofoam insulation like 1 cm smaller, to make it easier to insert between the floor studs. That led to an interesting discussion about the importance of insulation filling out all gaps, or there will be cold bridges. And how different kinds of insulation work in different ways (styrofoam being hard can easily be too big, while glass fiber insulation can be slightly too big and still fit, although it shouldn't be squeezed or it loses insulation value...).

The first day was super intense, but did run smoothly. There was full action from the start, and they got much further than I expected. Continuing at that rate would mean that I hadn't prepared enough materials for the second day. That stressed me out a bit. Generally I had a feeling of responsibility to keep everyone busy all the time. If I saw someone idle, I went up and asked "Hey, do you want something to do? Hmm... What can we come up with? Maybe you can start on this step? Not enough screwdrivers? Oh..." and I was worried they felt bored. But really, after just 2 days I think I see now that people don't want to be occupied all the time. They are happy just resting for a bit. Talking for a bit. Watching someone else do something. Next weekend I'm gonna try to take it a bit more chill. Also for my sake. Coming home from the first day I was so tired. When I arrived the next morning I almost felt nauseous at the thought of being in that intensity for another 7 hours. Luckily we needed to go to buy some more materials (in case they would finish too quickly with the floor and have to start on the walls). It was a welcome soft-start for me. Andreas took care of the teaching. Coming back around lunch I told the students I felt a bit over-stimulated and would focus on one task (with two helpers) for the rest of the afternoon. Having been burnt out many years ago, too much activity wears me out. I've learnt through the years that my nervous system often relaxes just by letting people know, not having to pretend. And, as my experience informs me, and which also happened this time, sharing your weaknesses like that also allows for others to share theirs. Many came during the afternoon with a lot more openness than before and asked if I was all right and told me some of their own struggles.

<u>By next time I would like to make some amends to lower the intensity:</u>

- I would like to reinstall the "check-in" that they used at the course last year. Andreas thought it sounded a bit too "hippie" so we didn't do it this time, but I kind of miss it. It's just that everyone gets to do a "check-in" while everyone else pays attention. Then you can say how you feel, where you're at, what you look forward to, if somethings holding you back. For example "This week has been a bit crazy with preparations and nervousness. I feel a bit over-stimulated and also slept really bad, so If I'm a bit off you know why. I'll do my best but I don't feel like using any dangerous tools today" or "Today I feel great! I'm so looking forward to finishing the floor! Just so you know I'm just waiting for a call from my granny today. I might disappear for some time, we haven't talked in a long time. Also, can I bring my dog next weekend?". It's just a space to get a bit personal, to give the others a heads up for any behaviour and to ask about something while you have everyone's attention. If we had had that the second day, I wouldn't have had to say something during lunch about me needing to take it easy. Perhaps others were feeling overwhelmed, or something else too, and didn't know how or when to say it. They put such emphasis at the bobini course last year that it's not all about building houses. It's about building lives. I agree, and I felt at that course that just a small thing such as a check-in in the morning made it about us and not just about the house.
- I would also like to put a heater and some mattresses in one of the empty almost-finished tiny houses outside (about 10 m2 and fully insulated) and make that a chill-room for if someone needs a break. Sometimes people stood and looked completely off, like they needed to empty their heads a bit. And if not them, then at least I need just like 15 minutes of silence before lunch. Perhaps just meditate shortly, that's what I usually do in the middle of the day but felt like couldn't do at the course.
- I also want to lower the amount of participants in the workshop to 8. In my early anxiousness about not giving the students enough experience in conventional construction, I wrote on the course application page that they might get to build on some of the half-finished (conventional) tiny houses that are around the workshop. I think I will do this next time, ask one of the owners if they want to burrow two of my students (on a rotating schedule) for the weekend. Might be a win-win situation.
- I also want to prepare even more for the different stations. My head needs to be super alert all day when I continuously need to remember and come up with tasks for the participants. I also think some of my stress-reaction came because they were so fast and I hadn't prepared for starting to build the walls yet. Loss of control. If I make a list of different tasks I want done during the weekend, we could even write it up on the whiteboard. That would be visible and clear for everyone, also when choosing and circulating groups. And I then also want to plan for some extra activities, so I don't stand empty handed if they are too fast again. For example sanding and painting the reused window I've bought. (But then again, remember that perhaps they just wanna chill a bit too...).

<u>The participants</u>

Finally perhaps some words about the participants. It's a pretty mixed group. As to mirror the applications, I aimed for 7 women and 3 men, but one turned out to be non-binary. 3 are vegans, perhaps 3 more are vegetarians (hinting that they are environmentally concerned). Their styles vary, some look very "proper", 3 of them have a lot of piercings, some have a "natural" forest-look. Their occupations range from artist, farmer, working in a warehouse, wildlife teacher, being unemployed, working for greenpeace. There are three students; in architecture, engineering and medicine. Everyones friendly and open and seems to get along both with each other and with us teachers. I can feel a little bit left out as a teacher. I of course get a lot of attention, but on a more professional level. I could sense after a day that some of them had really "found each other", while I felt I had mostly answered questions about construction or tiny houses all day long, as opposed to making friends. But it's to be expected, and I

feel welcomed and cared for too.

Upon asking them of their previous experiences, about half have no experience and 3 of them have been building quite a lot. They want to explore self-building to reduce the costs and to get increased confidence. A tiny house as a way to handle the environmental crisis is mentioned several times. On is engaged in environmental conservation for a living, but wants to start making changes in her own life, on a personal level. About half want to build a house for full-time living, while half want to create a getaway house or still don't know exactly what they want to build. 2 or 3 want to start this year, and the rest are still planning for sometime in the future.

Upon asking how they perceived the first weekend, there were shoutouts such as "Great!" "Fun!" "Awesome!". It took me some days of resting to get over the intense week, and I'm still a bit split thinking about next weekend. I'm afraid of the intensity, but I'm looking forward to testing my wall construction and to see the participants again.

15 January 2024

First online lecture: What is a tiny house?

The first online lecture was just 3 days after the first weekend (and in between that was my 50%-seminar!). I was super tired. I had prepared all other online presentations, but this one specifically lacked a lot of illustrations, which ended up taking all day to make. I'm usually quite good at memorising what to say, but this time I gave up without even trying. I would just read my notes.

As I live so small, and with a toddler, I had planned to hold the lecture at our local library. There is a study room that I often use and that is almost always empty in the evenings. I arrived 30 mins before, noticing there were 2 people there studying. Not good. I looked around, but couldn't sit in the entrance as they had some kind of event there. Couldn't sit close to the children's area as a big group of loud youth had occupied the place. In the end I had to find a small table in the middle of the library. It definitely wasn't ideal. I was afraid of disturbing the pensioners reading around me, and I was disturbed by people passing by. Next time, I'll have to find a more safe spot, perhaps book a room at Chalmers.

Everyone got to the lecture in time. Also Andreas, whom I wouldn't think wanted to participate (he doesn't get paid for attending evening lectures). I quickly went through the structure of the online lectures. Told them they are welcome to raise a hand or ask right out if they want during my presentation, but that I also have breaks planned for discussion.

The theme for the evening was the tiny house. I gave a very shortened version of my academic research so far. Starting off with history (from nomadism until today), then the studies on why people choose to live in a tiny house, and finally the environmental relevance of the tiny house.

I had a break after going through the history part. Haha, I think they were a bit thrown back at the sudden history lecture. They probably didn't expect to get a review of the development or architecture since the dawn of humanity! The only comment I got when asking if there were any questions was "…it's a lot to take in. I think I need to let it sink in.". It took about 20 minutes, then I had a 5 min break. I think it was unnecessary, people don't need a break until after maybe 45 minutes. But I used the time to go around to all the elders asking them if I was disturbing them. No one had even noticed I was there. That made me relax a little bit more for part 2.

For part two I went through who the typical tiny house builder is and why they do it. One asked, during my presentation "But why is it mainly upper middle class? Isn't that weird?". I replied that it's for several reasons; You need capital to start building, as it's not possible to take out a loan for a tiny house. But you also need social capital, people with time over to help, perhaps some parent with a big garden where you can build. Also, you need to have a mindset of "everything is possible. I can do whatever I want. I can afford to follow my dreams", which is mostly common in the upper middle class. Anyway, it was a good question and perhaps it's something I should elaborate on in the presentation/in the thesis.

<u>Reasons for living in a tiny house</u>

After presenting my material I wanted the students to comment on whether or not they recognised themselves if the reasons presented by the research. There was an overwhelming YES. This strengthens my presumptions. Some of the comments being:
"I recognise myself in everything!"
"I agree!"
"The economy is the most important factor for me. Even a middle class wage isn't enough any more to buy a house, you can only loan about a million. This is a way to get a house and live in nature anyway."
"I want to own less, not contribute as much to climate change."
"Everything resonates with me."
"I've lived in nature before, but those solutions have been too primitive. A tiny house is a bit of a luxury. A long time solution."
"Money and freed up time are most important for me. I want to have the freedom to work with something interesting, not being forced to work too much."
"I want time to do voluntary work. The initial investment is worth it if it makes available a low-cost and free life. And this way I don't have to decide where I want to live."
"Freedom is the most important reason for me."
"So much is abstract in our society. Building your own house is something real, something you can touch, a pride. It's a way to have influence, to have control. To be self-sufficient also regarding the production of one's own housing."
"I want a relationship with my surroundings. To have a story connected to the stuff you own creates meaningfulness."

<u>Is the environment an important factor?</u>

Moving on with environmental relevance, I felt like giving it some time. Some people in the group are very environmentally concerned, while others don't seem to care at all. Being the one who decides on what is said, I felt like getting a common understanding in place, using my power to inform about the state of the Earth. I then talked about how the tiny house could potentially contribute (less materials used and less emissions emitted due to its small size) (and a change in mentality towards "less is enough"). I then had time for discussion and was expecting some feedback, but they were pretty quiet compared to the last discussion. Someone asked "But I heard it can be better to live in a flat. Sharing stuff and such. What do you think about that?". It led to a discussion about the pros and cons. Less heat losses with packed-together houses, but most blocks built of concrete and still

with high energy usage. And about tiny houses wanting to share functions (washing room, storage, extra living room, big kitchen etc) in a community-like way, but that the law was in the way for such arrangements. This led into a discussion about laws and rules that lasted for 15 minutes, until the end of the lecture. Everyone seems very eager to learn about the building permits and such. They can hardly wait until lecture 5. But I still believe in the order I set up. Note to self to look into laws on camping sites until then. If I'm ever holding this lecture again, I will add the stuff about environmental relevance directly after the history part, and end with the studies on why people choose to live such a life.

After the lecture I was relieved and happy. I think everyone enjoyed the lecture and learned something, perhaps even more than they were expecting. I hope Andreas will join the next online lecture too. It's about construction theory and he can probably give a lot of good comments complimenting my understanding. Luckily that presentation is not as half-finished, we will just follow the handbook.

29 January 2024

Preparations

In order to keep the time schedule we need to have a finished floor before building weekend 2. As they ran into some issues placing the styrofoam in between the studs of the floor last time, they didn't have time to attach the floor. As we need to use the floor as a table for building the walls I felt it necessary to finish it in between the weekends. I want to avoid not being able to move forward during the weekends because some step is in the way for all future steps.

I asked in the group chat of the course (WhatsApp) if anyone wanted to join. Only got one reply - from a girl who's not actually in the course but who applied for it 2 weeks past the deadline. She is going to start building her tiny house this spring, why I invited her to join our online lectures and any potential in-between building days, as she can't apply to next year's course (if there will be one).

It was a great chance to get to talk all day with a future self-builder. She talked of how she all her life has felt restless in apartments and ready-made houses. She now lived on a house-boat and thrived, which made her sure it's the right move to start building a tiny house of her own. She is in the process of downsizing and downshifting - cancelling freelance jobs, reducing her expenses by letting go of the car and cancelling subscriptions. Many of her family and friends are sceptical or just can't keep up with the drastic changes, but she seems very sure self-building is what she wants to explore, wherever that journey takes her. She's very open, listening, intuitively exploring new ways of living and trying to find out what's actually best for her. She has several actors supporting her on the way - family members or friends lending their back-gardens, their tools, their expertise as engineers or carpenters. She's collecting reused materials ongoingly and seems to have a lot in store now.

She's in the process of ordering the trailer, why she was really interested in sensing the volume of a tiny house (which she's never been inside). She had an idea of 3x6m, and luckily just such a house stands half-finished outside of the workshop. She went inside and immediately discovered it was too small. I felt the urgency of her explorations, so I invited her to my house after the day was over (2.5x7.8 m). She seemed quite overwhelmed by the difference in size, perhaps it was even too long for her. I hope and think it helped her a lot along the way. She also seems very happy to be able to attend the online lectures, as she lacks someone to ask about tiny-house questions specifically. For example she was thinking about ordering a trailer with a weight limit of 4 tons. None of her engineer or carpenter friends had any idea if that was suitable, but I could tell right away that it would be too little considering the amount of reused (heavy) materials and the thickness of walls she was considering.

Anyway, the construction of the floor went fast. I was worried it might be difficult, since some of the floor studs got slightly bent when they inserted the insulation. But we very quickly found a way to handle the difficulty and were done with all 4 floor boards in less than 3 hours. We first placed all 4 plywood sheets correctly on the floor, one in each corner, then secured 3 of them with a few screws and removed one. Below that one, we put wood glue on the studs and then placed the plywood in the same position as before. We marked where the screws should go by chalk line. One screw per about 20 cm. One after the other, all 4 sheets went on.

As with every step of this construction, I have minimised the dimensions of the building materials to way below standards in order to reduce the weight as much as possible, why it's continuously interesting to find out if it will actually work and be stable. It was therefore a big relief that the 12 mm plywood we use for the floor on the 21mm plywood studs was in no way unstable or giving in when you jump on it. Feels great! It struck me as I was sawing/screwing that it was the first time I actually built anything on the house - I have otherwise been busy instructing the others. It felt great doing some manual labour.

On the way home I went by "Claesons trätjära" - a paint shop specialising in traditional wood tar and linseed oil paint. I have a wish to explore non-toxic paints. It's something I didn't have the time to do with my own house, but wish to prioritize this time around. We had a long discussion about what might be a good solution for my house. For the facade we agreed that a "Roslagsmahogny" (a mixture of tar, turpentine and linseed oil) should work - unless the glue in my plywood is the kind that dissolves in contact with oil. I should test that. They told me not to paint it until April when the outside temperature is better. For the window and door that needs repainting they suggested linseed oil paint, and I bought a small bucket in order to start the work on the window next building weekend. Found a nice dark grey color. They could however not answer if the linseed oil paint would be possible to use on the epoxy or not, but they would ask the fabricant and get back to me.

Oh, the day before I had to order a door. I've been keeping my eyes out for a reused one for 6 months now, probably checked Blocket/Marketplace at least 25 times. Nothing has been what I wanted. Most glass doors open inward and only have a handle on the inside. And then of course the dimensions have to be correct to fit in between the trims in the facade. I found a site selling quite cheap doors - at least if you bought it painted white. That's why I will have to repaint the door too once it arrives (as I want the exterior to be gray).

29 January 2024

Second online lecture: Construction

The second online lecture was about construction. 3 of the participants couldn't attend, but the carpenter teacher was there again. Luckily - he should be paid for those meetings too as he's contributing a lot in the discussions. I had struggled to find a good middle ground between theory and practice. If I only gave them general construction principles, they would have difficulty understanding how to use it, it would be too abstract. If I would only tell them about the construction of the house we were building, they would know only that and not be able to experience it. If I told them about conventional construction too, it might get too wide. Especially with such a topic as construction and material qualities it would be so good to do in a workshop with the possibility to touch and bend those materials by hand. But, I hoped this theory would function as an introduction, and that they could touch and feel the principles for themselves when back in the workshop this weekend (and the rest of the course).

I went through the handbook I have made ("Hus som håller"/"Houses that last") and added some real-life examples such as bridges and my own house. It took me about 25 minutes to go through the material, and I then nervously asked them if they had understood anything or if it was too theoretical. But they seemed really positive. Had some few questions, like "do different kinds of wood have different qualities? Like should I buy birch for the studs and oak for the floor". I replied that, yes, they are slightly different, which can for example be used if you want to reduce the weight, but that everything except for pine is rather expensive. People also asked about steel beams. We had a discussion about the fact that they are actually much stronger than wood, and are often used in tiny house construction in the USA, but that they produce much more CO_2 during construction than wood and that they are more expensive and more difficult to work with. But that a steel beam below a sleeping loft or the like, where you want to minimize dimensions for the sake of floor height, could be good to consider.

We moved on to go through the construction of the house we're building together. I went step-by-step through the SketchUp-model and simultaneously explained why we do as we do with the same vocabulary used in the start of the lecture. "The floor studs are standing because a standing stud can take more vertical load than if it was lying down flat" or "the plywood in the facade provides structural stability from horizontal loads and is also a part of the house's climate barrier" etc. Some of them looked a bit confused and perplexed while I was explaining (perhaps just focused?) so I tried to take it slow. But I hadn't prepared what to say before, and I think it could have been done better if I had. What they seemed most confused about was the air gaps, both in the wall and in the roof. They had difficulty understanding where the air went in and out and why it was used. There were also questions about what to do if certain parts got bad, if they had to be shifted out. We talked about that being a downside with my design - everything is stuck with everything else, so it's not possible to for example change the facade in case of damages. We also briefly discussed alternatives to the epoxy-solutions i'm imagining around the edge where the facade meets the roof, but don't arrive at a new solution.

Finally we had a pretty long discussion (25 minutes). Some of the questions/topics were how a self-builder knows what dimensions of timber to use. I sent them Lathunden from Svensk trä with lists of that (Should have included that in the presentation). Someone said "This is super relevant. It's the kind of stuff you didn't know that you didn't know but now understand that one needs to learn about. Where can I read more, is there any literature"?. I replied that no, not really. There is general literature (I linked them Bygga Hus - Illustrerad bygglära) (and promised to bring it next weekend) but nothing that is directed at tiny house construction specifically. That's why I'm creating the handbook, and that I wish to expand it even more in the future, with more step-by-step guides for conventional construction too. There was a general agreement to the fact that this would make construction more available. I showed them the step-by-step guide that was used in the online course I attended at Egnahemsfabriken and they really wanted to have a look at that. After asking the organisers for permission I have now uploaded it at our course drive.

Finally I asked them if they had some wishes for the next online lecture, where the guest lecturer Tony from Bobini is going to talk about building with reused materials. They had some questions about how to discern when something is too old to use - be it an old house or a wooden board. We talked a little bit about mold and rot, and I promised to send the question to Tony.

Talking to Tony after the lecture, he had apparently forgotten that he promised to hold the lecture. Said he could perhaps do a 55 minutes talk from his car, while driving. I said absolutely not, I need to uphold high quality for my participants. I'm quite annoyed at agreements not meaning much and quality being low on the priority list in the organisation Bobini generally. I will consider whether I will ask the students if they can switch the date or if I will ask someone else to hold the lecture.

1-2 February 2024

Second building weekend

<u>Saturday</u>

Me and the carpenter arrived 30 minutes before the course would start, to get to talk about what to do and prepare some materials. For example, we needed to be on the same page about how to build the wall. We had on the phone discussed displacing the joints of the outer/inner plywood of the wall to make it more sturdy, but upon thinking more about it I had decided against it and I needed to talk with him about that (wouldn't be possible to cut it all at once, and would have have forced us to have to build the wall as one big piece, instead of being able to work on smaller sections).

I had made a lot of small changes according to last time's feedback, which I informed him about before the others arrived, and then also the participants;

- One participant has decided to not attend the course anymore due to health problems. I decided to invite the participant who joined me in the workshop the other day, and who has been watching the online lectures already. As it's so early in the course it feels good to fill out the spot to get enough data.
- I also announced that the owners of the blue house outside the workshop would attend this weekend, giving the participants the opportunity to try out some conventional construction.
- Another change was that I introduced the chill-room in the adjacent tiny house, for me and anyone else who needs a small break during the day.
- I also tried out writing everything that we would do during the weekend on small notes, taped to the whiteboard. They were divided into 3 columns; "To be done" "Being done" and "Done". This is an attempt to make the participants more autonomous, not always asking

me what to do next, and for us to collectively understand the progress we're making.
- Finally I reinstalled the check-in/check-out that was used at the previous Bobini-course. My reasons are both to open up for getting to know each other better, but also to get more data for my research, ongoing finding out what people look forward to/appreciated/learnt.

The first round of check-in went great. It gave some of them a chance to say that they were feeling a bit unwell and didn't want to use any heavy tools. Another said she had been feeling mentally unwell for a month or so, but that it was like it was all gone as soon as she got into the workshop. Many of us had slept terribly and it was nice giving each other a heads-up for slow thinking. One was only happy and super excited to start working. We then did the morning gymnastics led by the carpenter.

I then decided to go through how the wall was going to be built with everyone. Last weekend we only went through stuff in small groups, but this time I knew everyone would work on the wall one way or another, so it made sense going through it with everyone. I showed them with plywood, planks and insulation, meanwhile pointing to the handbook and explaining what to do. We would finish drawing the shape of the house across 4 sheets of plywood (could have any shape as long as it's constantly convex, but we aimed for the shape I had planned. We transferred it from drawings to reality by measuring the height every 20 cm, and marking the plywood with dots. To make the line smooth, we took a slice of plywood and bent it along the dots, and drew a line along it). We would cut the inner and outer wall at the same time. We would then mark where the jigs in the walls for the roof studs would be (at the same distance from each other, to later fit the exterior roof plywood). After that it would be time to cut the 21mm plywood studs in the right lengths, and afterwards glue and screw them on. Finally we would put the insulation in between the studs, and fasten the facade on top.

I had first imagined cutting first the front wall, and then the back wall, but the carpenter convinced me that it would be much more efficient and precise to cut everything simultaneously. I wanted to divide them because I felt uncertain if the jigsaw could cut through 4 layers at once (it could) and also because I was planning for the participants to be able to be on different steps, using different tools (some cutting wall 2 while others were screwing studs on wall one, for example). Instead, almost everyone was doing the same thing all weekend. It was fine with the tools (3 jigsaws, + 1 we borrowed from those with the blue house). At some point all the batteries discharged at the same time, but it was time for fika anyway. Also, people didn't mind waiting and looking at what the others did. As one wall is 4 sheets of plywood wide it was easy for 4 groups to work simultaneously one one section each. It wouldn't have worked if the inner and outer plywood had not met over the same stud. It might be less stable, but worth it for how much easier it is to build. The first day we managed to cut out the walls and all the studs.

The couple owning the blue house came by and had a small presentation of their project. Everyone had a lot of questions and really showed excitement. They build using materials from auctions, why they have only spent 100 000 SEK on the complete house (not including interior such as kitchen, water, toilet and furniture). They were also asked where they would place it (they have several options in their parents' or their friends' garden). They use wood fiber insulation, which was what one group helped them put into the floor the first day. Another group went out after lunch, but for the last session everyone seemed to want to work in the workshop on our house. It was the same the second day, no one went out to build on the blue house, but did spend quite some time talking to them during breaks.

<u>Check-out Satuday</u>

"A bit calmer today, a better tempo when there were not so many different workstations". "Good that we were all doing the same thing simultaneously, that way you understand and learn also by watching". "Everyone else using the different tools gives me confidence to try it out too! If they can manage, so can I probably". "I feel so much responsibility to do a 'good job', I feel terrible when I accidentally saw a bit off the marking". "I loved the jigsaw, it was so fun". "I felt like I lost the overview when working in the blue house, when I got back in everyone had gotten so far". "I felt tired all day, thinking has been difficult. Especially towards the end I didn't dare do anything, not measure nor make any cut". "The great thing about everyone working at the same station is that we can ask each other and learn from each other. It's fun to see the others build, and you can compare in what different ways you solved the problem". "It's so great to actually see and understand the theory. You talked about the air gap, but now I actually see the air gap, and I understand it. Especially as I see how it's solved differently in your house and in the blue house". "This is incredibly inspiring. My head is totally spinning with new ideas. I'm completely exhausted now from all the dreaming and drawing in my head". "It was very rewarding to talk with those in the blue house. Especially hearing about how they kept their costs down". "It feels so great to move forward on the construction. I only have positive emotions". I felt tired but not nearly as overloaded as the first weekend. Perhaps because I know everyone more and because some of the things I'd introduced to lower the burden on me had worked so well.

<u>Sunday</u>

The check-in the second day went very fast, as most of us felt fine and were happy to continue on the walls, but were tired. One had had serious trouble sleeping because of an inspiration-overload. He didn't know if he should get up to draw or google stuff or just try to rest even though he couldn't sleep. Another said it felt like Christmas day, having been excited all night to get to rip the presents open (continuing to build on the house being the present).

The second day we continued with the walls. Some of the studs were cut yesterday, but we continued with the rest. They then needed to be attached to the interior plywood. We had already marked its position and drilled holes, and I imagined gluing and then screwing from below (pulling the wall off the table a bit). We also discussed the possibility of turning the section of the wall around. I left it to them to test. Both ways were tied, but drilling from below was the most common. Not ergonomic, but safe and with good results. I worked with one of the participants, sometimes getting called to some other group running into problems. We realized the importance of the CC distance being exactly 400mm for us to fit the 379 mm styrofoam insulation in between. Some used a template to complement the marking we had made before. As the studs were getting fastned, we tried inserting some insulation. In about every other gap we had to cut a little bit away. The front wall got all studs attached and most of the insulation inserted. We also attached the two pieces to the left of the wall and the two pieces to the right of the wall (but couldn't attach the middle as the door opening divided them - we will attach them when we raise it instead). On the second wall we attached half the studs. We didn't have time to attach the facade, but are ready to start with it next time. I think we'd be ready to raise the walls next building weekend.

Someone reminded me that perhaps I should take a break, since I got so tired from last weekend. A bit hesitant because of the loss of control I first instructed some on the next steps, should they be able to start on that in the meantime. Went to the chill room and read a chapter of my book before I realised it was time to clean. I think it would be good to have such a break in

the middle of each day, perhaps after work has started after lunch. I wasn't as mentally overloaded as last time, but I was physically tired and did feel a bit better after resting. There is however almost always some question arising and it felt wrong leaving the room. No one else tried it out. The issue of energy dropping towards the end of the day was however also raised by some of the participants at the end of the weekend. I can also clearly notice it, they get something absent in their look in the afternoon and seem unwilling to take on another task, especially if it is something new or a step that requires thinking. We all agreed that the cake we had for fika day 1 helped a lot. Note to self to buy fika (no budget for it though…) and ask if some participant wants to bring some sometimes. And we should somehow integrate a culture where taking breaks is normal. Effectiveness is not the main priority, we should all feel good throughout the day. I'm thinking now about buying one of those "Fatboy"'s (big beanbags that you can sit in). That way someone in the need of a break could throw themselves on one of those, while not having to go out into another house.

It was much better this time with people knowing what was to be done and taking initiatives, but I am still needed at site almost all the time. People seemed to use the drawings and the step-by-step guide posted on the whiteboard. They bring it about and discuss it with each other. When they ask me about it, it is easier to explain. I only gave them a very quick introduction to drawings in the last online lecture, but their understanding is much higher now. Good thing I mentioned it so early, it makes it easier ahead. Something positive with working on the same step, all of us, is that they could also ask each other for tips and share experiences in another way. The evaluation in the end made it clear that they seemed to prefer it that way. They felt it was less confusing, and that they learnt more.

The FOMO was also less this time. Still, upon request we've installed a small discussion after lunch each day. After the first weekend I had decided against it, as I felt everyone did seem to have understood everything at the end of the day anyway and I thought it would take too much time. But, someone strongly proposed it and everyone seemed happy about it. So, after lunch we ask if someone wants to share some experience they've made with the others, and then the same opportunity arises during the check-out at the end of the day. Someone maybe realised that it's much easier to drill first and screw after, and so it could be great to share that with the others before continuing. But it could also be a mistake that one's made. For example, two participants made a strong blue chalk-line on one of the plywood sheets to see where to put the screws (while the others pre-drilled instead). But the blue line will be really difficult to paint over, meaning we'll have to grind it away before moving on. Experiences like that are really important too, so that the others know what not to do. In the final check-out after the weekend, many raised these kinds of informal discussions and ongoing small problem-solving situations as very rewarding. One participant even has a notebook where all such insights are gathered, full of scribbles.

<u>Check-out Sunday</u>

"It's interesting to see the issues we run into at the end, because we weren't exact enough yesterday. Because we didn't use the distance template between all the studs, now we can't fit the insulation in some places". "Yes, it's a fine balance understanding what is a good amount of preciseness. Some take too much time measuring, it's construction after all, a millimeter doesn't always matter". "Still, if you notice you've done something wrong, it is almost always more worth it to redo it. Often it just takes a minute, but it saves you loads of time in the end. It's a lot of resistance from the mind to redo stuff, but it's worth it".

"It's like I understand much more now what we're doing and why. I just feel like I really need to practice with the heavier tools". "It was a good day, I'm tired and hungry now. We need fika in the afternoon, like yesterday". "I had a great day. I tried out so many tools and steps. I feel like my confidence is growing. I feel a bit more secure and safe every time. And we've only been here 2 times!". "I feel like 3 weeks is way too long! I want to continue now! But it's awesome that there is so much to look forward to. Are we going to do electricity too? Awesome. I can't wait". "The informal discussions have been so rewarding, I'm learning a lot. I think it's important to raise the discussions we've had in the morning with everyone at lunch". "Everyone doing the same thing has really shown that there are different solutions to the same problem. What is it they say; 'Every way is a good way except for the bad way'". "I'm learning so much all the time. I loved that we needed to be so exact this time, it was fun". "I'm so looking forward to raising the wall!" "It's so fun to see the bustling activity in the workshop. You're working in your bubble, and when you look up you notice the whole wall is nearly finished". "I'm thinking about whether there is a better way to do it than screwing from below. It was tedious". "I enjoyed building the air gap. Now I understand what you were talking about in the theory lecture. Things are starting to fall into place in my head". "I liked the general introduction at the beginning of day one. It made the rest of the weekend easier. Also things like how you shared that it was important to cut the styrofoam vertically instead of horizontally to minimise the waste". "It was fun. I learnt a lot, but I'm really tired, and I'm unsure how to save my energy so that it lasts all day. In the afternoon I'm wasted". "It was really satisfactory getting to move the small notes on the whiteboard when we finished a task. Make it feel like we're moving forward!"

I feel really satisfied with the weekend. The best thing was noticing their increasing inspiration and thankfulness - that what we're doing is working and is rewarding for them. I feel like all the changes I made were great, except I need to think more about how to integrate rest in order to regain the energy in the afternoon. Will look up FatBoy and buy fika. Someone mentioned airing out and doing a dance-pause. And perhaps a 6 hour working day would have been better than 7, but I won't change that during this course.

12 February 2024

Third online lecture: Circular construction

The only lecture that I didn't hold myself was also the most messy lecture. As I know little about working with reused materials, I hired a carpenter from Bobini for the presentation 5 months ago. But as I talked with Tony two weeks before he informed me that he was double booked and wanted to reschedule. I decided I wasn't really ok with rescheduling, and instead chose to ask another carpenter to hold the lecture on very short notice. He agreed, but didn't want to show pictures or do any presentation, only to be asked questions. He couldn't start the zoom meeting, why we had to do it on WhatsApp, and I therefore couldn't record it. It was stressful for me, and too bad for those that didn't join that evening. But, we decided to sometimes during the course schedule a visit to his house, close by to the workshop, so that he could show what working with reused material is like in real life.

As the lecture was based only on questions, the participants led the discussion. They were a bit shy in the start, but we then had a great talk. They seemed really interested. But, I do see the disadvantage of question based teaching as that, as the participants might not know what to ask for if they are too much a beginner on the subject.

The subjects they touched upon where when materials are too old to be used (it mustn't have lost any structural integrity, but surface mold can be cleaned), how to store reused materials (dry and airy), how much time it would take to collect materials (at least a year for a house), where to find materials (one can of course keep an eye on second-hand sites such as Blocket, but contacts is the best, or just asking at demolition sites. He mentions taking down an existing house to be too time consuming (3 full time weeks for a small summer house) and with too little good materials as a result) etc... We also talked about the difference in mindset. You need to be ok with letting the collection period take a long time and to be ok with changing your plans and letting the materials decide the style, look and dimensions of your house. If working with reused materials, the step on the 10-step program about finding materials needs to get started along with step 1.

22-23 February 2024

Third building weekend

The 3d building weekend was a big thing for everyone, especially for me. Raising the walls meant the real test as to whether my alternative construction would really work. I had also promised a roof-raising party Sunday afternoon and said that the participants could invite anyone they wanted. I had also invited my own family, and some members from Bobini. In other words, we had a big deadline on Sunday.

The check-in showed a mixture of emotions - excited, tired, good, stressed, confused. One person shared that she just found out she was pregnant, why she felt extra fragile and tired, and very confused about the whole tiny-house-construction idea, as there was suddenly so little time left to do it. Everyone was very supportive throughout the weekend, and her openness allowed us all to be there for her.
Before raising the walls, we had to screw the facade on the front walls, and finish the backside wall which only had half the studs attached, and no insulation or facade yet. I had therefore planned to go to the workshop the Wednesday before to work a bit, perhaps cut all the insulation or try to attach a piece of facade to see if it worked. Weeks of bad sleep (because of my toddler) however reached its peak, and didn't mix well with the strain of preparing for the weekend. I felt completely overwhelmed and had to spend a few days in bed. As I couldn't go before, I was super stressed during the weekend. So much needed to be done. On top of all, a lot of people were missing: 3 people day 1 (mostly due to sickness) and 5 people away day 2. I absolutely couldn't enjoy it. I wanted to be chill and let people stand around and talk or take their time, but another part of me just wanted to rush them on. When people told me "it's not the end of the world, maybe we can just postpone the party?" I felt like it would definitely be the end of the world. I joined in the construction all weekend, and me and the carpenter built together much of the time when no one else needed help. It's funny to see how much faster we, with a bit of experience, are than the rest! .I'm talking at least twice the speed.

The first morning went really slow, but after lunch it was like people just sped up, felt like getting the walls up after all. The work was the same as last weekend, attaching the studs with screws from below and cutting styrofoam to fit in between (still most often making it too wide so we had to cut it again). What was new was attaching the facade. It was tricker than I thought to fit it exactly over the interior plywood. The styrofoam had been placed between the studs but wasn't cut yet, so it was still sticking out, making it difficult to see if the edges of the plywood were above each other. As the jigs in them to hold the roof studs were cut simultaneously, it was quite important that they were exactly aligned, should the roof studs fit. We did our best, cutting the styrofoam somewhat along the line first, and then also in the jigs. But upon trying to insert the roof joists it turned out that almost all holes were too small, and that we didn't succeed in attaching the facade completely correctly anywhere. But, since the holes were too small anyway, it wasn't a big issue to fix the un-alignement, we just cut a wider hole in a direction that compensated the angle. But of course it took us many more hours!

In the end I had to put a deadline; at 13.30, we had to stop fixing jigs, and instead start raising the walls for the last 1.5 hours. We managed to fix all but a few jigs. The whole thing about raising the walls was scary and intense. We started with the back wall, which was in one big piece (lying on the floor ready to be raised). We put glue on the edge of the floor, then lifted the wall 90 degrees into place. We held it in place as best we could, some people standing on the outside and some people on the floor. We screwed it on from the outside, and then

diagonally from the inside. We attached diagonal lashes from the inside towards the floor to stabilize it. I almost fainted when we raised it! Got all dizzy and had to sit down. All the stress had worn me down, and it was just so much to take in. But we had to get going. The second wall was in two halves. It was more difficult, as we had to start with one half (easy), and then attach the second piece to the first piece and to the floor (difficult). We tried to stabilize it by inserting the roof joists between the two walls. It seemed like the first wall we put up was perhaps leaning a little bit inwards, forcing the second wall in the same direction. We had to use ropes and all our power to move it somewhat into position. It also seemed the floor was bending a little bit like a smiley, being lower in the middle and higher at the ends. No doubt because of the uneven supports we had underneath (although I didn't think of that until afterwards). 10 minutes before the doors to the party would open, we just had to accept how it ended up (just a few millimeters angled inwards, and perhaps not completely 90 degrees to the floor). It was a bad thing that we were in such a rush, that we had the drying glue rushing us on, and that we were only 5 participants present. There wasn't time to be sure about angles or doing it perfectly, which might cost us extra work later on. It was also extra hard to do it with the whole wall being so bendable.

Check-out

People felt like they were generally more secure in building this time. After an initial confusion and slow start the first day, they remembered how to build and got going. Someone said if it felt like "a receipt" that they had actually learnt something. They again appreciated working on the same task for all of them. Many were tired and liked the repetitiveness of the first day. The end of the second day people shared that raising the walls had been nervous but very fun and rewarding. They loved the collective problem solving going on while we were raising the walls. In order to get them straight we tried straps, bodyforce, hammering etc. One person thought it was the most fun weekend so far. There were also a few issues that were brought up during the check-out. One being the workshop being a bit too cramped and the risk of safety of working on ladders instead of a rack. One participant with the pronoun "hen"/"they" felt like we had been joking too much about typical guy/girl behaviour, which put the person in a weird position, not identifying with either. They perhaps didn't bring it up in the best manner, calling it "kindergarden behaviour" and being a bit derogatory. We however of course all promised to refrain from it. Another participant came to me privately and said he was upset and needed to talk. It was about a situation where another participant had screwed a screw at an angle through a stud, so that it poked out the other side. He saw it and said we needed to take it out. I said no need, it doesn't hurt anyone where it is. He felt like that was irresponsible as someone could indeed get hurt, and perhaps get an infection and spend 2 weeks at the hospital. I couldn't relate to the seriousness of the situation but told him to take the screw out if he wanted to. After talking, we understood each other's standpoints. While we were at it, I also saw the chance to bring up some more things I've been getting annoyed with with him too, as he repetitively throughout the weekends does something else than what I have instructed, and also goes around telling other groups whom I have previously instructed to do something else. He is very focused on detail precision, which makes his alternative solutions way too slow in the context of house building. He affirmed that he felt like he had the right to come with a lot of input into how things were made as he's been working in a workshop for many years (with more detail-oriented work), but understood and would try to change.

After the weekend I was completely wasted, tired from all the stress and hard work and the two minor conflicts. I felt ashamed about not having respected the non-binary person enough, but feel a bit stressed as to whether I will remember to "act correctly" in the future. In a way it felt a bit more cramped, like I wouldn't be able to relax as much in the upcoming weekends, afraid to do something wrong or have to handle another situation with the detail-oriented participant. I guess something similar was inevitable now that we're getting to know each other a bit more and friction occurs. I'm happy we have the check-in/check-outs to air it.

26 February 2024

Fourth online lecture: The 10 steps

After raising the walls, it was time to move into the second phase of the course. I've been thinking that the first lectures as well as the first building weekends would give the participants a good foundation and basic understanding for what is possible to build before starting them on their own design journeys. But it was now time to let them begin.

The 10-step program was originally made by Bobini, but I further developed it during the course last year (the original one was difficult to work with and a bit repetitive) (Appendix 5a). It's largely based on how I developed my own house, why it made sense to show them my process while explaining about the 10 steps, and could simultaneously function as inspiration. It starts with defining one's needs and to find reference projects. I spent the most time explaining these steps, because I find it the most important of all. Downsizing is such an interesting journey of getting to know oneself, and one solution definitely doesn't fit all. It is very important that the participants know what they individually want and need, and make sure those needs are met in the limited space of a tiny house. Not spending enough time in this step could make the whole house unusable. That's why I gave the participants a homework to make a list of their needs as well as to bring some reference projects for the next weekend, where we would move into step 3; sketching and drawing.

As I held a similar workshop on the course last year, I tried to remedy what could have been done better (appendix 5a). That time, they didn't write the lists until at the workshop, which took unnecessary weekend time and made the lists rather underdeveloped. I've been attending a course on AI lately, where I got inspired to see if it could be used to aid their work. I wrote

a prompt for ChatGPT that I suggested they used if they thought it was difficult to get started or to sort through their wants. I tried it several times before and was very happy about the results. It was formulated as follows:

> "I am taking a course in building tiny houses and am now going to start planning my own. I need to make a list of things I want (5-10 things) and things I want to avoid (1-3 things). Can you ask me 10 relevant questions, one by one, and then create such a list?"'

I also gave tips on how to correct what didn't feel right and how to get further help with ChatGPT. Everyone was quite absorbed during the lecture as I explained it and showed how it could work by doing it live (perhaps because many of them weren't used to using AI at all). I however feel like I could prepare it a little bit better next time, and allow it to take just a little bit more time, so that they really understand its potential (which I think it has!).

Going through the 10 steps, there were not a lot of questions. I guess it wasn't that much information to understand, just to listen and nod and hopefully be inspired. A lot of it was also "we'll get back to this later on in the course" (such as sketching, budget calculations, SketchUp...). It was the first lecture where we finished a few minutes before time. As usual, I recorded the lecture and wrote everyone a message on WhatsApp that I had uploaded to the drive afterwards.

26 February 2024

Fifth online lecture: Laws and rules

The much asked for lecture about laws and rules finally approached. 3 people were away, but they confirmed as usual that they will watch the lecture afterwards. As everyone joined the WhatsApp chat in the beginning of the course, that's where all communication happens now, which is very handy. I decided to start the day by asking them about their homework, as I assumed there would be many questions about the laws at the end of the lecture. I inquired what they wanted to build in order to divide them into groups for next weekend's design workshop, and everyone explained briefly for like half a minute. The 3 who could not attend the lecture wrote it to me on WhatsApp. Everyone but one wanted to design a full-time residence. About half wanted to build lightweight. Everyone but one wanted a loft. In the end I felt like the most logical division for the workshop was a "small/lightweight"-group and a "big/heavy"-group.

It was quite a fun lecture to hold. Laws and rules is something I know quite well, and feel comfortable explaining without too much notes. People were asking questions as soon as they thought of something, which I think was good to clarify as you went along. The handbook worked great. Only talking about these questions would have been very difficult. It also makes the participants relaxed so they know they don't have to take notes like crazy. But that also makes it clear why it's so important to not leave anything out when creating the handbook. They should be able to relax with the fact that all the information is available there when they need it.

They wanted to know more about what would happen if you don't follow the rules. Prescription time for illegal construction (10 years) and fees if you're caught before that were two topics (can be found in a list from the municipality, but is in the case of Attefallshus lower than the fee for gaining the permit) (but experience from people within Bobini tells me that the municipality never intervenes with an illegally places tiny house unless a neighbor complain, and that they have only asks to move the house within a penalty). They also asked about play huts, glass houses, tents, fences etc. They were surprised that everything standing still needs a permit, even though it has wheels or is see-through. What I couldn't reply were questions about camping sites, was that a possible solution for tiny house villages? I've tried to check this up before, but the law is very shady on the subject. A few of them felt very confused, like this was far from what they usually relate to, and that they needed time for it to sink in. But no one felt like it was way too little information, so I think I've managed to gather all the most important stuff.

15-16 March 2024

Fourth building weekend

The fourth building weekend we would hold the design workshops. I had decided to divide the group in two, and to have the others working. The first group (small/lightweight) would have their workshop Saturday afternoon, and the second group Sunday morning. This gives us the possibility to start and end together. I estimated that it would take about 2-3h per workshop. The idea was that whoever didn't have the workshop would be building together with the carpenter.

I would have a similar set-up as last year (see appendix 4a), using the same cut-outs of furniture that we used that time. I also needed pens and papers. What was updated since then was first of all the longer preparation time that I had given them by presenting the homework 3 weeks before. Last year the thing about working to scale was also a big difficulty to them. I therefore first thought of printing some 1:20 rulers in the laser cutter at school, and perhaps also a few readymade floors in standard sizes (most people want a tiny house that is 3,1 wide and 6-8 m long). With the 75%-critique coming up in school the Monday after the building weekend, I however found all my time went to preparing for that, so I instead prepared a way to explain to them how to calculate the scale with normal rulers. The upcoming 75%-crit also made me not even consider going out to the workshop before the weekend to prepare the workshop space, and also made me not able to plan what to build during the weekend very well, other than wanting to attach the interior roof and do the roof insulation, and to start the repainting the window and door.

The check-in showed a range of emotions now common the first day of the weekend - someone is happy and excited, someone tired. There is a general looking forward to the workshop. There were also a

lot of other positives shared, someone having a very rough time personally, but feeling it like a blessing to come to the building weekends and get hugs and get to talk to kind people. One participant agrees that they feel welcome and like we have created a very good culture. Someone says we're "like a small family" where everyone dares to open up. Another one agrees that they "can be themselves" here. That's just amazing.

Starting building, we realised that the walls were indeed not completely 90 degrees to the floor, but both leaning a little bit toward the wall with the door. The result is that the roof joists get a bit angled. There is also some issue with the wall sometimes filling out the jig in the roof joists, but sometimes being squeezed so that a gap is created. This would be problematic when attaching the interior plywood. The first day therefore goes to attempts at straightening the walls and correctly securing it to the roof joists with screws. It's obvious that the very thin building materials make the whole construction so soft and bendable it is difficult to make straight. We didn't see it at the time, but the second day when we started attaching the interior roof, it was clear that our attempts to straighten the wall had made it quite uneven, bending slightly at the top but not at the bottom. It's not visible by the naked eye, but makes attaching the roof more difficult. We have to cut every sheet of plywood into a rhombus instead of a square. It's not by a lot, but 1-4 cm on each side. We should have been more careful at doing it right from the beginning when raising the walls! With the many issues arising, it's difficult for me to focus on the workshop. I wanted to spend the morning preparing in a calm manner, but couldn't help but engage in the building and in the end only had 30 mins to set up the workshop.

<u>The design workshop</u>

We sit in one of the half-finished tiny houses on site around a long table with chairs on either side. The workshop lasted about 2 hours (where the participant were free to stay and sketch on in the end if they wanted to), and started with me stating what we would do:

1. Go through the lists and reference projects together
2. Do quick hand-sketches of ideas of floor plans
3. Build floor plans to scale with cut-out furniture
4. Receive feedback

Going through the lists took about 30 minutes for the first group. The second group (with big houses) took 50 minutes, and had a lot more ideas and wishes. It felt good giving it time, as they were inspiring each other and also put some order in their own ideas when explaining them to someone else. The lists were great, much better than the year before, which makes me think having it as homework helped. They were perhaps even too long, or with many wishes contradicting each other. No one had used Chat-GPT, perhaps because they already had such clear ideas of what they wanted to build. Here are some examples of their wishes:

<u>Person 1:</u>

- Getaway/temporary housing
- Mobile - able to drive 80 km/h
- Fireplace as the heart of the house
- Lightweight, easy to move
- Many and big windows
- Easy to clean
- No complicated system solutions
- References: Minimalistic wooden interior with black details.

<u>Person 2:</u>

- 3x6 m (has already ordered the trailer), "efterfordon" (30km/h)
- Full-time habitation
- Built in artistic atelier - big, open room with roof window
- Storage in unexpected places - f.x. under the floor
- Off-grid with possibility for on-grid
- Need two exits
- Small kitchen
- Not national romantic style

<u>Person 3:</u>

- Let reused materials decide the aesthetics
- Creative exterior that can look however
- Very light with windows in different levels
- A double glass door to the exterior
- Minimal amount of furniture
- A lot of off angles in the interior
- Kitchen hidden away from living room
- A loft that can become dark for sleeping
- Possibility to walk on the roof
- On-grid

We then moved into the sketching phase. That step worked great last year, with everyone sketching freehand and making several iterations. This year, it was difficult. People seemed hesitant about how to do it, getting too detailed too soon or only erasing the lines of their original drawing instead of making many small drawings like I instructed them to. Perhaps it was because they already had some ideas. I guess the earlier you are in the process the more it makes sense, but as some were practically done with their initial idea before the workshop it made more sense for them to make it to scale from the start.

Some had difficulty focusing. They were great at spitting out ideas, sometimes completely contradictory but all filling them with excitement. Getting them down on paper was another story. Suddenly you couldn't both have a greenhouse on the roof, and a sleeping loft. While some worked around the challenges, a few simply lost interest and started talking, yawning or climbing up to the sleeping loft for a break. The ones working on their plans did surely develop. I went around, asking how people were doing and giving feedback to things they struggled with. A few of them wanted the bathroom and the kitchen beside each other on one side of their houses, but it proved to be a bit tight. We worked around it by angling the door to the bathroom 45 degrees or turning the bath-tub. Last year, the most common thing I had corrected was narrow passages. This time, I don't know how many times I asked "and where are you going to eat?" - at least half of them had failed to consider where to put a table and chairs (or whatever you use for eating). Another recurring thing was to have forgotten a place to put your coat and shoes inside the door. Many also had the idea that they would be able to have two floors with standing height, and were disappointed to understand they wouldn't be able to stand on the sleeping loft. One of the participants has a bachelor in architecture, and it was clear to see how clever that floor plan was to many of the others. There, the issues were more a consequence of lack of experience of what it's like to be in a tiny house, what feels cramped and what makes a room airy. We talked about how real-life mockups are a good idea with parts of one's plan that one feels unsure of.

<u>Sunday</u>

Coming back from the workshop Sunday morning I had expected the work to have developed a lot more than it had. Everything looked almost the same as when I last left. It seemed like the participant who often disregards my instructions and is very detail oriented had taken on the task of attaching the first plywood sheet of the interior roof. 3 hours into the day, it still wasn't up, making everyone else wait, as no one could start on the insulation or on the rest of the roof. It's an issue I will have to bring up with the participant before next week, or we will fall too much behind in schedule. I also feel bad for the other participants who get bored out of being held back from working. I will also attempt to avoid putting that person at jobs that need to be done before someone else can do their job. Being behind in schedule made me stressed, as putting the roof up was not a task I would be able to do by myself in between the weekends. I skipped the fika

and worked as fast as I could, taking over from the slow-working participant. The carpenter started on the other side of the roof, and soon others could start cutting and attaching glass fiber insulation to the roof from the outside. In the end, we didn't finish. I wanted to push it, and lost track of time. Suddenly, some people needed to go to the bus. I wanted to put just one more sheet up, why I forgot the check-out. Suddenly most people had left without having the chance to give feedback. I felt pretty bad about it. The people who attended the workshop the first day gave great feedback. They were happy and inspired. It would have been great to hear from the other group too, as they, with their bigger floor plans and more complicated ideas, did struggle a lot more.

Sunday evening, I didn't really feel good about the whole thing. I felt bad about having forgotten the check-out. I wrote a small check-out of my own in the group chat on WhatsApp, and asked how the others had been. No one replied though, making me feel even worse. I also felt bad about having called the person with the pronoun "they" for "her" once and getting corrected. I feel embarrassed that I can't just do it right every time. But it is also really stressing me out that it's so easy to offend someone unintentionally. The person didn't attend Saturday, and it really felt like the air was easier to breathe that day. I also felt bad about the fact that 3 people, who had their workshop Sunday, didn't attend Saturday. They all had their reasons, but still it gives me the feeling that people are using the course for their own good and not for the common good. I also felt annoyed that construction was going so slow. It felt like people spent more time drinking coffee and talking than building, which just means that nothing happens. Even though one person was indeed slowing the rest down, they could have painted the window or done something else useful. The 3rd building weekend we ran into a lot of issues with the jigs being too small and not aligned, and half the group being sick. This time we had the workshop and was otherwise just working really slow. This means that we are about one whole weekend behind in my initial schedule. Meaning we won't have time to do the interior or the system solutions, which of course would feel like such a pity. I thought a lot about how to make them more focused, but in my unhappy state I didn't come up with any good solutions. I didn't feel like trying harder when they were not giving the same amount of engagement back.

17 March - 4 April 2024

Thoughts and preparations

The sour mood from the last building weekend gave me food for thought. My work up until this point has been very focused on the assumption that self-builders have a lot to give, if given the possibility. Being disappointed started questioning that assumption, or at least questioning the span of their possibility to have a positive influence and achieve something. Self-builders no doubt have a lot of ideas, wild and free of convictions. That in itself is worth a lot, the ability to reimagine something, unbound by dogmas and rules, in times that demand drastic change. But the ideas they bring forth are often contradictory or irrational. Many often have an issue following through on their thoughts, not able to go from idea to drawing or making necessary decisions to move forward. Some quickly lose interest, some can't organise their time, while others get caught in talking, or overthinking, or something else that halts progress. Can they really drive a revolution forward?

In a way, I see the role of the architect and the carpenter clearer - the profits of having professionals. Andreas is great at building. He is simply faster and better at it than the rest of us. He knows materials intuitively, and has used so many tools that he always knows what is the best one for the task. I excel in organisational skills and planning, having the overall perspective and making sure everything gets done in a logical order. I'm also good at developing downsized floor plans and at figuring out new constructional solutions, and I can mediate those in drawings and text. The difference when me and Andreas are working together, compared to when two participants work together, is extreme. We're often at least twice as fast. And that, of course, has to do with our professionalism. We have experience of construction, of different tools, of problem solving. Since we've built things before, we know that unless you keep up the good work, nothing gets done. "Extreme professionalism" within the field of architecture - when unrelated professionals completely take over every step of the process of planning and building homes - does indeed have its issues. But the other extreme, leaving the process to self-builders alone, can prove problematic too. I think I've been partially blind to it, thinking that I was a mere self-builder when designing and building my own house, and imagining that anyone could do the same. But I missed the fact that I had a bachelor in architecture, and that I have a mind that is really well suited for planning and executing such a project (hence studying to become an architect). The design workshop and the progression of the course has reminded me that everyone is not. In a way, I have moved from regarding myself as a self-builder, to realising that I'm an architect. I have also started to change my view on professionals in regards to the self-building movement. Moving from an initial view of professionals as unnecessary and backward, to realising that we can provide much needed guidance and support. While some self-builders are capable of managing to design and build a house, a great many of them struggle. I think that sharing the handbook and the 10-step-program will help, but that it would mainly aid those that are already well structured and hard working. Many need even more support, both in the design, planning and construction phace. For us to work together, professionals such as architects and carpenters however need to change the way they usually work. We need to move from "doing" to "supporting others to do". Or, from "deciding" to "support others to arrive at the best decisions". We need to learn how to listen and how to enhance someone else's idea, instead of our own. We need to know the rules and the standards, but be ready to set them aside to try something new. In the words of Bornemark (2018), many of the issues with standard construction

are derived from architects being stuck in a Ratio-based approach to architecture, but self-builders can with their strong Intellectus come up with new ideas and push architects to reimagine housing. In that way, self-builders and architects could work in synergy.

Realising that I can't expect the same from my participants as I can from professionals made me look at our slow phace in a new light. It encouraged me to take a professional role and take the responsibility for making sure we finish the house. This means spending a lot of days in the workshop trying to catch up. It also means stepping up in terms of clear organisation and inspiration. Providing them with the possibility and the will to participate is all I can do. For next weekend, I will have done all in my power to inspire them to be as efficient as possible: Bring back the to-do-list (that I for some reason stopped doing). Keep the schedule and clearly announce times for changing groups. Be sure to hold the check-in/check-out. Clearly show what step we're on from the step-by-step-guide. Prepare all the materials in different piles for different groups. Having done all necessary tests (with paints and construction) so we don't have to spend time making decisions during the weekends. Tell them we're behind, and just let them know that we won't do system and interior work unless we speed up just a little bit (without being pushy or accusatory - just try to inspire them to be a little bit more focused). I also need to be ready to work a lot in between.

I ended up spending about every third day in the workshop. First, I was there with my partner to put up the last sheets of plywood on the interior roof and insulate the whole roof from the exterior. Another day I came back alone and sanded + varnished the roof. I found a varnish (Le Tonkinois) that is so toxic-free it's even allowed to be used on toys that get chewed on! I also painted the door one layer (but didn't have time for the window). A week before the building weekend, my daughter broke her leg, so I had to be home with her for a week - absolutely not in line with my plans. I asked in the group chat for the course if someone could help out, and was happy to hear 4 or them volunteered on different days. That sure took away the last ounces of grumpiness from me! The third time I thus went out with one of the participants (and my daughter). The participant sanded + varnished the roof a second time, while I made some tests with the paints to know how to mix it and in how many layers we would apply on the interior and exterior walls.

I also did some tests regarding how to waterproof the edge of the "frame" surrounding the roof. My initial idea was to cover it with epoxy+fiberglass (a solution that I've used on my wooden boat, so I know it would be very waterproof, but rather expensive and also toxic). I had been looking for alternatives, and when in the construction warehouse one day, I found an interesting looking tape for repairing roofs. I wasn't sure though, and didn't open it at first. I talked to my tutor about a solution, and he mentioned that same tape. After testing, it worked perfectly. That means we can completely leave the idea with epoxy, and instead use the bitumen tape around the upper edge of the frame. That provides both water protection at the most sensitive area, and it connects the "frame" with the roof in a waterproof manner.

A few days before the workshop, I found a babysitter and could spend a day in the workshop. I varnished the roof a third and final time and prepared the to-do-list and the different groups. I also bought all the materials for the upcoming weekend. I had planned to use 4 mm plywood for the exterior roof (below the roofing felt), but I started considering the possibility to use oil impregnated board instead. I did some tests and thought it might work. The carpenter thought it was a big risk - perhaps the oil in the board would lessen the ability for the bitumen glue to fasten the roofing felt.

Fate decided for me, as the store was out of plywood. The advantage of the board is that it's half the price, but time will tell if it's a mistake or not to change.

Working every third day was great. I had so many decisions to make regarding constructional solutions, colors and styles, and sitting at home thinking about it only made me stressed. Every time I came to the workshop and could instead DO, the stress eased and the solutions appeared. It also gave me a welcome refuge from writing, as my wrists and eyes easily hurt after a few days in a row of computer work. It gave me a hint of how I'd love to work in the future, and how I imagine most people would feel good from doing - mixing sitting with moving and thinking with doing throughout the workweek.

26 March 2024

Sixth online lecture: SketchUp 1

As a follow-up on the design workshop I held an online lecture in the 3D-modelling tool SketchUp. I choose it because it is free and relatively uncomplicated. I had made a guide with all the basic commands and followed that as I showed them how the program worked. I however felt like they were unusually quiet, so after about 20 minutes I stopped and was like "Do you follow...?". I got the feeling they found it very tricky and overwhelming. We started from the beginning again and I quickly built the house of one of the participants. I tried asking them continuously "...and how do we move this here?" "Which tool do you think is suitable now?". 2 of them were quite active in responding. Another one just said "I feel really old right now. I don't follow". It made me a bit hesitant. In the course I attended at Bobini last year, the SketchUp course was much asked for and much appreciated. This time, I'm not so sure. Perhaps it was simply too complicated to push into such a short amount of time (1h15min). Perhaps it would have been better to have it as an on-site build-along lecture (which of course I didn't have time for with this setup). I showed them what I had planned to do, but with the apparent difficulty they found with it I saved some of the more complicated tools for next time.

5-6 April 2024

Fifth building weekend

Saturday

Despite my low mood from last building weekend, I was again looking forward to seeing everyone. I caught a cold 2 days before and didn't know if I'd be well on time. Saturday morning I was feeling very tired and still had a bit of a runny nose, but I decided to go anyway. It felt like it was too important, now that we're a bit behind in schedule, to be there and at least instruct in the beginning. Only 6 participants were present - 1 working, 2 sick (but one expected to come Sunday), and 1 who had to stay home because of "family issues". It of course initially stressed me a bit as I was hoping to get a lot done during the weekend to catch up, but I was generally calmer than normal. Hakuna matata. During the check-in, one participant told us she had lost her apartment and instead bought a campervan to live in until September. She had another month to refurbish it, and saw it as great practice before building her tiny house (She said she was able to use the 10 step-program for that project too!). But she was happy to attend the course to get out of the intensity of rebuilding it. 3 of the participants were really looking forward to painting. The last one was "angry at capitalism" but was happy to be here and to share it with the rest of us.

The plan for the weekend was primarily to get the interior walls painted and to prepare the roof for roofing felt the weekend after. Inside, it meant to use fillers in all the cracks and screw-holes and thereafter sand it (I initially planned to have trims over all the rows of screws but wanted to test if we could get the whole wall smooth instead). For paint we use linseed oil paint, mixed with 50% boiled linseed oil to create a more see through effect (according to tests I had performed the week before). Two people immediately felt drawn to that work, one who appeared to have studied to become a painter once, so she knew more than me about it - great! I left them mostly to themselves, checking in every now and then to see the progression. The holes really became almost invisible, and the preparatory work got done the first day.

I put my carpenter in charge of preparing the roof. I had been in the workshop to insulate the parts of the roof that we didn't have time to insulate last time, but apparently I had forgotten the top of the house, so one group got to start with that. We ran out of glass fiber insulation (both what I acquired reused and what I had bought new), but luckily we found some leftover pieces on top of a shelf in the workshop. They were only 70 mm thick, but we parted them and used many thinner layers to the required thickness (120 mm). All insulation also needed to be stuffed in so that nothing went over the edge. The next step was rolling out and attaching the wind barrier. It's the same we use below the trailer, a lightweight roll wide enough to cover the whole width of the house. It's unusual to use on roofs, but suitable for the task as it stops drops of water from entering, but allows moisture from inside to escape. We cut 10 m of the roll, rolled it up from both sides towards the middle, attached the "double-roll" on top of the house, and let it fall down to both sides. We roughly attached it with staplers. The windbreaker was further attached by the next step - attaching the laths for the air gap. They run along the roof joists, allowing air to circulate from side to side. I had initially thought of making them from 21 mm plywood, but decided to buy wooden laths instead for the sake of simplicity (I have during the course of the construction realised that using plywood as studs is in many ways problematic - it is difficult to cut it into studs without a big and expensive machine, and it is difficult to screw into it from the side, the layering sometimes just making the screw spin). I bought 22x70 mm wood. Most of them we split in two table circle saw, making 2x22x35 mm. I however decided to keep the whole width (70 mm) where the sheets that would cover the roof would meet. We put a table on each side of the house to be able to reach further up. The top of the roof was only accessible from high ladders placed on either side of the house. How much easier it would have been if we had a rack to move around! With a higher budget and a bigger workshop, that would be a priority, also for the sake of safety. The air gap was finished sometimes early afternoon Saturday, and we moved on to attaching the sheets.

We started low on each side and moved upward. The house was designed so that full sheets would fit perfectly - no need for cutting. But as became obvious during the work with the interior roof, the soft walls had caused the edge of the roof to bend a bit like a snake. That's why we had decided to use the 70 mm wide air gap where the sheets would meet, to allow for the warp. We attached the sheets with the nailgun. starting from the middle and working our way outward. The 3 mm board sure was wobbly, and I got really worried if I had made the right choice to switch from the plywood roof. Would it hold for any snow? The carpenter seemed calm enough about it at least. We managed to attach 3 boards before the end of the first working day.

Another fun detail is that we added a "time machine" - a message from now to whoever takes the house apart in the future. We wrote a small message on a piece of paper that we all signed and hid it in a plastic bag among the insulation on the roof.

During the check-out, people thought it had been fun shifting between different stations. A lot of them liked the preparatory painting job - using filler and sanding. They liked the repetition of the tasks of today, that you had time to get good at something before moving on. Many of them found that it was simply easier to work, they felt more flow. They couldn't really understand why but to me it's clear that it's because they are more confident and experienced. Hardly anyone calls for me anymore - they know the tools and they can also to a higher degree make good decisions without me. Someone likes that the progress starts getting so obvious - we almost have a finished house!

Sunday

The second morning, the person who was sick but thought he'd be able to come, messaged saying he still felt bad. Another one told us that she received an unplanned visit and wanted to stay at home. The person working had suddenly got sick and couldn't come. That left us with only 5 people. 2 of them started feeling bad towards lunch and had to go home, meaning we were only 3 participants present at the end of the day. It's pretty extreme. They all had legit reasons for not attending, but of course it affects the course a lot. I feel like the time set up for building the house would have been pretty correct had 10 participants been there every weekend, but had I known the attendance would be so low, I would have planned for a smaller house, added another weekend or allowed a few more to participate. The low health of many of the participants is something to consider when thinking about their possibility to build and to be part of driving change. As the research suggests, many of those choosing a tiny house lifestyle do so because they have been through some kind of life crisis. In my experience from meeting self-builders in this course and the course I attended, the main reason is a previous burnout. But there are also other examples, such as diabetes, myalgia, worn out joints or depression. Either way, it is clear that it affects their ability to build. Many have had to leave early or have only been able to watch while others build on the previous weekends. Having been burnt out myself (perhaps being one of the reasons why I've been attracted to the tiny house lifestyle) I always show full consideration for anyone in need of a break. If anyone is sitting in the Fatboy, I bring them a blanket and tell them to stay put until they feel good. But I can also just state that it is making work progress a lot slower, and yes,

it's stressing me out.

With a lot of praise to the participants who stayed the whole day, we still got a lot done. The to-do-list was almost entirely done, meaning we attached all the boards on the roof and trimmed the edge, sanded the facade and painted the interior, attached insect-and rain protection along the edge of the roof joists on the facade and prepared the interior roof for treatment. As they did such a good job on their own, I had time to consider how to cut the "frame" on the facade around the edge of the roof. We had made a paper template on an earlier weekend, but I found it wasn't exact enough. Instead, I found it very precise, and much more easy, to just hold a sheet of plywood up against the facade and draw a line along the roof to get the right shape. What we could have finished, had we been more people, was to finish cutting and painting the frame, and to paint the doors/window again. Despite the low attendance, I felt pretty calm the whole weekend, and left in a happy and optimistic mood. I also experienced less stress because I had no slips in using the non-binary pronoun the whole weekend. The three people attending the check-out (only younger girls) were happy. They liked how small the group had been, like they dared to do more when the others weren't around. I have also never seen them be so hard-working and focused. One of them said "I know I've said it before, but this really was the most fun weekend so far!".

9 April 2024

Seventh online lecture: SketchUp 2 and budget calculations

For the second Sketchup lecture, only 4 people attended. 3 others wrote in the chat they couldn't attend, but the rest were simply missing. It confirmed that perhaps ShetchUp was too difficult for them. I was going to show them some more complicated tools, but decided not to. Talking to so few people was rather discouraging, especially as the ones attending were the quiet kind. I showed them a project I've previously built for a client, and how it was possible to export images and to export drawings to scale (as I want them to be able to make their own building permit application for Attefallshus). I then showed how to add materials to surfaces. We then moved over to the Excel-sheet I had prepared for budget calculations. I showed them the calculation for the house we make in the course, and how they could make their own using the dimensions and numbers from SketchUp. As I didn't want to go into more difficult tools, and they weren't asking any questions, I finished after 45 minutes. Just after closing the program, I remembered the reason I had shown them how to add materials and how to do budget calculation in the same lecture - the ability to see the area of a certain material which can be used in the budget calculations. I started Zoom again (alone) and showed them that last trick, and then uploaded both videos to our common drive. But, my hopes of them managing a SketchUp model and a budget calculation of their projects is kind of low at this point.

A week later, I was talking to the teacher of a building course at another folkhögskola, and he gave me the tip to use ChatGPT for dimensioning. Not that my participants seemed that interested last time I introduced ChatGPT, but it was still worth exploring. I'll make some tests on how well it works and if it does, perhaps it's a good way to get a general sense of what materials to buy and what the cost will be for self-builders who don't have time to learn SketchUp and Excel.

8-25 April 2024

8-25 April: Thoughts and preparations

Looking at what we needed to accomplish in the two weekends ahead, I realised I needed to step up the in-between construction if we were to have any chance of making it. I also had to start prioritizing - "perhaps we don't need to build the bed, but in order to install the water we do need the kitchen and bathroom." and "Perhaps solar cells aren't necessary, but it's not a working house without some kind of electrical system..." I ended up with a very long list of everything I deemed necessary to give the participants what I promised and to feel like we did somewhat finish the house. At the end of the list are things that aren't strictly necessary but that we can do if we find the time. I added all the things to the to-do-list in the workshop, to clarify both for me and for the participants what needs to be done (It became a very long list!).

Simultaneously, time was running out to finish the rest of the thesis, with a lot of writing left to be done. The first week after the building weekend, I tried to be in the workshop every second day or so and squeeze in some writing whenever I could. It really didn't work, I just felt split and stressed, not being able to fully focus on anything. Instead, I decided to spend full-time and do absolutely everything I could in terms of construction- and course-preparatory work, in order to leave me with some continuous writing time after that. I usually only make the decisions and buy the materials needed for the upcoming building weekend, but this time I needed to plan for two weekends. It was really intense holding so much information in my head at once. A lot of tricky things were left - how to install the lights required to be able to tow the trailer, what products to use for the water system and how to design the kitchen drawers, for example. The interior of the house was a bit underdeveloped as I

hoped some of the participants would want to design it. Now, with us being behind in the schedule, we don't have time for it. I drove back and forth between different stores almost every morning trying to find the right products, frantically googling and comparing in between. I had high hopes for a second-hand shop for reused boat parts, but could only find the foot pedal for the water system. I however also found the electric central and the sink for the bathroom second-hand by asking around at the workshop - great! Had I been smart, I would have bought these things even before the course started. I always advocate "think first, do after", but there I was finding myself having to think a lot when actually only having time to do. It's the kind of stuff that really wears me out. While it was really positive for my mental and physical health to spend time in the workshop between the last two building weekends, this time it was draining. The main reason was that it was too much - every day instead of every third. I was also so rushed, always feeling like I didn't have time to do enough, and actually not feeling like I had any time but that I should instead be writing. I worked like a maniac and pushed myself a bit harder than I otherwise would because I knew the Easter holiday was coming up with a chance to rest.

Some days I had help from participants or my partner. Most days no one could help so I was there alone. The things that got done during the 7 days I spent in the workshop: Planned the electrical and plumbing work and purchased materials. Purchased all of the materials needed for the rest of the constructional work (alone this time - strained my hip when lifting the heavy plywood sheets and rolls of roofing felt). The walls got a last layer of paint. I put plywood sheets on the floor in order to achieve the same look as the roof, and they got varnished 3 times. I cut out the remainder of the frame, sanded the edges and painted it with 2 layers of linseed oil paint. A participant put the same color on the edges of the facade where the frame would cover and hinder us from applying paint later on. We finished the trimming and fastening of the boards on the roof. We attached the frame to the facade and sealed the edge with bitumen putty on one side (then we ran out of putty).

I have now learnt the hard way that it's the painting that takes the most time in-between building weekends. I therefore painted 3 sheets of plywood in the same manner as the interior walls, so that they could be cut out and be finished right away. 2 would be used to the bathroom walls, and one to the front of the kitchen- and bathroom counter. For the same reason, I cut and varnished the kitchen- and bathroom counter tops. I also prepared some of the trims that need to be put up next building weekend.

My right hand had 3 watery blisters from all the painting. During Easter I was like a sack of potatoes, having to sleep for a while during daytime every day. By the end of the 5 days holiday, I was somewhat back on track. Having prepared everything, from planning to solutions to shopping, I could spend a week writing before the next building weekend. I wish I hadn't put myself in a situation where I had to push myself like that, but the slowness of the participants during building weekends and my daughter breaking a leg were things I couldn't have planned for. Let's hope this push didn't drain me, but that I'll have energy for the last month of the project.

26-27 April 2024

Sixth building weekend

I still felt the fatigue during the building weekend, but I managed. In my tired state, I however forgot to save the file in which I took notes, so what I write is from memory (and therefore a bit shorter than normal).

Again, only 6 participants present. One was working, 2 had an "emergency family situation" and the fourth was sick. I'm starting to get used to it, but it still stresses me out when I have hopes to accomplish more but then can not. The 6'th building weekend was all about finishing the roof and starting on the interior (the things that I found would be most important). I gave the carpenter the responsibility for the roof. It felt great not having to deal with it, because it's hard but also because I find it boring. I was also needed for the interior, as we continuously had to design the kitchen (I just had vague ideas and the width/height/depth of it) and figure out how to build the bent part of the toilet wall. We ended up attaching paper to the wall of the (to-be) toilet and cut it along the bent edge of the roof. We then transferred the shape to two sheets of plywood. On one of the sheets we attached split laths as framing (a 22x45 latch slip in two gives 2x22x22mm). We glued it and nailed it from below in the same manner as when we built the walls of the house.

We started from the left by attaching the kitchen. It's built as a frame with laths (22x45mm wood) and with a double sheet of 7 mm varnished plywood on top. For the front, we used leftover pieces from when we cut out the walls that I had painted white already before. After putting up the kitchen, we attached the bathroom wall. At first, only the sheet facing the kitchen was put up, as it could then be attached to the floor, wall and roof through its interior laths. We then put insulation in between the laths, and after that attached the sheet facing the inside of the toilet. Finally, we put up the frame for the bathroom counter.

We ran into some problems with the roof. Since the walls are a bit skewed, of course it's difficult to attach a straight roll of roofing felt. It was also hard to work on ladders (again - should have had a building rack for better balance!), especially when we had to lift or adjust the felt. Another problem is the fact that the roof turns inward in the front and the back on the trailer, leaving the roofing felt falling off unless properly fastened. We put a lot of asphalt adhesive and hoped for the best. We also had to attach a metal edge at the bottom, both as a drip-edge and as a way to hold the felt in place. Time will tell if it works if it bulges out. I'm also a little bit worried about the absolute top of the roof, where it's in fact completely straight. I hope no water will gather. A greater incline would have been better for the water (but not for the interior roof-space). In case I have a problem in the future, I guess I'll have to fill it out with bitumen filler and increase the angle. Each roll of roofing felt is 1m wide. With the roof being 2,44 m wide, the last piece had to be split. Cutting the last roofing felt to fit was of course the most hard, as it had to compensate for the accumulated skewness of the walls. They managed to cut it, but time ran out in relation to attaching it. Instead, the carpenter and another participant went out a few days after to fasten it and finish the job.

The last thing we got done during the weekend was to prepare all the trims for the exterior, and some of those for the interior. As trims are super expensive, I decided to split a wooden stud into thin slices with the table circle saw. It was time consuming but had a great result. We then used the band sander to soften the edges, and then varnished or painted the trims depending on their future usage. I didn't know how handy the table circle saw was before, but now I imagine it could have been used more also earlier in the process. As we've had a lot of issues using plywood for studs, I think it would have been better

to just have sliced a wooden stud in two, or, even simpler, ordered wood of the right dimensions (not available in the common stores but available online).

7 May 2024

Ninth online lecture: Energy and system

There were 6 participants present at the last online lecture about energy and systems. I prepared the presentation the same afternoon. As always, I took a starting point in the handbook ("Hus som fungerar"/"Functional houses"), but just removed much of the text (gets messy on an online presentation). I discovered a mistake in the mathematical formula for the calculation of u-value. It just reminded me how important it is to get that book checked before spreading it - there are probably several other mistakes hidden in the text... Apart from going through the material in the handbook (Heating systems, ventilation, GWP, cold bridges, moisture, electricity, solar energy, water and sewage solutions) I added a few more things that I hoped would ease their future planning. First of all was to explain how to calculate the overall u-value for your house with the help of my Excel sheet used for budget calculations. I set it up so that the participants only need to add the dimensions of their house and the thickness of their insulation. Going through the presentation, I was proved that it was spot on, because before I had the chance to mention the Excel file, someone interrupted me and asked if there was a simpler way to calculate that. Luckily, I could reply, "Yes, I prepared this file for you, just fill some things in and you'll have the answer!". I also decided to add another chatGPT prompt for them. I felt in the last online lecture that perhaps it was too difficult or demanding too much work from them to do the budget calculation. They are "only" self-builders after all, and this is just a weekend course. I tested prompting with chatGPT before the lecture, with something like:
"I'm going to build a house and would like you to help me create a list of materials to bring to the store, and to do a preliminary budget calculation. My house is Xm long, Xm wide and Xm high. It has a roof of X degrees. It is going to be built using a wooden frame and insulated with X mm wood fiber insulation. It has a total window area of Xm2 and a door that is XxXm. I'm going to build it on a trailer that I also need to purchase. You don't need to include system solutions."

The list it provided me was good, but it lacked a few things So I told it "I think you missed a few things. Include eaves, gutters, triangular mouldings, drip edges, sealing strips, paint, and flooring (what I immediately found missing when seeing the proposed list), and update the list with those items". Later on I also asked it to include necessary tools. What I learnt was that it was great at estimating the amount of meters/sq.m of materials, but that you still need to be very attentive. It's a tool that could shorten the amount of time for preliminary calculations, which could be great for someone who is interested in building a tiny house but has no idea if they can afford it. I also know ChatGPT can help with giving an overview of the construction process. I've only tested using the "normal" ChatGPT, but there are several GPT's aimed at construction specifically (feeded with relevant data). It should never be blindly trusted, and it is of course only giving you standard solutions, but I think it's a great tool to get started for non-professionals. Last time I introduced ChatGPT, people seemed interested but no one used it. This time, they actually seemed more keen on trying it. Perhaps because it is a bit taunting to get started on the budget calculation. I will ask them next time if someone has tried it.

The lecture went well. It was fun. 2 participants had their camera on, which is always more nice than talking to black boxes. I went through the whole presentation without pause, as I've concluded that I perhaps took a few too many breaks in the first lectures. I however reminded them that they were welcome to interrupt, which they did sometimes. In the end we had a good discussion about composting toilets, and one participant who studied to become a solar panel installer added some information on that topic. Everyone was looking forward to the next building weekend, perhaps extra much now that they know what we will be installing in terms of system (if we work fast enough).

9 May 2024

Visit to my tiny house

As the 9'th "online lecture", I had planned to visit my tiny house for inspiration. When we had the design-workshop, everyone was so eager to come visit. Back then, I suggested bringing forward the visit, but nothing was decided. As the final week of the course was nearing, we had to find a date when everyone could attend. I posted a few alternatives on WhatsApp, and people got to do "thumbs up" or "thumbs down". Apparently, the day before the final weekend fitted people best. I spent a lot of time cleaning the house, and 5 participants arrived around 4 PM. They were very interested in sensing the volume and space. They were surprised how big it felt considering the mere 17 m^2. I also showed them the system's solution (ON-grid) and we talked about the construction. Apart from bringing inspiration and an experiential reference, it was fun seeing them outside of the workshop in their everyday clothes. Would I do it again, I think I would have had it earlier on in the course. I also think it would be better to have it on a weekend, such as going around by car to several tiny houses. Andreas offered to come see his house boat, but it would have required better organisation and planning.

28 April - 9 May 2024

Thoughts and preparations

Interior decoration is not my strong side. The inside of the house was just a sketch, I hadn't even looked at colors or details. Suddenly, everything had to fall into place at once. I always tell self-builders that preparation is key to not getting stressed during the actual project, and there I was, feeling stressed because of insufficient preparation. Only having two weeks before the final building weekend, and having to finish the booklet, did not help either. Of course my perfectionism didn't help either. While before having entertained the thought of skipping the sofa and the solar panel, my ambition got the better of me, and I saw a chance of "really" finishing it and making it feel like a proper house upon completion. But I needed some aid. I called my mom for help. We were supposed to just go to the workshop and decide on a fabric for the sofa, but none of the ones we brought the first time around really fitted. The roof is so intense it's hard to bring in new patterns. In the end, we had to go to the workshop 3 afternoons that week, each time bringing new fabrics. Thursday before the building weekend, we thought he had finally found the perfect fabric. Gold, pink and orange with big flowers - as a way to celebrate the intensity of the roof. We just went to the workshop to test it quickly - and of course it absolutely didn't work. We had at this point tested at least 15 different fabrics and colors. But right then, we realised it wouldn't work with anything remotely similar to the roof - we had to go in the other direction. We went to buy a blue color for the sofa cushions, and blue-green-white floral pillows. We bought it Thursday evening, and didn't even have time to test it in the workshop - it just had to work. My mom had 2 intense days of sowing from early morning to late.

I also had to have everything else ready for the last weekend. No more "ok, let's just bring it next time". There were so many small steps to be done. I had started on a lot of it the week before Easter, but details were missing. The water system required a tap (copper pipe+pipe bender), water hose, hose fasteners, water tanks, pool pump. The electrical system demanded the building central, a 16-23 amp cable (had to rebuild it ourselves), hole saw, cable clamps and enough cables to reach around the house. Since it's a vehicle, the light system for the trailer demanded portable backlight-and blinkers, flat flashlights as front light (because I couldn't muster connecting the electrical cables from the front lights to the back lights), cardboard fasteners for that, and then reflexes in 3 different colors. I also bought a solar panel to connect to the small portable power station I had purchased before, and LED-strips for lightning. And then of course all the material for the interior we were going to build - laths, plywood and screws. During my visits to figure out the textile, I put two layers of varnish on uncut plywood sheets so that we'd be able just to cut everything without having to paint after. Looking at the to-do-list, I decided to skip the interior of the bathroom, as waterproofing would take time (both to do and for the paint to dry). As I wanted a fold-out sofa, I needed a system to do that. I tried to google "simple construction pull out sofa" but came up short. So I just had to improvise. I had an idea, but trying it out in sketchup revealed several issues and took a lot of time. The design wasn't entirely finished before the building weekend. I'm pretty good at organizing things and keeping several things in my head at once, but this was extreme. It was all things I wasn't completely comfortable with either - electricity, water and interior - making it more time consuming. I was also nearing the deadline of my thesis booklet and still hadn't started on the discussion, meaning preparing everything was very hard and stressful work.

28 April - 9 May 2024

Seventh building weekend

The very last building weekend. I took a two day break before, so that I'd be able to enjoy it. We had a very long to-do-list left. I wasn't happy about being tired, and about the uncertainty of whether we'd manage to finish the house. I have at this point developed a little bit of bitterness about people not showing up at the building weekends. I was so clear in the application that this was an intensive course that demanded the participation of everyone every weekend, and that you shouldn't apply unless you knew you could take the time. I'm pretty good at managing my own time (because I'm so sensitive to stress that I have to always be in good time so I don't have to pressure myself). Giving up so much power to third-party self builders is of course a risk I took, and that has had its ups and downs. So, I didn't dare hope for too much, but if at least 7 showed up I did think we'd be able to make it. And so, I went into the weekend with relatively positive energy. I went there with the carpenter an hour earlier to set up different workstations and put all of the material in order.

<u>Saturday</u>

The first day, 4 people were there in the beginning, and 2 more joined after an hour. At the check-in everyone were a bit melancholic but also eager to finish up. As someone said "It's so cool to see things happen that you didn't think were possible at the beginning of the course". A few were well rested and eager, but most were tired from having been at a party, a movie evening or similar the day before. My head was also very slow (and I made a few mistakes in measuring etc. during the weekend). After the morning gymnastics I went through what we were going to do and people got to choose groups. We had to move from a nearly empty shell without

a window and door, to a finished house. I decided to prioritize the exterior the first day. Two people put trims and painted the facade, while one helped the carpenter with attaching the door and window. One group started on the toilet wall and another on the sofa. About an hour in, the carpenter called everyone to explain how they put the window in, and how you can bend metal from the window sill. He also explained how to measure the angle and length of the trims for the facade. It occupied everyone until lunch, which made me feel we got behind from the start.

In the afternoon, work carried on and the facade got all its trims on and got painted once. The sofa was well underway - I desperately wanted it finished since we'd made the cushions, so I helped that group out. It was super difficult to build the pull-out sofa I had designed, and I constantly had to refer to the sketchup model to get everything right (and still measured wrong once, but we managed to hide it). The two people responsible for the toilet wall+door were however progressing very slowly. I know a wall like that would take me perhaps 2h to build alone, so it took me by surprise that they were barely half way at the end of the first day. That definitely wasn't good in relation to keeping the time plan - that wall kind of had to be done by the first day, or we wouldn't be able to start on the table or the interior trims. It was the very careful participant who had taken responsibility for it. We had a bit of an argument over it, when at 3 o'clock I went by and saw that they had only partially cut the door opening out (leaving 5 cm in every end and in the middle). Apparently he had an idea that the wall would be too wobbly if he cut the whole thing, so he wanted to do it by hand after putting the wall up. It simply wasn't true, and wasn't effective. I told them to just cut it and try to move on a bit. He replied "Oh well, I guess all my ideas are totally useless" I replied "No, all your ideas are useless, some of them are great, but a lot of them are overly complicated and take way too much time.". They cut the opening as I suggested, but it didn't get even (the common issue when not cutting one whole straight line), which I won't be able to hide with trims later on (which of course annoys me a bit). He didn't mention anything during the check-out, but I said sorry to him and the other one, saying it just got me really stressed with the slow progress but that I didn't mean to be upset with them or to stress them on. I thought we were fine, but the rest of the weekend, he's been grumpy, saying things like "May I come with a suggestion? Or, is it just going to be ridiculed again?" Or, when I tell him how to do something, he says "Fine, yeah, you're the boss, let's just do it your way". He's the only participant acting like that, and I haven't found a good way of dealing with it. Whenever the others meet an issue they don't know how to deal with, they just ask me or the carpenter. The problem arises when a participant is constantly finding issues (where there are none) and then not asking, but trying to solve it by themselves in a non-carpenter-logic fashion. I know the participant knows how to handle a screwdriver and has a lot of workshop-experience, but I know he could have learned so much about what solutions and what mindset are good to have when building houses. But it felt like he went into the course not wanting to learn, but just to "do his thing" (and getting very grumpy when we try to teach him a better way).

As time was scarce but I still wanted them to get an idea of the system solutions, I showed them the portable power station and how to connect it with the portable solar panel. The carpenter showed them how to change a power connection from 16 to 32 amp (I learnt something too!). At the check-out, everyone was tired. Everyone felt slow today, a lot of things got complicated (like 3 frame screws cracking when getting screwed into the door, or the door opening being slightly screwed making the door bulge, or my mistake with the sofa). We decided to rest and come back with good energy the day after.

Saturday evening, I was tired but happy at first, but just before I went to bed I started feeling super stressed, with elevated heartbeats and fast breathing. It was mostly the fact that the bathroom wall wasn't done yet - meaning I had two groups who wouldn't be able to get started in the morning, meaning we wouldn't be able to finish on time, meaning I'd have to spend days in the workshop finishing things while I actually really needed to work on my booklet. I blamed myself for letting the careful participant take on a job that would hinder others from starting on other things in case he would work too slow. I also blamed myself for not intercepting more during the day when I noticed the slow progression. My head was also just racing with different solutions and measurements for everything we had to do. I went up and wrote down everything that had come to mind, but it still didn't help. I didn't fall asleep until 5 A.M, waking up at 6.30.

<u>Sunday</u>

With 1.5 h of sleep, I was heavy to say the least on Sunday morning. I texted the carpenter asking if he was up, and together we went out to the workshop an hour earlier. I asked him to finish the bathroom wall, while I prepared everything for the sofa (that I had finished planning that restless night). We worked fast (as we do when there are no self-builders there) and the wall was up at 9 o'clock.

Luckily, everyone else seemed happy and rested. We were 6 people, with one person planning to leave after lunch. Luckily the most hard working were left. I was afraid I'd be tired, but I was effective and bright all day. I guess everyone got motivated by the deadline. We were so close! The whole day was a bustling beehive. We were often 5 people at once within the tiny house, almost standing on top of each other, each on their separate task. I got asked a question every 30 seconds, it felt like. Whenever I didn't help out but had a moment to work alone (not very often), I focused on the LED-strips I wanted along the roof edge. Not a "necessary" thing, just the cherry on top. The others finished the sofa, some others put joint filler around the edges of the window/door, one person built the table, one person put in the door of the toilet, some put trims around the interior and installed the water system. The carpenter took care of the edges of the roof we'd left unfinished, and also installed the electric central. At the very last second, the LED-strip got installed.

At 3 PM (or perhaps just 10 minutes late because of the last trims), we pulled the house out of the workshop. It was so pretty. The shape, the colors, the size. I hadn't been able to see it from a distance before, but it really turned out well. My mom brought the pillows for the sofa, and my dad some flowers. The interior looked amazing, actually better than I could have imagined. Sure, some trims are missing, there are a lot of beauty marks and I need to cut the LED-strip etc, but WOW, it still looks good. The headmaster of Angereds folkhögskola, a member from Bobini and my family had come to watch, and we toasted with champagne. I just said thanks to everyone, and Andreas held a short speech about how amazing it always is to see people going from clueless about construction to in the end having made something spectacular and leaving with more confidence.

<u>Final check-out</u>

We also held a final check-out. Here are some of the comments:

"We freaking built a house together! That's amazing!"

I always wanted to build but didn't have the time or the confidence. I'm so happy to realise I actually loved it!"

"It's been so inspiring to be in this environment, and to hear about so different lifestyle choices and alternative ways of living"

"There are three things I tell my friends about: First of all about how professional this setup has been. All the materials,

the whiteboard with the do-do-list, that everything is always prepared, the read thread throughout everything we've done. And that we managed to move from start to finish! Secondly, the dance-warmup. It's been such an amazing way of removing every idea of "No, I can't, I don't dare", and it really connects us as a group. Thirdly, to get to know the other participants. It has given me hope for the future to see young people daring to venture to build their own house without prior knowledge."
"The set-up of the course has been perfect. The order of things we've done is perfect. Us becoming such a tight group has been so rewarding and has really helped the motivation. I hope we all soon build a house!"
"I've only worked with sustainability on a system-level, but now I got to bring it to a personal level. I can hardly put into words how much I've learnt, I couldn't even hold a jigsaw in the start, and now it's my favorite tool."
"This has been a very strange time in my life personally, but to be able to come here has been a source of happiness. I feel so much more capable. Even though I couldn't always participate physically, it felt like there was room for me, and that there were tasks to do that I could manage. I'm infinitely grateful and inspired"

11 May 2025

Participant evaluation

An anonymous evaluation form was sent out before the last building weekend, to be filled in before Sunday evening the 11th of May. 8 out of 10 participants replied. A summary of the evaluation can be found on p.89 and a full version as online appendix 5c (participant evaluation). To access, follow the link on p.117.

14 June 2025

Epilogue

I spent another day in the workshop finishing the installation of the electricity and water, and doing other small things such as adding the trailer lights.

The house was moved to Chalmers for the exhibition of the master's theses in June 2025. It was apparently the first time a student brought a house, so there was no protocol on how to do it. After many emails back and forth we were able to avoid any "temporary building permits" and "risk analyses", and the property owners simply gave a written permission. It was placed outside the building for architectural studies, and visited by many who passed by. The work of the thesis was also exhibited at the open seminars, with models displayed and a video on a screen showcasing the progression of the course. The video is also available as a digital appendix (follow link on p.117).

There are plans for the house to be exhibited at "Frihamnsdagarna" in Gothenburg the 28-30 August 2025. It will also be part of the art week in Kungsbacka on 27 September, and perhaps other venues. When not exhibited, the house will be used by me and my family as a guesthouse, playroom and office - all that we sometimes miss in our tiny house.

The handbook got professionally printed before the open seminars and exhibited together with the house. Many have asked to get a copy, but printing it privately results in too high a price for mass distribution. During the summer, I will send it to several publishers to see if anyone wants to publish the book.

Angereds folkhögskola wants to continue the collaboration and increase their focus on self-building as a form of education. Although it depends on the economy of the school, the plan is to extend my course to 20h/week (50%) in spring 2026 and onwards. Increasing the hours means the participants can get student loans when attending, meaning the course can run on weekdays instead of weekends. It also provides an opportunity for me to continue working with what I find most meaningful. In the meantime, I will be holding another self-building course at Angereds folkhögskola, where a group of students will be designing and building the new interior of the cafeteria. Bobini is interested in hosting summer courses. I'm considering further developing my design to make it fit a smaller "teardrop trailer", suitable for a shorter course. I'm also considering holding an online "Design your own tiny house"-course, and otherwise continue to tutor private self-builders in their design processes.

No matter what the future looks like exactly, I wish to find ways to be the kind of architect that uses my knowledge for the empowerment of self-builders and for the good of the planet, and hopefully inspire others to do the same.

Figure 63: The house arriving at Chalmers.

Figure 64: The open seminars at Chalmers.

Figure 65: The finished handbook.

Figure 66: Many people got to visit the house during the exhibition.

A master's thesis by
Andrea Kretz Ottander

Our modern way of building and living is unsustainable. A constant strive for more is consuming resources at a rate that is threatening life on Earth. Change is going too slow in the hands of profit hungry corporations and stagnant bureaucracy, and people have been deprived of the power, knowledge and time to act themselves.

But there is

a tiny revolution

of people trying things differently.

With hammer, saw and creativity, we reimagine living. Avoiding authorities with our wheels, voluntarily minimizing our space, belongings and consumption, we attempt to reimagine "The good life" in a more sustainable way.

"Could we exchange material consumption with meaningful activities?"
"Could we exchange stress with peace?"
"Could we strive less, but gain more?"
"What if less is enough?"

This thesis is for those of you who are curious about us.
And for those of you who want to join us.