# EARTH ACADEMY

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# TITLE PAGE

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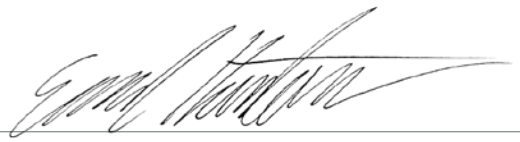

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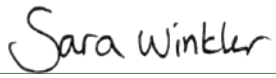

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## READING INSTRUCTIONS

This master thesis is divided into three chapters: program, design process, and presentation. The program consists of a general introduction, the theoretical framework, site analyses, in-depth investigations of the user group, and the building typology. The program results in a room program, room diagram, and design criteria which paves the way during the design process. The program is followed by a design process chapter, where the design iterations and considerations are presented. The Integrated Design Process is not linear, but the chapter is presented linearly to make it easier for the reader. Lastly, the final design proposal will be presented with an overall conclusion and reflection of the master thesis. The presented illustrations are in scale and self-made unless else is stated.

The thesis is about designing the Danish phenomenon, Højskole, which is translated to English as Folk High School throughout the thesis. Furthermore, the Danish word "*fælledskab*" will be mentioned in some chapters without English translation to retain the word's meaning and definition. Empirical research such as literature, documents, and web pages are quoted and referred to using the Harvard reference method. All illustrations not created by the group members are listed with references in the illustration list.

Illu. 0 Ballen Harbour

## ABSTRACT

This master thesis summarises the design proposal of a folk high school on the outskirts of Ballen, Samsø. The scope of the thesis is inspired by the Energy Academy's vision of establishing a folk high school with sustainability at its core, teaching people how to live more sustainably, and adding to the societal paradigm needed for reducing the impact of global warming.

The thesis investigates how architecture can create the framework to promote a change in human behaviour towards a more sustainable way of life. The term sustainability will be broadened and reinterpreted based on the theoretical concept of fælledskab as a social construct making people take responsibility for their climatic impact.

The thesis is based on an interdisciplinary design approach, where the combination of architectural and engineering competencies creates a sustainable and integrated design proposal. The design process consists of different investigations and analyses of the urban spaces, life cycle assessment of building materials, the experience of the indoor environment, and rational tectonics.

The folk high school's design proposal depicts a platform that extends the identity of Samsø as the frontrunner of the green transition and promotes a societal change towards a sustainable future through the built environment.

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# INTRODUCTION

Climate change is undeniable, making it impossible to sustain our current lifestyle without destroying the planet for future generations (Bæredygtig udvikling, 2022a). The primary responsibility to change this development lies on the authorities and the corporations of polluting industries, though the power of the consumer is not to be understated. To try and halt these effects of the modern human impact on the environment, we must change our way of living to accommodate a more sustainable lifestyle with a focus on resource management and lowering the individual's carbon footprint.

The consumer is not oblivious to this needed paradigm change yet is mostly uneducated about how to lower their impact on the climate crisis (TNS Gallup 2019). This thesis aims to design a folk high school with a primary focus on educating young people about living sustainably. The folk high school will act as a testing ground for a sustainable lifestyle where carbon-heavy aspects of everyday life are substituted with alternatives for the students to explore before implementing them in their daily life. Factors such as food production, resource consumption, the built environment etc., are to be challenged to create new sustainable habits.

*"(...) It is bullshit right? We plant trees and eat less meat sometimes, except when we go to parties. Or we fly less, except when we fly anyway and buy a ticket for 200 kr. Extra. We plant more compensations trees somewhere; well it becomes a welfare society bullshit or welfare society bingo." (Appendix 02. p. 13)*

*"... det bliver noget bullshit ikke, hvor man planter et træ, og så spiser man lidt mindre kød nogle gange, undtaget når man går til fest, eller man flyver lidt mindre, undtaget når man skal flyve alligevel, og så køber man en billet til 200,- ekstra, for så planter man nogle kompensationstræer et eller andet sted, altså det bliver lidt velfærdssamfunds bullshit eller velfærdssamfundsbingo..." (Appendix 02. p.13)*

Illu. 1 View from Balle Bjerg

# MOTIVATION

Humans are constantly influencing the earth through overpopulation, pollution, burning fossil fuels, etc. This has resulted in climate change, poor air quality and global warming potential (Bæredygtig udvikling 2022a). The motivation is to solve the problem of reducing the human-caused environmental changes through architecture on the individual level. A platform must be created where the climatical issues are taken seriously by acknowledging and discussing that humans need to change their behaviour to affect the present climatical problems. It is time to look at the bigger picture to reach out to the future and ensure the well-being of the upcoming generation. An investigation made by Kantar Gallup shows the yearly $CO_2$ consumption of 17 tons per year per Dane. To balance the climatic changes, the emission must be reduced to 2-3 tons by 2050 (TNS Gallup 2019).

This reduction is massive and relies on more remarkable societal change by generating awareness of sustainability in the everyday life of people. However, the investigation also shows that people know about the climatical issues but do not know enough to take part in solving the climatical changes individually (Illu. 2) (TNS Gallup 2019). There is a lack of knowledge which must be acknowledged and solved. This issue is precisely what is the motivating factor in this thesis.

*(...) It is just a realization that we still don't do something tangible to these things (sustainability) (...) we have not reached far enough in the society. The folk high school could be the place, where people can experiment with it, (...) live sustainable, in four months or try it out, get it under the skin and have a nice experience and meet other people, young people, and have fun right? It does not have to be opposite. (Appendix 02. p. 13)*

*(...) det er egentlig bare en erkendelse af at vi stadig ikke er kommet dertil hvor vi rent faktisk håndgribeligt gør noget ved de her ting (bæredygtighed)(...) som samfund er vi ikke kommet ret langt. Højskolen kunne godt være det sted hvor man eksperimentere med det, (...) lever bæredygtigt, i fire måneder, eller ligesom prøver det af, får det ind under huden, og har det fedt samtidig og møder nogle andre fede unge mennesker og har det sjovt ikke, det behøver jo ikke være modsatrettede. (Appendix 02. p. 13)*

Living sustainably is not easily definable, and the steps are not easily implementable. We want to create a space for sustainable living, where the definitions of sustainability will be challenged, by making an exploratorium before implementing them in the visitors' households.

**YEARLY TON $CO_2$-CONSUMPTION PR. DANE IN TON**

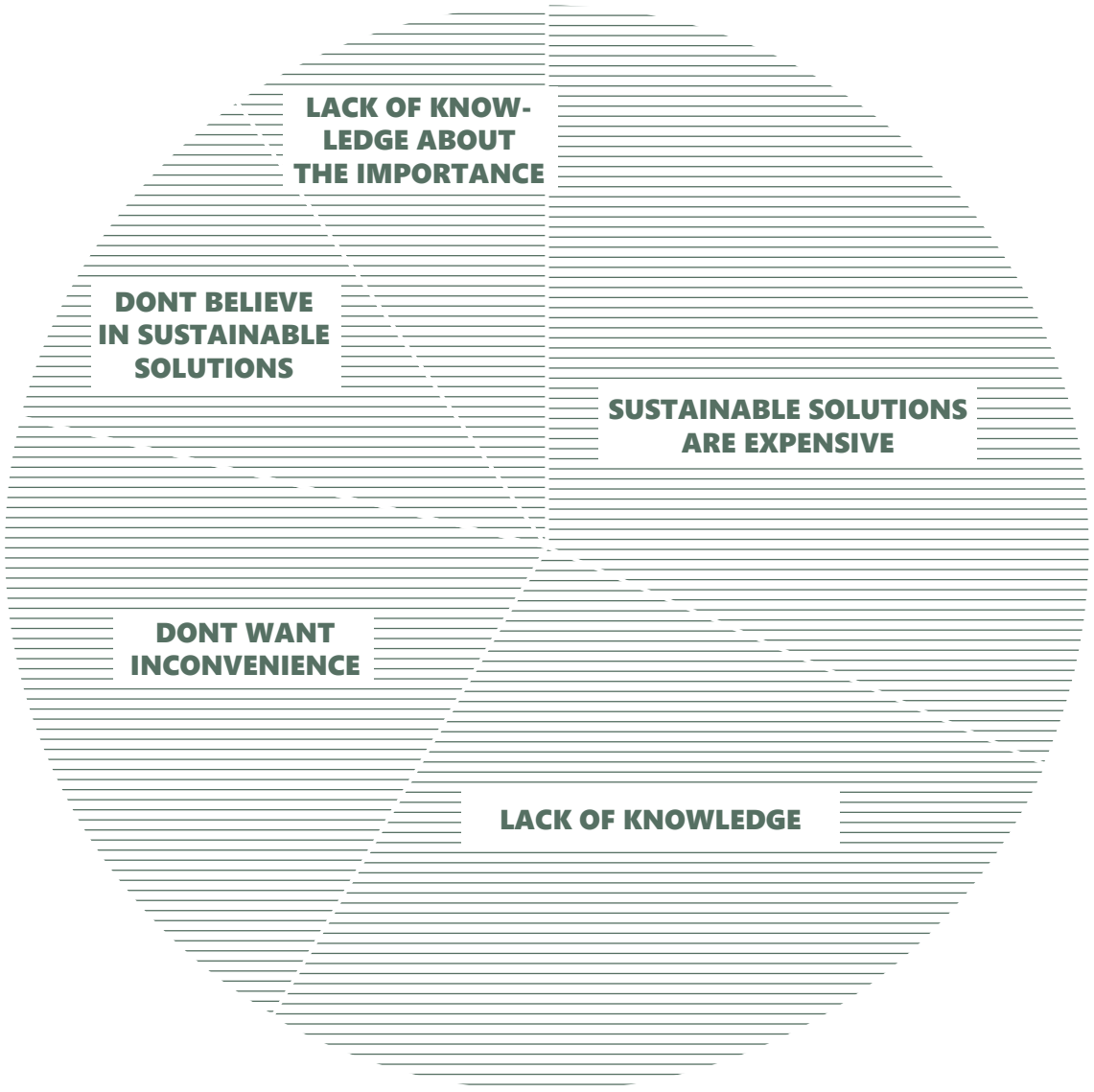
**6**
Common public consumption

**2,5**
Electricity, heat, fuel

**5,5**
Clothes, electronic, building materials, cars

**3**
Food and drinks, public consumption, infrastructure

**TOTAL YEARLY CONSUMPTION 17 TON**




Illu. 2 Investigation by TNS Gallup


## SAMSØ

Samsø is an island in Kattegat, between Jutland and Zealand, with 3724 permanent residents (Vestergård 2017). The island is heavily shaped by the ice masses of the previous ice ages creating a dramatic hilly terrain. Scattered along the island, small villages are preserved to their original expression, with houses predominantly half-timbered with thatched roofs centred around the village pond. The capital of Samsø is the central town of Tranebjerg, with 824 citizens housing, municipal functions, schools, a hospital etc. (Hansen and Kjær 2017). Samsø is already a frontrunner in the sustainable paradigm change, supplying 100% of its power from sustainable sources (Samsø Kommune 2021a). The site is placed close to the Energy Academy in the town of Ballen. The Academy was established to spread knowledge about green transition (energifonden 2022). The upcoming folk high school will continue the story of Samsø as a sustainable island and educate people on their green transition.

Illu. 3 Map of Samsø

## OPPORTUNITIES

Samsø inherently possesses three main opportunities for cultivation based on the existing perception of the island: tourism, gastronomy, and sustainability. Tourism has increased by 26% between 2015 and 2020, making tourism the second-largest source of income after agriculture. The municipality has made it clear that they want to expand the tourist season across the year to create more workplaces with full-time employment as a base for settlement (Samsø Kommune 2019b).

Food production and processing on Samsø is a significant part of the identity of Samsø and is defined in the experience of the landscape. Healthy and fresh food is and will always be a part of the story of Samsø and carries a potential for exploration according to sustainable behavioural change.

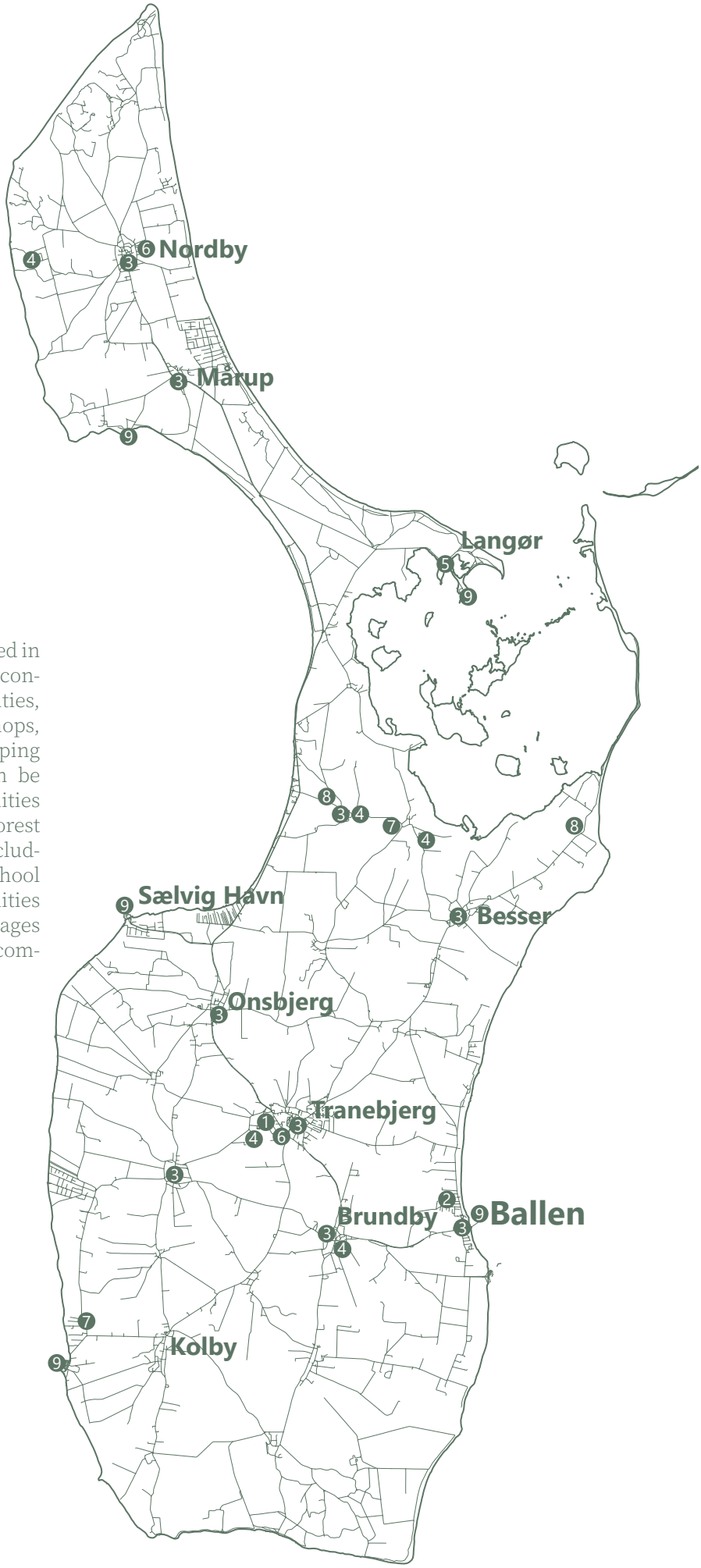
Samsø was in 1997 appointed as the renewable energy island of Denmark by The Ministry of Energy, obliging Samsø to become a leader in energy preservation and leading the way in green transition in Denmark (Samsø Kommune 2021b). The collaborative effort of the municipality of Samsø and the Energy Academy has transformed the image of Samsø to be the frontrunner in sustainable living. By now the island is fully supplied by renewable energy from wind turbines as well as solar voltaic and solar heating on both private and municipal buildings. Creating a source for prolonged stays, as the folk high school, carries the potential in extending the active season for both Ballen and Samsø increasing the number of residents and adding more quality to the urban life of the town.

By extending the sustainable image of Samsø beyond green electricity, the image of Samsø will be continued and put into perspective by creating a new platform on Samsø for young people to explore sustainability and to flower a behavioural change. The opportunities of Samsø will be further explored by mapping qualities which the folk high school can utilise.

Illu. 4 Brundby Mølle

# QUALITIES OF SAMSØ

The relevant functions have been mapped in relation to the folk high school, which consists of farming, gastronomical facilities, cultural centres, art galleries, workshops, and shelters for outdoor life. The mapping shows a range of qualities which can be used in the school's curriculum. Facilities for sport, ceramic, permaculture, and forest in the near vicinity of Ballen can be included in the daily life of the folk high school (Illu. 5). Utilising Samsø's present qualities instead of making duplicates encourages the students to interact with the small communities across the island of Samsø.




- ❶ Sambiosen
  - Sports arena
  - Sports field
  - Tennis pitch
  - Fitness
  - Gathering hall
- ❷ Samsø Energy Academy
- ❸ Art galleries
  - Painting
  - Pottery
  - Jewelery
  - Glassblowing
- ❹ Shelters
- ❺ Nature school
- ❻ Brewery / Distillery
- ❼ Organic Farming / Permaculture
- ❽ Fruit and berry plantation
- ❾ Marinas

Illu. 5 Mapping of potentials

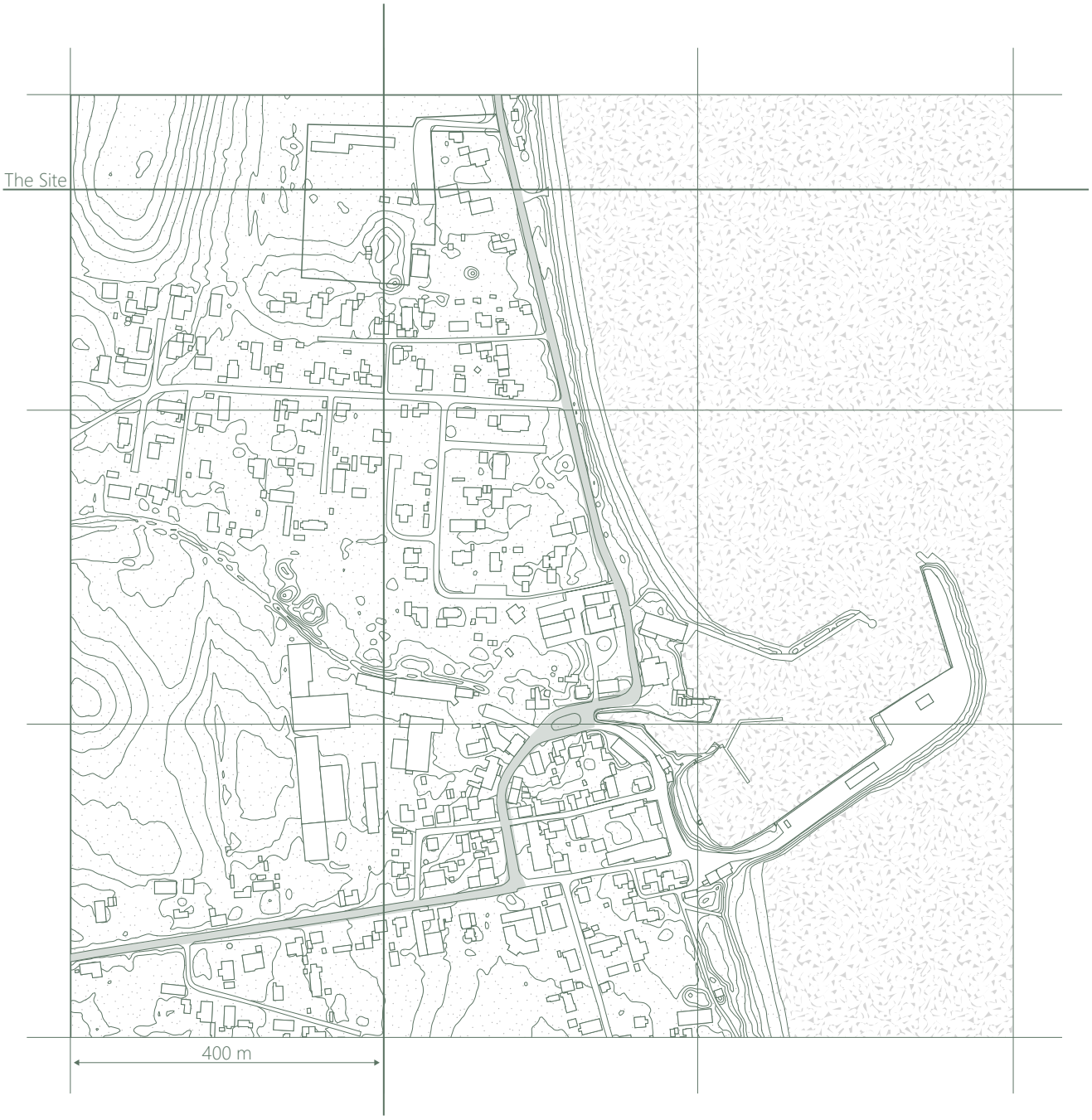
# BALLEN

Ballen is a town with a long history influenced by industry, ferry fare, fishery, and tourism (Hansen 2017). The harbour has acted as the main gateway to the island throughout time which led to establishment of businesses such as shops, grain storage and shipyards around the port. Later the town became the entrance for the tourists and visitors and generated workplaces like hotels and restaurants (Samsø Kommune 2021a). The town stretches a few hundred meters in each direction from the harbour as its centre (Illu. 6). Everything is accessible by foot because of the short distances within the town. In recent years the locals have voiced for more activity throughout the year, with smaller events or activities to break the seasonality of the urban life (Samsø Kommune 2019b).

*”Ballen should be a city for native-saminge, half natives-samsinge, tourist and everything in between, A town with room for everyone. A town with life and activities all year round...” - (Samsø Kommune 2019)*

*“Ballen skal være en by for fuldblods-samsinge, fritidssamsinge, turister - og alt derimellem. En by med plads til alle. En by med liv og aktiviteter hele året...”- (Samsø Kommune 2019)*

Placing the folk high school in Ballen will increase the activity in the town across the year. Involving the town into the curriculum while inviting them to use the school facilities will create a community around the school.




Illu. 6 Mapping of Ballen Town

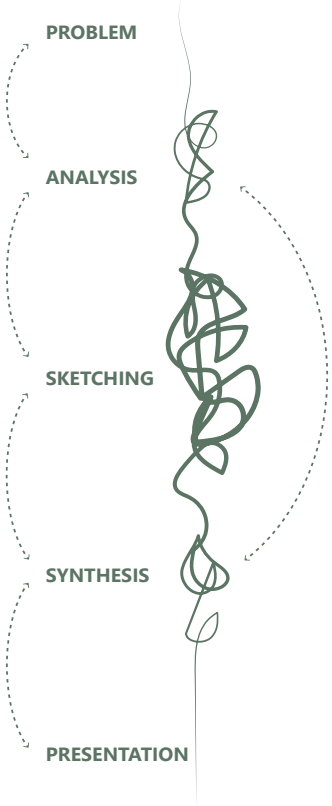
# METHODOLOGY

Many different aspects come into play when using *The Integrated Design Process* method. The engineering fields define the qualitative aspects of the design, whereas the more intangible discipline of architecture defines the qualitative elements. Achieving high architectural value requires a design method capable of implementing The Integrated Design Process defined by Mary-Ann Knudstrup (Knudstrup 2004).

The design method is centred around five phases: Problem, Analysis, Sketching, Synthesis, and Presentation (Illu. 7). The flow between these phases is nonlinear during the design process requiring taking steps back and constantly re-evaluating the current design (Knudstrup 2004).

The problem is developed into a statement, dictating the project and its phases. The relevant information to solve the problem is acquired in the analysis phase. Written sources, interviews, mappings, microclimatic analyses etc., all add to the comprehension of the problem and how to solve it adequately. The sketching phase is based on the preliminary work in the analysis phase. All aspects of the design proposal are combined in the synthesis phase, and the program's demands are met. Through these phases, several tools are used, which are introduced on page 17, illustration 8.

The final step is the presentation of the project, where the design is unfolded in illustrations, diagrams, and visualizations as the answer to the problem statement (Knudstrup 2004).



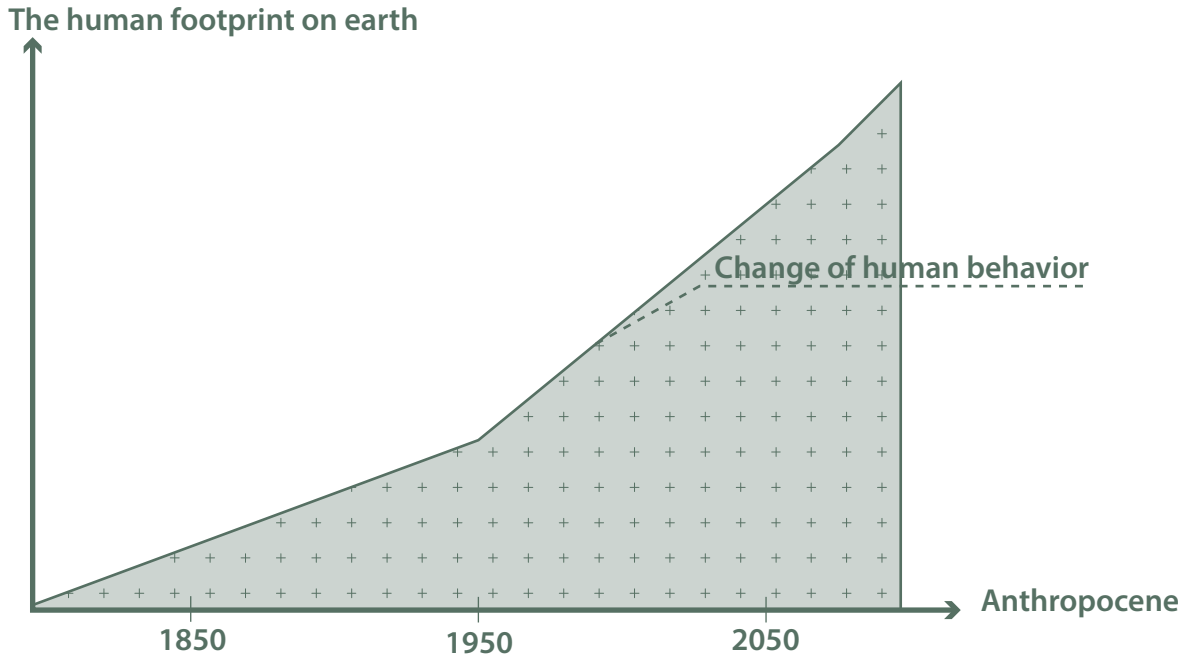

Illu. 7 IDP

| | Tool | What | How | Why |
|---|---|---|---|---|
| ANALYSIS | **Research** | Gathering state-of-the-art and general knowledge in selected topics through research building the theory. | Reading and investigating different topics, scientific articles, papers and books. | The knowledge gathered creates a framework for the design and a basis for decision making. |
| | **Interviews** | Interviews with relevant sources and stakeholders. | Physical and digital semi-structured interviews with Energy Academy as stakeholder and Kalø Højskole as relevant source. | To formulate the functional requirements, establishment of user behaviour and needs. |
| | **Personas** | Fictional persona with needs and demands. | Fictional personas based on the information gathered by the interviews and research. | To better convey the future users of the facilities, and the requirements they pose. |
| | **Case studies** | Analysis of existing buildings with similar points of departure and themes, as a source of inspiration | Research of ethos, execution, and reception of existing building from both technical and architectonic aspects. | To serve as a source of inspiration, serving as a guide in the design process. To learn from in both good and bad aspects of the building. |
| | **Mappings** | Analysis of existing structures, functions, and other elements in physical vicinity. | Through site visits and desktop analyses. | To understand the site and the immediate context as well as important points of interest and site-specific limitations. |
| | **Microclimate analyses** | Analysis of the microclimatic impact on the site. | Desktop analysis of the impact of wind, sun, and downpour based on data from weather services and 3D models. | To investigate the risk of flooding on the site and predominant wind directions to implement in the positioning of the buildings. |
| | **Registrations** | Photographical analysis of existing features of both site and vicinity. | Registration of existing structures and elements by photos and maps. | To get an understanding of the expression of the existing built environment in the vicinity of the new building. |
| DESIGN PROCESS | **LCA - analysis** | Estimation of environmental impact of materials in different phases throughout the building's lifetime. | Calculation done in LCAByg tool based on industry standard EPD's assessing environmental impact of raw materials. | By evaluating the different options for materials. |
| | **BSim and BE18** | Energy consumption and interior climate simulation. | Simulation of indoor climate including indoor temperature, air quality, energy consumption etc. | To optimise the indoor climate according to standards, determining key parts of the design, as window area and placement. |
| | **Models** | Investigations of volumes and the spaces in between. | Physical models in foam and 3D modelling in Rhino and Revit. The programs are used as a visualization tool. | Helps an understanding of the masses and the connection in between and with its context. |
| | **Daylight** | Analysis of the daylight in the buildings, and if the amount meets the requirements. | The analysis is conducted in Grasshopper. | Helps determining if the design choices are sufficient. |
| | **Acoustics** | Analysis of the acoustics in selected rooms. | Stationary calculations. | Get an understanding of the selected materials and its impacts on the room. |
| | **MagiCad** | Creating a ventilation strategy with ventilation pipes, aggregate and ventilation fixtures | The analysis is conducted in the 3D program Revit with the plug-in tool MagiCad. | To find the needed dimensions of the ventilation pipes and number of ventilation fixtures needed. |
| | **LindQUIST** | A tool that shows several types of ventilation fixtures. | Different types of fixtures can be selected to analyse the ventilation in the living area. | To ensure a sufficient type of ventilation fixtures with the right velocity and throw length. |

Illu. 8 Tools

# THEORETICAL FRAMEWORK

The theoretical themes create the framework of the project and act as guidance throughout the complex integrated design process. The interconnection between social sustainability, tectonics, environmental sustainability, and phenomenology will embrace the project as the overall architectural approach for the upcoming folk high school.




Illu. 9 Antropocene era

## THE NEW ERA OF HUMANITY

*Definition:*
*The Anthropocene era = A new geological age*

We live in the Anthropocene era – A geological time characterised by the last hundred years of human history (Hamilton, Christophe et al. 2015).

Since the 1890s, through the industrial revolution, the growing consumption of coal resulted in increased $CO_2$ emissions that ended the Holocene era and kick-started the Anthropocene. The industrial revolution was the reason behind the change in human activities and changes in the entire ecosystem. For example, the industrialised society used about 4-5 times more energy than the earlier agricultural society. To solve the climatical issues, it is not only about gathering or evaluating data but knowing more about the human impact on the earth and what should be changed in modern society to help alleviate the consequences of human lifestyle (Bonneuil and Fressoz 2017).

The ecosystem is a unity affected by the climate and the components within the system. Every element is essential and is a piece of the whole picture, including the human impact on air, sea, land etc. The modern human has the force to change the planet in any capacity. How and in which direction the earth and the ecosystems should grow in the next thousands of years depends solely on human behaviour, both individually and on a societal scale (Hamilton, Christophe et al. 2015). A new social behaviour, a new way of living is needed to break the growing climatical disasters and take control and authority of the earth in a new and sustainable way (Illu. 9).


Illu. 10 Social Sustainability

Usually, sustainability is defined by three notions: social sustainability, environmental sustainability, and economic sustainability, where each of these influences each other (Illu. 10). In this master thesis, the typical definition of sustainability has been redefined. All three fundamental definitions of sustainability are rooted in social sustainability and human behaviour. Both environmental and economic sustainability is defined by and relies on human behaviour. Social sustainability will be the core of this master thesis. This notion prioritises human behaviour and paves the way for a holistic approach to environmental and economic sustainability spearheaded by a change in lifestyle.

The theoretical essence of redefining social sustainability relies on the book "*fælledskab*" written by Søren Hermansen & Tor Nørretranders. They present a new understanding of how human lifestyle can impact a better sustainable way of living. As Hermansen believes, a folk high school based on fælledsskab can make it possible to affect the younger generation by letting them experience a new sustainable way of life, spreading like rings in the water through society. The folk high school is the beginning of a new sustainable lifestyle. It is not possible to go back to the Holocene. Instead, it is essential to ensure that the human impact on Earth is balanced in the time of Anthropocene through behavioural change (Illu. 9 p. 19) (Hermansen and Nørretranders 2011).

In the following sections, a comprehensive understanding of the theoretical framework will be introduced, exploring the themes of *fælledskab*, environmental sustainability, tectonics and atmosphere in-depth and how they influence this master thesis.

## SOCIAL SUSTAINABILITY

*"A fælledskab school can be a meeting place for discovery and development of fælleder. An understanding that becomes clear that day, when resources, either it is energy, food or social relations, are inadequate thus everybody don't have access to it." (Hermansen et. Al 2011 p. 153)*

*"Fælledskabsskolen kan være et mødested for opdagelse og udvikling af fælleder. En forståelse som bliver krystalklar den dag, hvor ressourcerne, hvad enten det er energi, mad eller sociale relationer, bliver så knappe at ikke alle har adgang til dem." (Hermansen et. Al 2011 p. 153)*

This master thesis does not interpret sustainability as independent notions consisting of social, economic, and environmental sustainability. Rather, sustainable thinking is fundamentally a part of social sustainability and human behaviour. Changing human behaviour will be the solution in obtaining true holistic sustainable thinking in all aspects.

The book *fælledskab = fælled + fællesskab* written by Søren Hermansen and Tor Nørretranders emphasize the need of community (*fælledskab*) in society. Hermansen, the head of the Energy Academy and cowriter Nørretranders points out their clear vision of changing human behaviour and improving human's negative impact on the earth. Creating *fælledskab* is the catalyst of managing the shared resources on earth to which everyone has free admission to, but no one has ownership or control. To create *fælledskab*, a common (fælled) and a community (fællesskab) are needed (Hermansen and Nørretranders 2011).

Community and the common are two interdepending determinants that affect each other. The common are resources shared between people in a respectful matter. The historical definition of commons consists of fields for grassing animals shared by farmers in the village. Everybody has access to the resource, but there is no formal ownership or control. The community is a group of people connected through common tasks and a shared network of connections. The community will be strengthened by managing the common, and the common is better when there is a community to take care of it (Hermansen and Nørretranders 2011).

In the bigger picture, humans form a community, that needs to take care of the common, earth, to ensure the quality of life for the present and future generations. The earth's resources depend on people to manage them well without over-exploiting or harming the earth. *Fælledskab* can, in its essence, pave the way to richness of resources, happiness, and quality of life but at the same time to tiredness, complications, and hopelessness. It all depends on how the common is treated. For example, the natural resources such as groundwater are almost used up, rainforests are felled, natural areas are transforming into cities etc., because the community has not treated the common properly (Hermansen and Nørretranders 2011).

*Fælledskab* is a possible solution to initiate a change in human behaviour that creates a sense of responsibility for the earth, directing the environmental issues in a positive way. Hermansen and Nørretranders argue that the problem will not be solved by giving the responsibility to the government or selling it to private investors, but by letting the people regulate the common that they are living in on their own. A *fælledskab* can only exist with the management and involvement of the members of the *fælledskab* (Hermansen and Nørretranders 2011).

Creating or developing an architectural model for *fælledskab* will be the fundamental focus of this project with a theoretical basis in the book *fælledskab = fælled + fælledskab*. The aim is to create a platform to learn about the Anthropocene era, discover the human impact on the earth and initiate a change in human behaviour through *fælledskab*.

# ENVIRONMENTAL SUSTAINABILITY

*"A sustainable development is a development, which fulfils current demands, without bringing future generations' options to fulfil their demands in jeopardy"-(Bæredygtig udvikling 2022a)*

*"En bæredygtig udvikling er en udvikling, som opfylder de nuværende behov, uden at bringe fremtidige generationers muligheder for at opfylde deres behov I fare. "-(Bæredygtig udvikling 2022a)*

The building industry is responsible for 40% of the total energy consumption, 40% of resource consumption, and 35% of total waste production in Denmark. A significant reduction in carbon emissions and resource consumption can be found in how the building industry conducts itself and the stakeholder's choices (Lendager and Pedersen 2021). Humans must acknowledge the issue, find solutions for reducing resource waste, explore alternative building methods and ultimately limit the overall climatic impact. Buildings are necessary for the existence of human beings, but they can be built in a way that doesn't harm the environment (Lendager and Pedersen 2021).

***What can the building industry do?***

Looking at waste as a resource, the environmental impact of construction will be significantly lowered. The resource use of virgin materials and the waste management of torn-down buildings can be partly eliminated by recycling or upcycling materials (Lendager and Pedersen 2021).

*"To recover or reuse a waste material by making it a new resource. Using innovation to create a product that outperforms a benchmark in terms of quality, $CO_2$ and aesthetics" – (Lendager and Vind, 2018 p. 55)*

The conventional building practice is broadly defined by a cradle to grave view on materials, where the building has a lifespan, after which the building will be torn down, and the materials are thrown away. Building from a circular economic standpoint will significantly lower the climatic impact of the buildings (Lendager and Pedersen 2021).

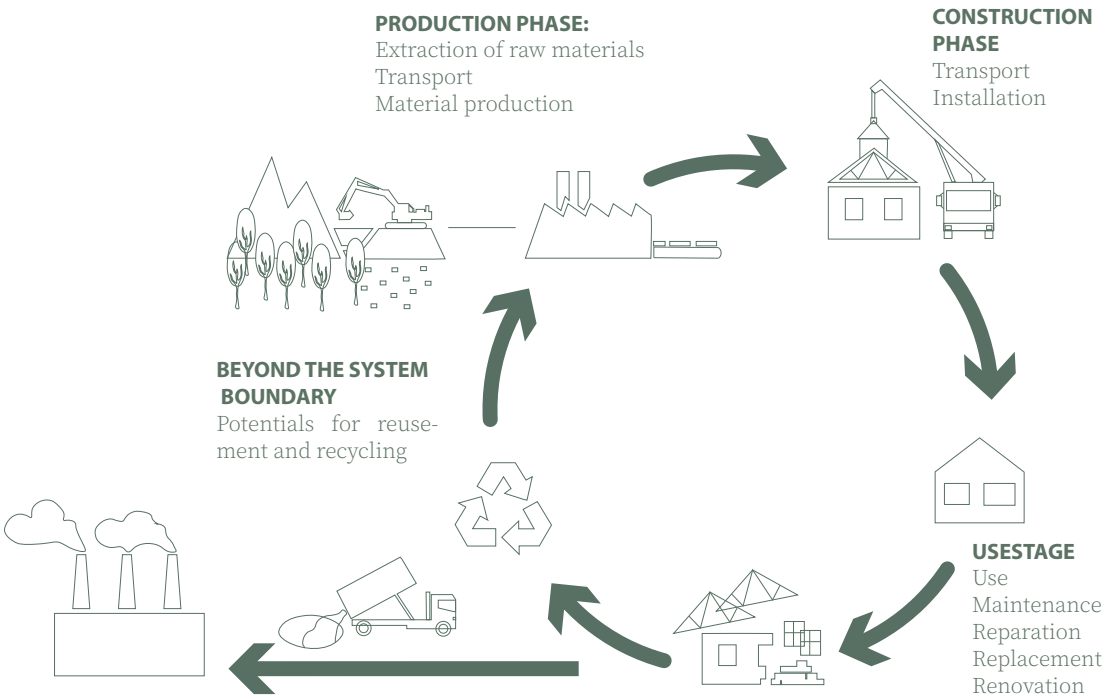
Buildings, production of building materials, and disposal of materials after demolition can affect the environment locally and globally. The environmentally sustainable quality of any structure can be achieved by reducing and being aware of the emissions of problematic substances and optimising resource utilisation. A

**THE BUILDING INDUSTRY IS RESPONSIBLE FOR:**

**40 %**
Total energy consumption

**40 %**
Resource consumption

**35 %**
Total waste production




Illu. 11 LCA

life cycle assessment (LCA) can give an overall picture of the building's potential impact on the environment regarding carbon footprint and other pollutants (Illu. 11). The tool LCAbyg can be used to assess the environmental impact of materials and give an understanding of what materials affect the environment most through the different lifecycle phases: production, construction process, use stage, the end-of-life stage and benefits of reuse/upcycling beyond the system boundary (Energi styrelsen 2015). The use of energy in buildings is essential to achieving sustainable buildings. The LCAbyg tool will be used in this master thesis to ensure choosing building materials with low environmental impact. In Denmark, the building authorities have created regulations and frameworks for a building's energy consumption. However, that is only a minimum requirement, which can be challenged by pushing the limits even more.

In this context, the term zero energy buildings are introduced. Zero energy buildings in Denmark are designed to have a low energy demand, covered mainly by local sources on-site by renewable energy to minimise the usage of fossil fuels. A reduction in the energy demand and optimisation of the building envelope is a must to reach a zero-energy building. Because of the optimisation of the building's sufficient envelope, a consensus for heating in a zero-energy building should be as low as possible with a maximum of 7-10 kWh/m$^2$ pr. Year. The tightness of the building envelope is also necessary to secure minimal energy loss in the building and ensure the indoor environment is sufficient (Heiselberg, Larsen and Marszal-Pomianowska n.d.). For this master thesis, boundaries will be pushed to achieve a sustainable building typology that meets and acknowledges the environmental issues. Instead of achieving the minimal demands, the wish is to reach a zero-energy building where passive and active strategies will be investigated and applied holistically.

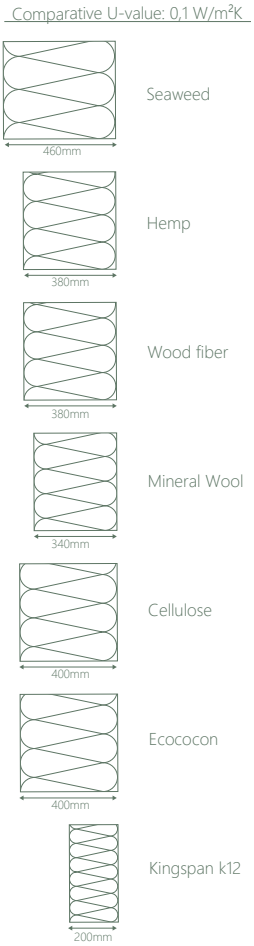
***Biobased materials***

A report published by The Department Of The Built & Environment, Aalborg University, summarises the potential for biobased materials as building resources and materials in Denmark. The biobased materials include wood, straw, flax, hemp and marine materials such as eelgrass, seaweed and seashells. These biobased materials can replace conventional building materials like concrete, steel, bricks, and mineral wool. The assessment of the available biobased resources shows immense potential in producing biobased materials from forests, agriculture, and the marine environment in Denmark. These are resources that are renewable, cultivated and can be harvested from the same fields, and even waste material from existing production lines. The report highlights that straw can quickly be produced in Denmark and fully cover the need for insulation for single-family homes (Rasmussen, Engelund Thybring et al. 2022). Because biobased materials have great potential of being sustainable alternatives leads to an investigation in the life cycle assessment of the different insulation materials.

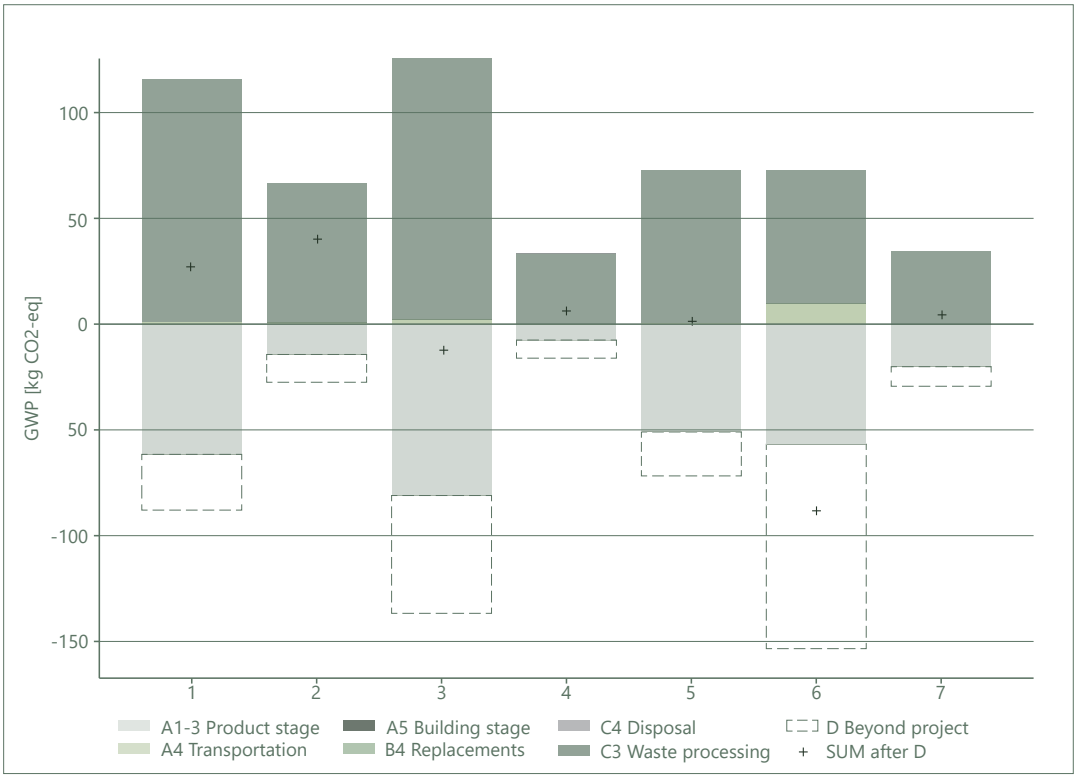
***Initial life cycle assessment of insulation materials***

The construction basis of the buildings is deeply dependent on the choice of insulating material. To determine the insulation material of the folk high school, a comparative LCA is made based on the carbon footprint of a single square meter of wall. To determine the material amounts, the u-values must be comparative, resulting in walls of differing thicknesses offering inherent architectural possibilities (Illu 12). With thicker walls comes the potential for creating shading by recessing the windows and hiding solar shading within the façade or creating sitting niches in the windowsills. Contrarily thinner walls will create a lighter expression and allow better natural sunlight within the buildings and a greater net area.

The LCA calculations show the different carbon emissions in the phases of the building lifetime (Illu. 13). All materials chosen for comparison are bio-based and are carbon negative in the production phase. The difference is only apparent in the end-of-life phase, with waste processing and reusability. The chosen materials from the tests are the premade loadbearing Ecococon wall modules of straw for the external walls. Wood fibre insulation will be used for the roof, floor insulation and non-loadbearing inner walls. These materials are net-carbon negative and carry the potential for direct re-use beyond the project's lifetime. The Ecococon modules benefit from being premade and quickly assembled and disassembled to be reused in other projects (Ecococon 2022).

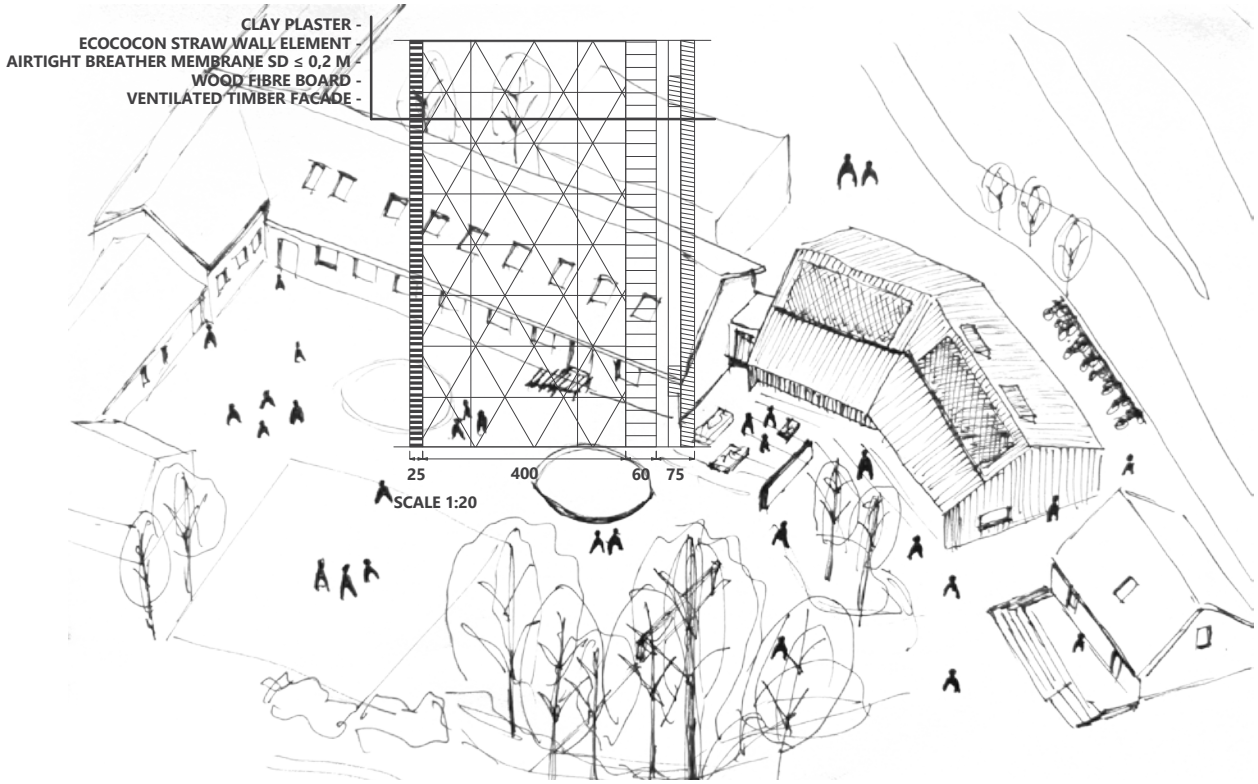



Illu. 12 Comparative U-value




| | Material | A1-3 | A4 | A5 | B4 | C3 | C4 | D | Sum (before D) | Sum (After D) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Seaweed | -6,16E+01 | 1,01E+00 | 0,00E+00 | 0,00E+00 | 1,15E+02 | 6,82E-05 | -2,64E+01 | 5,41E+01 | 2,77E+01 |
| 2 | Hemp | -1,43E+01 | 9,31E-01 | 0,00E+00 | 0,00E+00 | 6,58E+01 | 6,82E-05 | -1,31E+01 | 5,23E+01 | 3,92E+01 |
| 3 | Wood fiber | -8,10E+01 | 2,01E+00 | 0,00E+00 | 0,00E+00 | 1,24E+02 | 6,82E-05 | -5,57E+01 | 4,45E+01 | -1,12E+01 |
| 4 | Mineral Wool | -7,52E+00 | 8,29E-02 | 0,00E+00 | 0,00E+00 | 3,33E+01 | 1,40E-01 | -8,57E+00 | 2,60E+01 | 1,74E+01 |
| 5 | Cellulose | -5,10E+01 | 1,86E-01 | 0,00E+00 | 0,00E+00 | 7,27E+01 | 6,82E-05 | -2,08E+01 | 2,19E+01 | 1,09E+00 |
| 6 | Ecococon | -5,68E+01 | 9,82E+00 | 0,00E+00 | 0,00E+00 | 6,31E+01 | 0,00E+00 | -9,66E+01 | 1,62E+01 | -8,05E+01 |
| 7 | Kingspan k12 | -2,01E+01 | 2,71E-02 | 0,00E+00 | 0,00E+00 | 3,46E+01 | 6,82E-05 | -9,24E+00 | 1,45E+01 | 5,22E+00 |

Illu. 13 LCA calculation 1m² wall




Illu. 14 Feldballe Friskole

### *Feldballe Friskole*

*Architect: Henning Larsen*
*Site: Ebeltoftvej 56, 8410 Rønde*
*Build in 2021*

Feldballe Friskole in Denmark acts as a study on the modular pre-produced straw panels of Ecococon. The project was built following the voluntary sustainability class and followed five dogmas: Biomass in the construction, Design for disassembly, Good indoor climate, Free of toxic chemicals, and Reuse of local materials. For the construction, biodegradable materials have been used and chosen based on obtaining more $CO_2$ than the building would produce, rendering the building net carbon negative (Rasmussen, Engelund Thybring et al. 2022).
The potential of the biobased material Ecococon will be used as the basis for designing the building envelope for the upcoming folk high school. The choice of materials, good indoor environment, achieving zero energy and implementation of passive and active strategies must serve as an example of building and living sustainably.

# TECTONICS

***Durability, Utility, and Aesthetics***

The roman author and architect Vitruvius was one of the first architectural theoreticians who created a set of guidelines for architectural design and several notions to describe and assess architecture. He told three core requirements that described architecture: Firmitas, Utilitas and Venustas, which means durability, utility, and aesthetic. If architecture is not durable, it has no functional value and will be a work of art. Without artistic value, you are left with just a building, not a piece of architecture (Dansk Arkitektur center 2022).

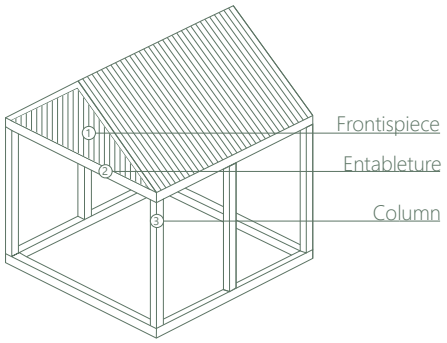
Like Vitruvius, other theoreticians such as Marc-Antoine Laugier, Herman Haan and Bernard Leupen have summarised their definition of tectonic architecture introduced in the following. Their understanding and perspective will be summarised and discussed to determine and shape the tectonic approach for the upcoming folk high school.

***The primitive hut – Simplicity***

Marc Antoine Laugier breaks down architecture to its very core as protection for the human body from the weather. The building envelope is the goal, and the construction system the means to reach the goal everything else is ornamentation and should be avoided (Laugier, Herrmann et. al 1977).

*"He wants to make himself a dwelling that protects but does not bury him. Some fallen branches in the forest are the right materials for his purpose; He chooses four of the strongest, raises them upright and arranges them in a square: Across their top he lays four other branches; on these he hoists from two sides yet another row of branches which, inclining towards each other, meet at their highest point. He then covers this kind of roof with leaves so closely packed that neither sun nor rain can penetrate. Thus, man is housed. "– (Laugier, Herrmann et al. 1977 p. 11-12)*

According to Laugier, true aesthetics is not dependent on circumstances or conventions. This ideal is closely connected to the primitive hut of antiquity, where the elements such as the column, entablature and the frontispiece are the rational and main elements of architecture. Laugier highlights that if these parts are fitting and




Illu. 15 The primitive hut

formed correctly, it will be a piece of perfection (Laugier, Herrmann et. Al 1977). Everything else, such as arches and pilasters, is just distortion and waste which must be removed (Illu. 15). Laugier was the centre of a new puristic understanding of form and structure that emphasised the rational. His approach served new architecture with scattered decoration and was the early frontrunner of 20th-century functionalism (Nygaard 2011).

A strict hierarchy of the building elements can be understood from the citation left; First, four columns, then four branches on the top and last, the roof will be covered with leaves for protection. The primitive man went through some problems where crude solutions were needed. Issues that were related to his body. Every building element has a function and is placed in a particular order to achieve a purpose. The construction is a prerequisite that must be there, while the building envelope is the goal for protecting the human body. All the architectural elements were related in a meaningful way and defined resource use that made sense for the human body. Building with minimal resources is at the heart of building sustainably, while the aesthetical use of the limited resources is the pinnacle of tectonic architecture.

The concept of the primitive hut described by Marc-Antonie Laugier illuminates the basic needs architecture serve. Covering the human body as a tectonic principle, where the building envelope is the goal and the construction system the means to reach the goals. Laugier's approach

to architecture is interpreted in this master thesis as the tectonic framework, where sustainable architectural design is avoidance of abundance and aims for the rational.

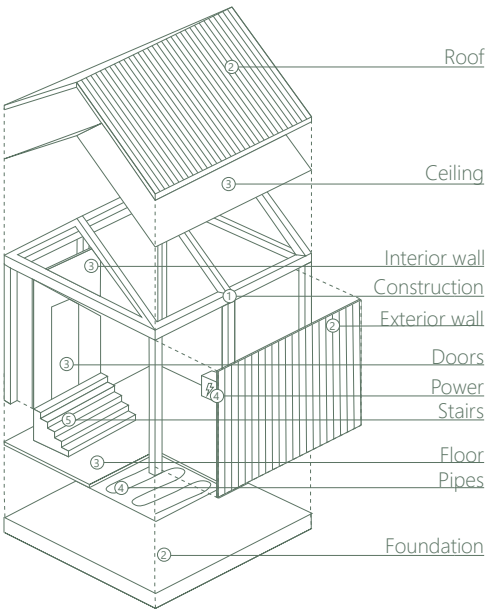
***Structuralism and the flexible setup***

Herman Herzberger is one of the most influential architects in structuralism and additive design. Herrtzberger's design method combined a limited number of elements to achieve enormous flexibility and openness. His approach is grounded in structuralism that divides structures into stable and interchangeable parts that can create a complex building typology through a few uniform elements (Nygaard 2011).

Hertzberger's view on architecture is that buildings should be flexible in their planning and able to transform if needs be. Hertzberger points out an example of a parking garage designed with a sloping floor. The solution can be cheap and easy to construct, but the building cannot be used for anything else if things change, for instance, if there is a period when few people own cars. A flexible building should be able to adapt itself in case of a change in users. He acknowledges that creating a flexible system will never be the best and most optimal solution for any given problem, but the most suitable one for the sake of the building as an everchanging object (Ghail and Vlijmen 2005).

Bernard Leupen defines the flexible building as the frame and the generic space. The frame is the building's permanent and durable structure which defines the changeable space within (Leupen 2005). This space within the frame is defined as a Generic space, a general and unspecified space, which will be altered through the building's lifetime according to the user's needs (Leupen 2005).

The frame is, in turn, made up of five layers that create the composition of the building: The load-bearing structure, Skin, Scenery, Servant elements, and access (Illu. 16). The main loadbearing structure is the columns, beams and loadbearing walls etc. The skin is the exterior surfaces of the building, such as the façade, foundation and roof. The scenery is the interior surfaces defined as the wall claddings, interior




Illu. 16 Structuralism and the flexible setup

doors, floors, and ceilings. Servant elements are the pipes and cables supplying water and power to the building. The access is the corridors and stairs of the building (Leupen 2005).

To these five layers, Leupen defines three types of changeability: the alterable, the extendable, and the polyvalent.

Alterable space contains a layer of the five defined elements above, which can be changed. Extendable spaces are not fully bordered by the layers and can be extended or compressed according to the new use of the area. Polyvalent spaces invite different uses through their form and dimensions (Leupen 2005).
Steven Groak focuses on the building's inherent ability to adapt. The first definition of the building's ability to adapt and change physically, the other definition describes the buildings adaptability in differing social and cultural settings (Groak 1990). With a society in constant develop-

ment, Groak sees a need for buildings to be able to adapt both physically and socially. With the ability to adapt, the useability and durability of the buildings are heightened.

These definitions of flexible architecture point toward the need for elements to be isolated to one use. Rather than utilising the room dividing and load bearing capabilities of the inner walls, the walls in the flexible architecture should rather be utilised only for their room-dividing capabilities, to ease the changeability of the plan, leaving the loadbearing capabilities to a separate system. In relation to structuralism and flexibility, tectonics can be defined as the main system or the elements that can generate different solutions and uses according to its time, use, and user behaviour.

With a folk high school, the buildings should not be fixed in their use and plans. The school is not meant to have a fixed curriculum and is susceptible to changes in trends and must be able to accommodate changes in school structure (Appendix 03). There is the inherent risk of the school not getting enough students and closing. By building flexibly, the school buildings will be able to be reconfigured easily to house other functions if needed. By exploring the options of the different types of flexible architecture defined above, the upcoming folk high school will be a physical study in building flexibly so as to build sustainably.

Hertzberger's and Leupens' approach to long-term flexibility will be considered when a design accommodates the present needs while remaining open to the changing situations of the future. Embracing the needs of future users leads to further exploration of how people relate to architecture, especially understanding the atmosphere of folk high schools.

# THE HUMAN SCALE

***The relation between the human body and architecture***

A phenomenological approach points out the intangible architectural qualities that are important and can sometimes easily be overseen in a time where everything quickly changes (Nygaard 2011). According to architecture, phenomenology is about the experience rather than the physical object.

Human identity is deeply rooted in the place; we are the world around us, our place, our society, and our region. A place is an objective quality that shows character, where the importance relies on creating a place – our own and the place's identity (Kjeldsen 2012). In the following, the traditional folk high school atmosphere will be introduced as an inspiration to create a building typology that accommodates the characteristics and experience of folk high schools.

***Atmospheres of folk high schools***

Folk high schools see community as a defining factor in generating participation, unity and coherence. Community and togetherness constitute learning, working, singing, playing and dwelling together, which creates togetherness (Rahbek 2019). Students have the freedom to experiment and push boundaries in a safe and homely environment (Rahbek 2019).

As the students step inside, the school embraces an all-encompassing and all-involving environment. There is no space for having a distanced position because the students are the community and the folk high school itself. There is an informal requirement that every school member participates and shows involvement and ownership of the community (Rahbek 2019). Setting the framework of opportunities and freedom to live out one's passion for providing an experience is the entire framework of folk high schools.

*"It is a free space away from the present, where it is possible to use three hours whittling a paddle without having to perform (Rahbek 2019 s.89).*

*"Det er lidt et frirum fra resten af virkeligheden, hvor man kan få lov til at stå i tre timer og snitte en pagaj uden at skulle præstere i det" (Rahbek 2019 s.89).*

Folk high schools are experienced as a bubble, enclosed and separated from everyday life. Community, freedom and diversity are the keywords to describe the atmosphere where the schools' themes and aesthetics reflect their identity (Rahbek 2019). Distinctively, a homely atmosphere is needed so the students feel safe. The theoretician Juhaani Pallasmaa summarises what a homely atmosphere is and how it can be created through architecture.

***Homeliness***

*"Home is an expression of the dweller's personality and his unique patterns of life. Consequently, the essence of home is closer to life itself than an artefact." (Pallasmaa, 1995 p. 132)*

For Pallasmaa, phenomenology has been a starting point for understanding architecture. Pallasmaa specifically criticised the eye's domination in modern architecture, which has resulted in the human body and the other senses being "homeless". Architecture is precisely an object interacting with the human body and all senses (Nygaard 2011).

One of Pallasmaa's well-known aspects of the human impact on architecture is his defi-

nition of the term home. Pallasmaa states that our perception of home is a remembrance of something warm, protective and loving from one's childhood. A home is a combination of psychology, psychoanalysis, and sociology, which might be left out of the present concept of architecture.

*"As we open a door, the body weight meets the weight of the door; the legs measure the steps as we ascend a stairway, the hand strokes the handrail and the entire body moves diagonally and dramatically through space." Pallasmaa, 1995 p. 63*

*"Når vi åbner en dør, møder kroppens tyngde dørens tyngde, ben måler trinnet, når vi går op ad en trappe, en hånd stryger langs gelænderet, og hele kroppen bevæger sig diagonalt og dramatisk gennem rummet." (Nygaard, 2011 p. 190-191)*

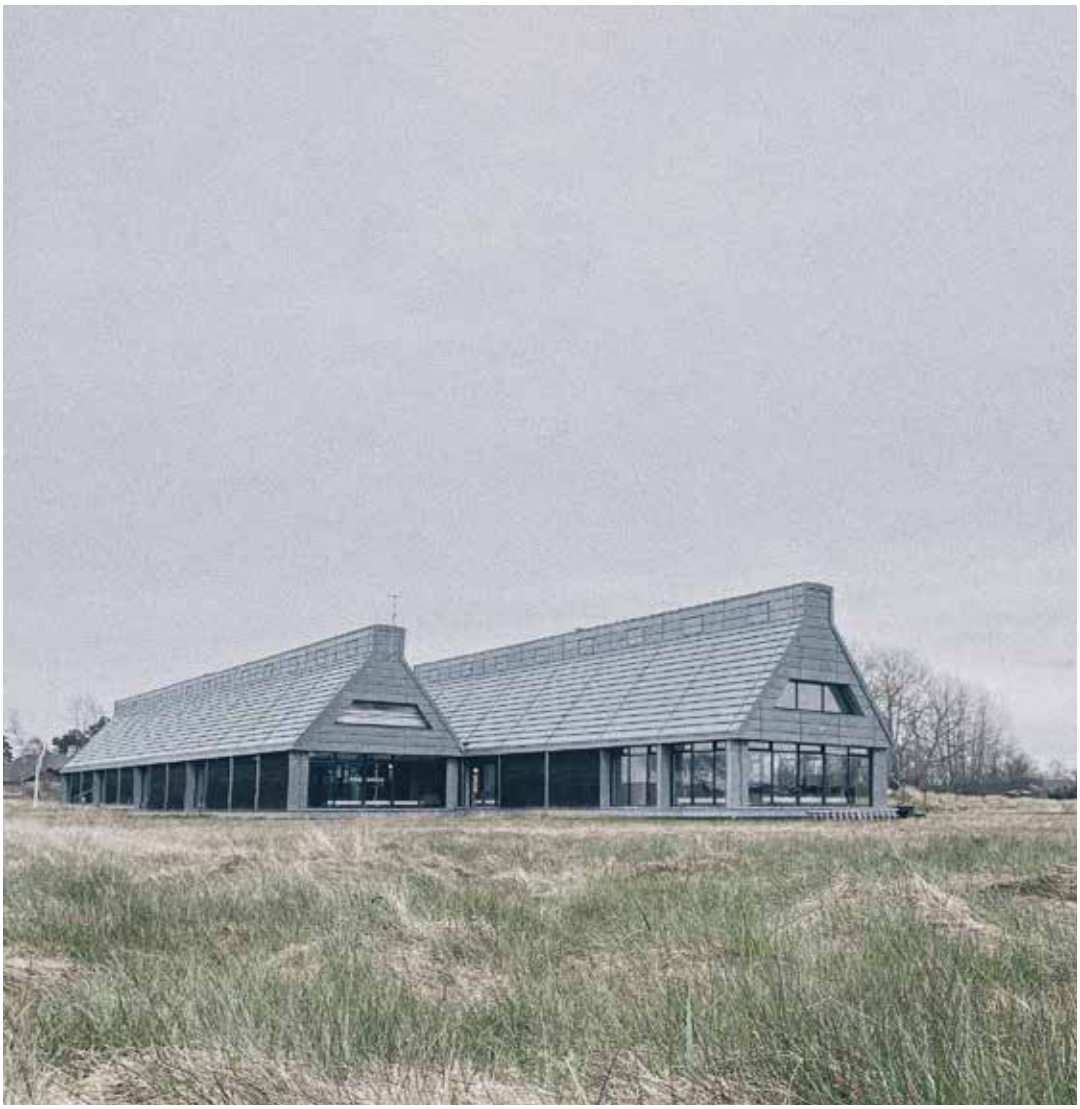
Architecture must be open for decorating a space with memories and elements that express our identity and personality to feel at home. A house is not just a shell but a collection of memories and personal images that help people remember who they are. Therefore, human beings are constantly searching for their childhood home and the homely feeling (Pallasmaa 1995).

Creating spaces that have a certain smell, a specific indoor environment, or materiality provides something that makes the user relate to their home or the homely feeling. Letting the space be flexible also allows users to unfold and personalise the dwellings as they want to. According to Pallasmaa, the phenomenological approach emphasises architecture as something fundamental that does not only express but creates our world (Pallasmaa 1995).

The atmosphere must reflect *fælledskab* where the students, through the schools' core values, community, freedom, and diversity, take responsibility for the negative impact humans have on the world, cultivating a new human behaviour, and spreading a new kind of sustainable living. The architecture has an opportunity to bring a homely atmosphere, preserve the spirit of folk high school and reinforce social sustainability through safety, community, involvement, and ownership.

## THE ENERGY ACADEMY

The Energy Academy was established based on the NGO Samsø Energi og Miljø office when the island was appointed as the energy Island in 1997. The primary task of the Academy is to convey the message of climate-friendly development and energy efficiency. The academy helps organisations and companies in the green transition, establishing contact between relevant funds and governing bodies. They help organise transition, create workshops and set the same goals for the organisation (Appendix p. 02).



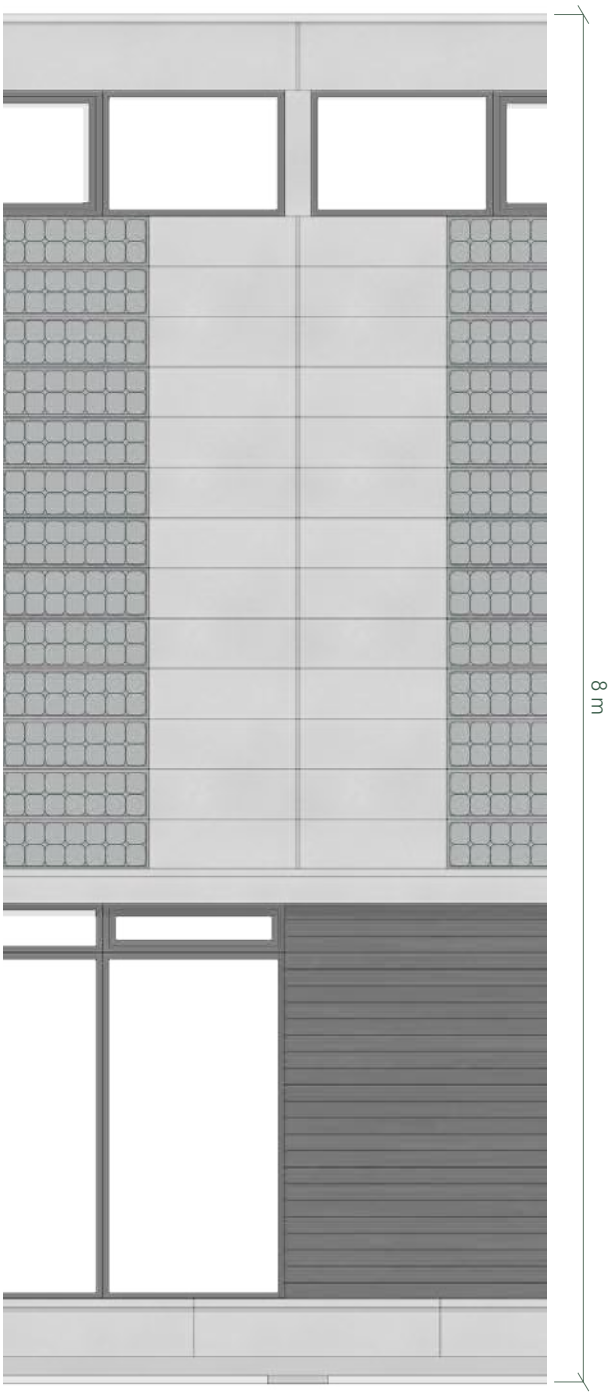
Illu. 17 The Energy Academy

## THE BUILDING

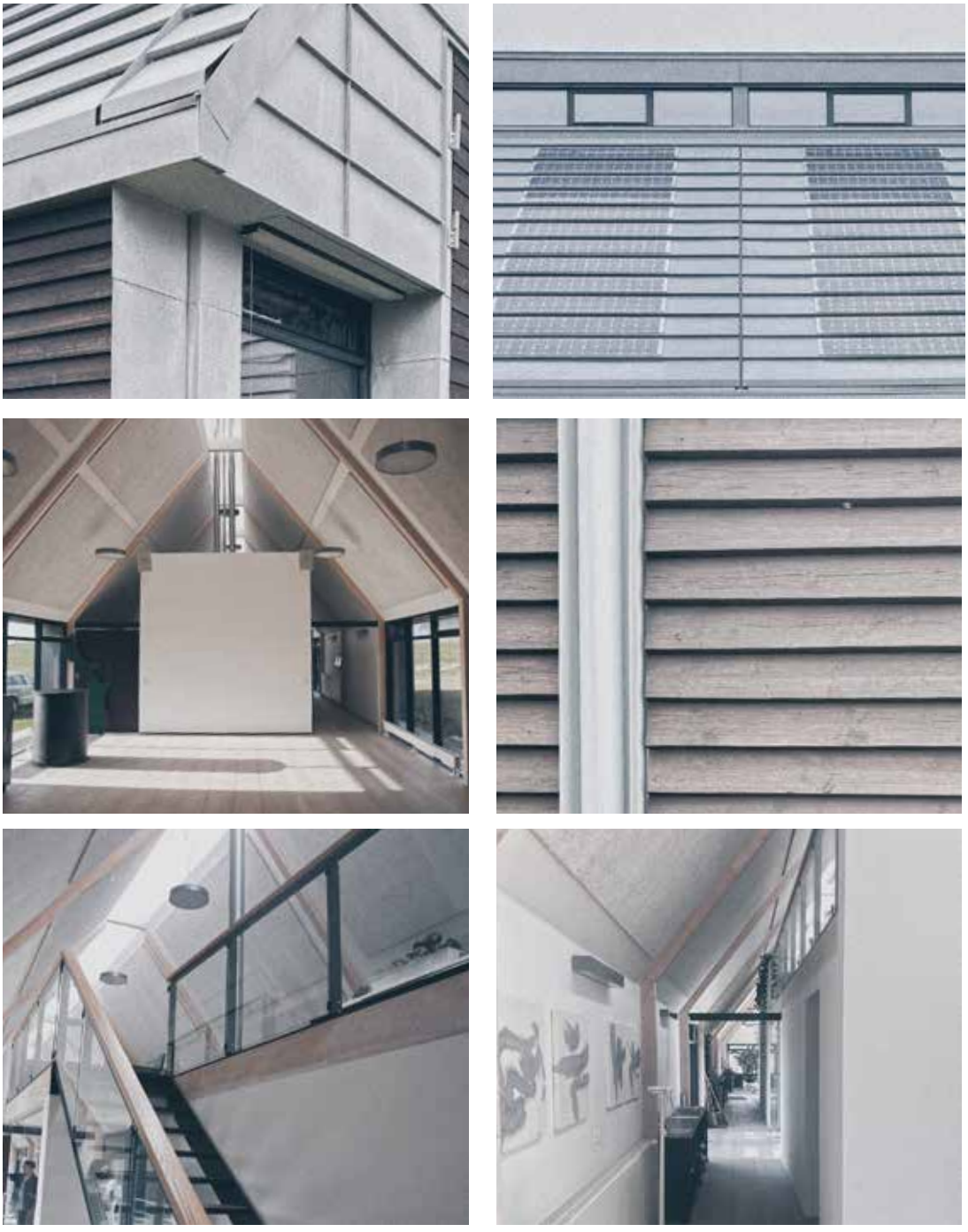
The building is built with sustainable solutions in mind and is completely self-sufficient (Illu. 18). Ventilation windows, solar panels, insulation from recycled newspapers and rainwater collection are some of the strategies implemented in the building (Energiakademiet 2022a) (Illu. 19).

All windows are recessed, creating a natural passive shading effect, and all of them have visible outdoor shading. Solar panels are built into the roof panels, which allows the panels to blend in with the roof.

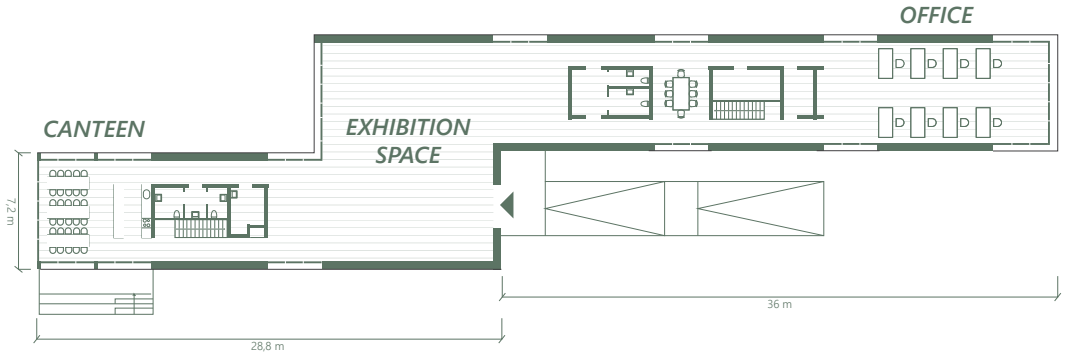
The existing building on the site of the Energy Academy was built with what was determined to be the best sustainable solutions when it was built in 2006 (Energiakademiet 2022a). The aim is to replicate this theory by actively showing the technological advantages by building to a high sustainable degree in 2022.




Illu. 18 The Energy Academy facade



Illu. 19 Pictures from the Energy Academy, outdoor and indoor




Illu. 20 The Energy Academy plan, not in scale.

## THE EARTH ACADEMY

In recent years, the initial planning for a folk high school associated with the Energy Academy has been set in motion. The Energy Academy has, together with the organisation Lokal Forankring, made plans to develop a folk high school (Lokalforankring 2021).

The Energy Academy's folk high school wishes to apply the known and unique qualities of the classic folk high school structure that allows students to immerse themselves in selected topics and progress their journey by learning about themselves. The ethos of teaching uneducated farmers and craftsmen about general education, culture, and philosophy is outdated in a time when all members of the public are educated to a relatively high degree. The Energy Academy, and their representative Søren Hermansen posing for an interview, see the need for turning the premise on its head.

The role of the folk high school is no longer to supply general education for the craftsman but a broad education in craftsmanship for the overly educated public (Appendix 02).

Furthermore, Hermansen sees a need for educating the public on leading a sustainable lifestyle. By creating a space where all the complexity of the sustainable concepts are being investigated and tested, the students will expand their knowledge and the tools to implement them in their everyday life. Many people want to make a positive difference but do not know where to begin or what aspect has the most significant impact on global issues (Appendix 02).

The Energy Academy is an important platform where knowledge can be shared to increase the awareness of the climatical issues and a place where strategies and discussions can be made for the improvements of Samsø in the field of sustainability.

The Academy's planning and requirements of the wanted folk high school on Samsø will be used as inspiration. Placing the folk high school in the vicinity of the existing Energy Academy is a priority to create a unified identity and include the Energy Academy in the learning environment.

Illu. 21 The Energy Academy, Canteen

## THE EMPLOYEES

Through the years, the employees at the Academy have made a reputation for themselves and are widely known in Denmark and internationally for their work in the field of sustainable energy production (Appendix 02). The Academy is a gathering space for global and local development of energy conservations and green transition. There are about eight employees with competencies in developing sustainable solutions. These employees have the role of conveying the message about the green transition to interested people. They conduct several meetings for education, research, courses, meetings, seminars and exhibitions focusing on sustainable resources.

The academy often gets visitors from companies who need energy consultation, tours, workshops and seminars (energiakademiet 2022b). Designing a folk high school must respect the Academy as an independent institution while creating opportunities and facilities that invite the employees into the school's curriculum. For instance, facilities for exhibitions, seminars, meetings etc.

***Demands***

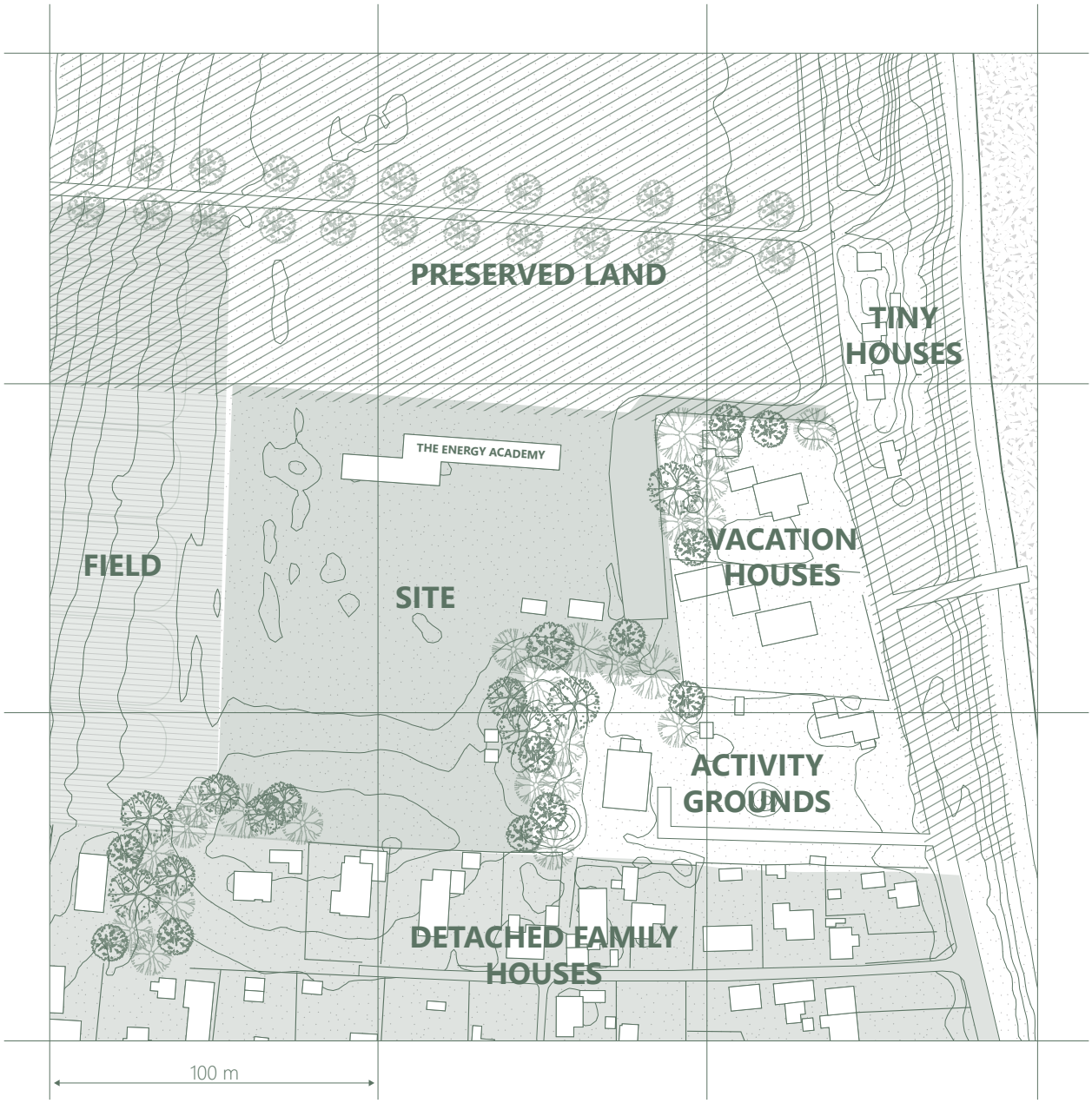
- *Office space*
- *Exhibition space*
- *Be the trademark for the Energy Academy*
- *Easy access to the folk high school*
- *Privacy*
- *Natural light in the building*
- *View to nature*

Illu. 22 Pictures from the surroundings on the site

## THE SURROUNDING CONTEXT

The land is preserved north of the site as part of the beach preservation, which means that the land cannot be included in the site (Illu. 23). Along the coastline, tiny vacation houses are placed, which used to be fisherman's houses. Between the tiny vacation houses and the site lies an ordinary vacation house and an activity ground. Today the activity ground is mainly a sports field that gets used by the inhabitants of the town for sports activities and in the summer for markets and tourist activities. To the south of the site is a neighbourhood with detached family houses either fenced off or hedged, shielding for privacy. To the west of the site, there are simply fields.

Relating to the surroundings is prevalent in the design process to make sure the buildings on the site follow the established logic of the context. By mirroring the characteristics of the neighbouring functions and relating to the established entrances of the site, the buildings will fit into the urban fabric of the surrounding town.

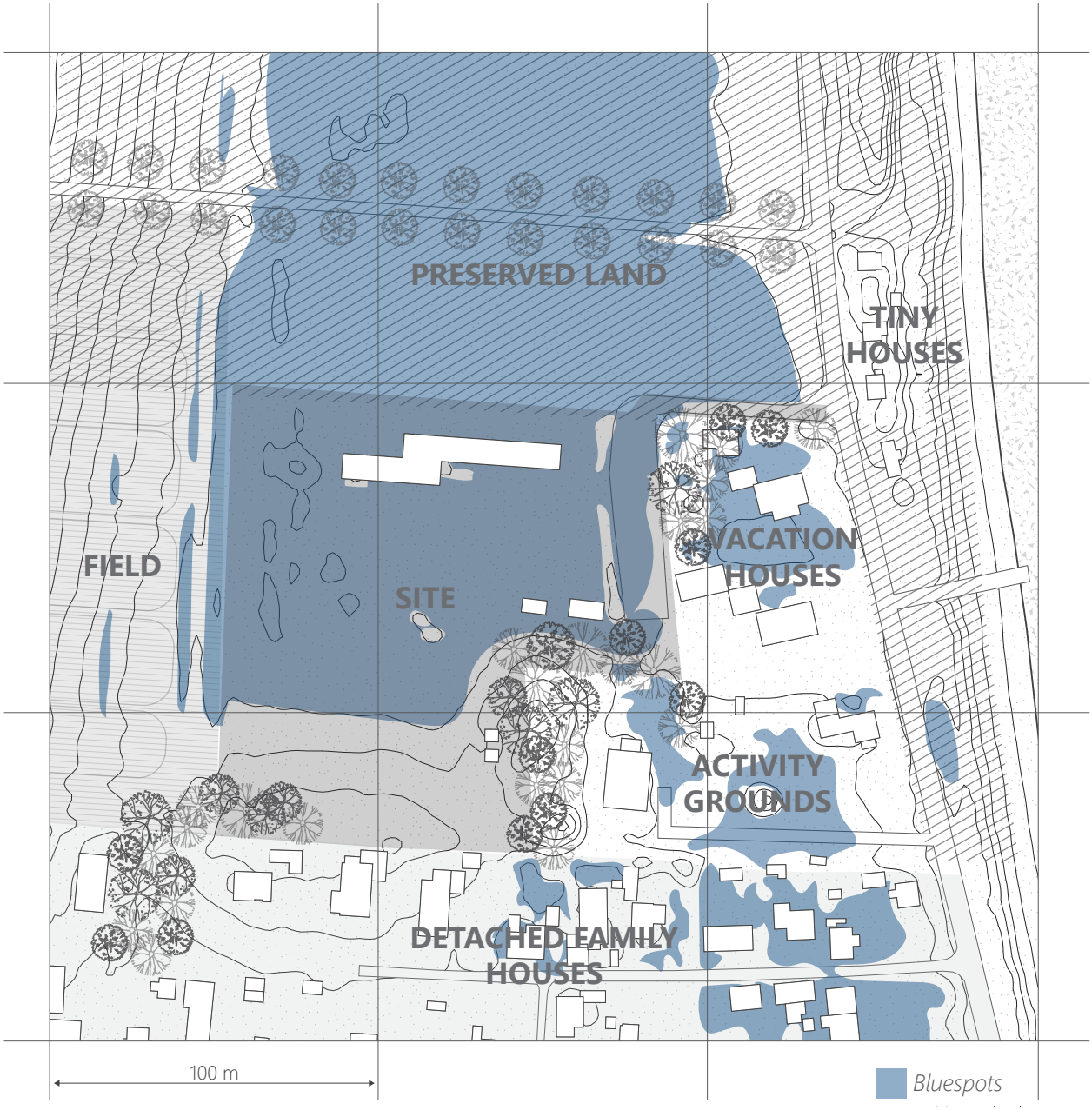



Illu. 23 Map of site and context

## CLIMATIC CONDITIONS

Climatic studies of the site have been conducted, with the findings showing that the site's topography is a low point in the landscape, creating a blue spot covering almost the entire site (Illu 24). The potential for water to accumulate will have a significant impact on the design of the future building mass. The design must work around this obstruction, possibly utilising this factor in the urban design and agriculturally between the buildings. With torrential downpours becoming more and more common, the potential for flooding rises. It is estimated that by 2050, flooding will occur twice as often as today (Sjøgren 2017).

The wind is almost exclusively coming from the west in the summer, with the primary wind directions in the winter being from the south and west. The wind can be utilized to improve natural ventilation in the buildings in the summer for cooling, for the users, or the exterior spaces with a breeze. With the open fields to the west of the site and the fact that the site is near the water will most likely result in increased windspeeds which can hinder the use of the outdoor spaces (Cappelen and Jørgensen 1999).




Illu. 24 Bluespot analysis

## USER-CENTRED DESIGN

Being able to embrace social sustainability, it is important to design with a focus on user-centred design, where the user's needs and demands are investigated and fulfilled. In the theoretical framework, the folk high school's atmosphere was explored. In the following, the folk high school will be analysed and investigated simultaneously with exploring what a folk high school is and how it works. Several user group interviews are conducted to reveal the key functionalities which should be accommodated.

## FOLK HIGH SCHOOL

The folk high school is a widely spread concept in Denmark, and there is no definitive kind of folk high school. The origin of the folk high school dates to 1830, when N.F.S Grundtvig developed the idea of a new form of school. According to Grundtvig, the cental concept of the folk high school is to shed light on human life and bring enlightenment (Rahbek 2019).

With time the idea of the folk high school evolved and changed from being about general education to expanding the offers to specialised courses such as sports, outdoor life, and political or religious themes. Today, many folk high schools work as a steppingstone for applying to specific educations, substituting general education for specialisation (Nielsen 2019).

*"In the 80s, a folk high school stay was possible, because of the huge unemployment rate and financing the stay with the given unemployment benefit. It was cheaper than having an apartment in the city and providing for oneself. This was closed afterwards. Everything follows the legislations, which follows the unemployment curve, which follows the general economy in the society and then there are trends, right?" (Appendix 03 p. 22)*

*"I 80erne kunne man komme på højskole, fordi der var stor arbejdsløshed og man kunne finanserne hele højskole opholde med de der dagpenge der. Det var faktisk billigere end at have en lejlighed der inde i byen og forsørge sig selv. Og det lukkede man så for, så derfor følger det jo lidt nogle lovgivnings mæssige ting, det følger arbejdsløskurven, det følger den generelle økonomi i samfundet og så følger det selvfølgelig trends, ikke." (Appendic 03. P. 22)*

The folk high school's educational approach does not end in an exam. Instead, the outcome is education and information itself (Rahbek 2019). Every folk high school have a common belief that the life we lead is not unimportant; it is an assignment that one needs to respond to (Nielsen 2019).

The folk high schools of today offer a range of courses of differing lengths depending on the wants and economy of the student. From longer periods spanning an entire year or a semester of 12-25 weeks to shorter summer courses of 1-2 weeks aimed at families and older people (Kunsthøjskolen 2022).

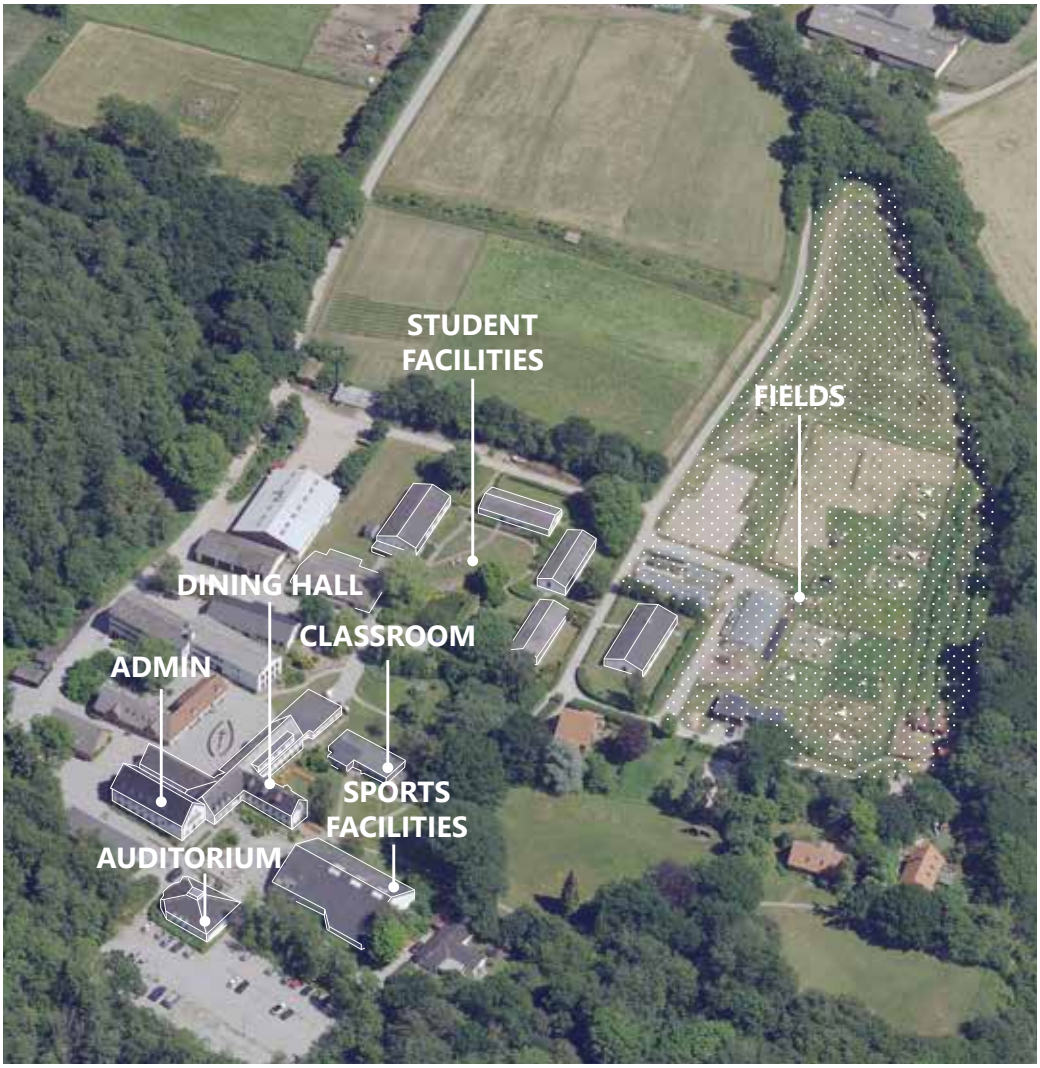
Community is a big part of the experience. At most folk high schools, the students share rooms. These smaller communities span from 2-3 people in the student rooms and 10-12 people per student housing. There are no breaks from people and communities at a folk high school, which is why many young people choose to stay at a folk high school for the social aspect. Today, the folk high school students are usually youngsters who have finished high school (Appendix 03).

*"... Community takes up and fills a lot (...) It is a lot like a family (...) So a folk high school is first and foremost a question of living together. It is basically a total normal everyday community..." (Appendix 03 p. 30)*

*"... Fællesskab fylder jo meget (...) Det er jo meget som en familie egentlig. (...) Så det vil sige det der med højskole, det er jo først og fremmest et spørgsmål om at man bor sammen. Det er simpelthen helt almindelige daglige levefælleskab..." (Appendix 03 p. 30)*

***An example of a folk high school***

An interview was conducted with the headmaster for Kalø Højskole to understand the characteristics of the typology. Kalø Højskole is a general folk high school established in 1952, with a broad range of educational courses from sustainable farming to general courses with a focus on broadening horizons in culture, arts, literature, and philosophy (Kalø Højskole 2022). Kalø has undergone many changes and has been on the edge of closing. They have had to make changes in their program to get students to attend, which resulted in the course GRO being established in the fall of 2021 (Appendix 03). The course, GRO, consists of subjects such as sustainability, biodiversity, sustainable farming etc. The school has a capacity of 80 students, primarily composed of young people in their twenties, but the number of students fluctuates a lot. The school also offers summer courses which are usually attended by the older segment (Appendix 03). The case study of Kalø Højskole is used as inspiration to estimate functional requirements and what courses are offered.




Illu. 25 Kalø Højskole contains data from Styrelsen for Dataforsyning og Effektivisering, skråfoto, 05/04 2022.

## THE STUDENTS

A folk high school is a very social place. No stay is like the previous. At the beginning of a stay, the social gatherings can and are at times controlled by the teachers, but with time the students take control and create their community and activities, both among themselves in the houses but also between houses (Appendix 04).

*"You don't have to worry too much about growing up. You can just focus on being yourself." (appendix 04 p. 34)*

*"Man skal ikke bekymre sig for meget ift. At blive voksen. Man kan bare koncentrere sig om at være sig selv." (appendix 04 p. 34)*

An informal interview with four students has been conducted (Appendix 04). Information was gathered, and the image of the average folk high school attendee was painted. The students expressed their need for a break from everyday life, and the hectic school pressure was the reason behind choosing to stay at a folk high school. Some of them were dropouts that needed to slow down and rethink their path in life, and others sought community with the same interests and passions (Appendix 04).

An investigation composed by the Danish Ministry of Higher Education and Science confirms the statements from the semi-structured interview about the pressure and uncertainty among students (Uddanelses- og forskningsministeriet 2018). The student's reason for choosing a folk high school is the need to have a break from their daily life, a need to explore who they are or to search for community among peers.

The interviews and the questionnaire unravelled key problems such as identity crisis, loneliness, the need for change, feeling pushed into the work environment, and a lack of exploring one's field of interest. This interview creates an understanding of the primary user's situation and their reasoning for their choice of folk high school.

*"We get a lot that have a bachelor's degree or have completed an education, that states that they have a need to do something else before they enter the job market and the adult responsibilities or just a break for another reason." (Appendix 03 p. 29).*

*"Vi får mange der kommer, med en bachelor eller en fuld uddannelse og siger, jamen de skal lige lave noget inden de skal ud at arbejde eller tager en pause eller af en anden grund" (Appendix 03 p. 29)*

***Demands***

- *New Activities.*
- *Space for different sizes communities*
- *Diversity of people to share experiences and opinions with.*
- *Individual time and space*
- *The feeling of home.*
- *A place to have a break, reflect and explore.*
- *Practical workshops and learning spaces*

*"I forget all the time that this is a school, because I associate school with some certain requirements, and I don't feel, that there are any. Beside those we make ourselves (Rahbek 2019 p.92).*

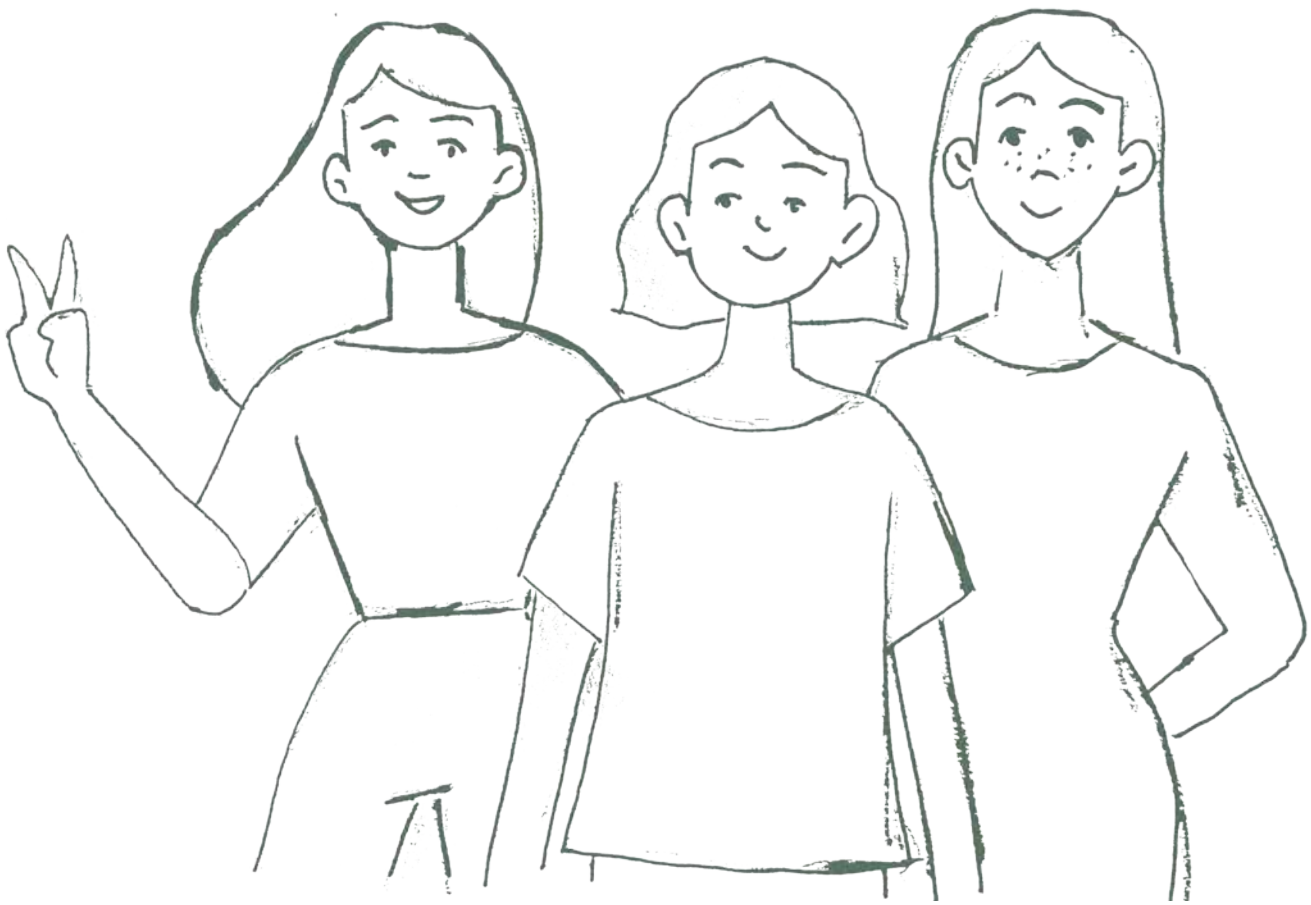
*"Jeg glemmer hele tiden, at det er en skole, for jeg associerer en skole med bestemte krav, og jeg føler ikke, at der er nogen krav. Ud over dem, vi sætter for os selv" (Rahbek 2019 p.92).*

*"You don't have to worry too much about growing up. You can just focus on being yourself." (appendix 04 p. 34)*

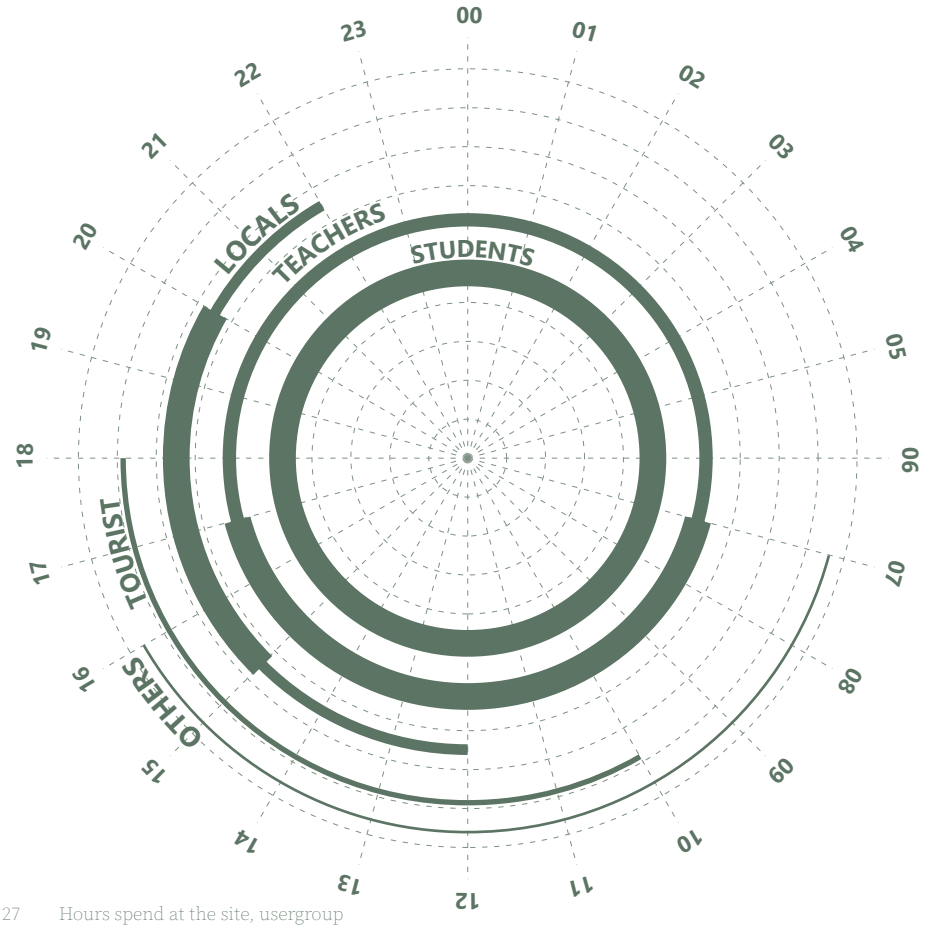
*"Man skal ikke bekymre sig for meget ift. At blive voksen. Man kan bare koncentrere sig om at være sig selv." (appendix 04 p. 34)*

*"You don't use that much time in the rooms, but time is spend in the smaller communities. But that all depends on who you are as a person" (appendix 04 p. 35)*

*"Man bruger ikke særligt meget tid ind i værelserne, men mere i de mindre fællesskaber. Det kommer selvfølgelig an på, hvem man er. " (appendix 04 p. 35)*



Illu. 26 Students




Illu. 27 Hours spend at the site, usergroup

# SECONDARY USERS

A range of secondary users of the folk high school has been identified through the interviews and analyses. Their characteristics and needs will be defined in the following.

***Teachers***

At some folk high schools, one or two teachers are required to stay on campus, but others make it a choice between the teachers (Hoyer 2017). Therefore, it is required to have at least two staff housings on-site, with space enough for a family to live. Because the folk high school is based on an island, the offer for teacher dwellings might be in higher demand if the teachers are coming from the mainland.

*Demands*
*Teacher facilities*
*A house to stay in, for a longer period*
*Room for family*
*Privacy*
*Own entrance*

***Locals***

For the locals, the school should act as a local gathering point, where they can meet for talks and community events such as communal eating or general assemblies, for which the latter is something the Energy Academy is already used for.

*Demands*
*Open facilities*
*Activities*
*Easy access*

***Tourists***

Ballen is a very popular destination for tourists in the summer. The folk high school should serve as an inspiration for a sustainable lifestyle with events for the public in the tourist season. The folk high school should be an exhibition that showcases sustainable building techniques and active strategies in the architecture.

*Demands*
*Open facilities*
*Visibility*
*Activities*

# SYNTHESIS

The different theories, analyses, and investigations mentioned so far form the basis of the problem statement, vision, room program and design criteria for the thesis. A synthesis of the program will be introduced in the following which will guide the entire design process.

## PROBLEM STATEMENT

***"How do we create a folk high school based on embracing fælledskab that becomes the ideal example of a cultural change and formation of a behaviour that accommodates a new sustainable lifestyle?"***

## VISION

Embracing a sustainable lifestyle is daunting. Determining where to begin, where the most significant personal impact is and what power the individual has, is not apparent. This daunting task will be made tangible by creating a space of sustainable exploration in a wide range of aspects with *fælledskab* as the driving force. The upcoming folk high school will become the place to visit to live more sustainably, pushing a behavioural change for visitors and giving them a chance to test out alternatives before implementing them in the private life of the visitor through *fælledskab*.

Embracing community and togetherness through architecture is the fundamental essence of creating a folk high school where the visitors together take responsibility for managing a fælled. The visitors will be equipped with the tools and skills necessary to push the sustainable societal change themselves as a more significant cultural shift.

Illu. 28 Picture from Balle Bjerg

## REGULATIONS

The room program describes the indoor requirements for each room divided into four comfort criteria: thermal, acoustic, atmospheric and visual comfort. In the following, the four comfort criteria will be introduced and the regulatory requirements the room program is based on.

The thermal comfort follows the Danish standard regulation, DS/EN 16789-1:2019, where the requirements are chosen by evaluating the level of expectation from low to high. The auditorium, classroom, library, office, meeting room, and living rooms are categorised as high since these spaces cover concentrated work and prolonged stays of the users. The remaining rooms sprout room, dining hall, staff room, workshops, assembly room, teacher facilities and student rooms are categorised as a medium level of expectation because of the low usage (p. 54). When simulating the indoor environment in BSim, the BR18's regulations and its guiding examples of requirements are followed, between the school functions and the student dwellings.

Investigations by the Danish Technical University have shown that a good indoor climate will enhance the learning and concentration among the students (Toftum, Wargocki et al. 2011). BR18 states that a $CO_2$ level of 1000 ppm (Illu 29 p. 53 & p. 54) in a building is sufficient. The study shows that reducing the baseline to 800 ppm in rooms with educational purposes benefits the users and enhances their overall performance. Following this logic, the classrooms, auditorium, library, offices, and meeting rooms will have their baselines reduced to 800 ppm (Illu 29 p. 53 & p. 54).

For workspaces, it is important to ensure visual contact with the outside, letting the users have a sense of the rhythm of the day, and sufficient natural lighting (Arbejdstilsynet 2017). For visual comfort, the requirements stated in BR18 will be used (Illu 29 p. 53 & p. 54).

The entire school will gather in the auditorium and the dining hall. Therefore, the acoustic comfort must be sufficient. The dining hall follows the building regulation of BR18 (Illu 31 p. 53 & p. 54), whereas the reverberation time for the auditorium follows the requirement from the SBI 137 instruction (Illu 29 p. 53 & p. 54) (Petersen 1984).

| | Requirements | Reference |
|---|---|---|
| **Thermal comfort** | | |
| Operative temperature | | DS/EN 16798-1:2019 Tabel 4 |
| Summer season, approximately 0,5 clo  Category I | 25,5 °C | |
| Winter season, approximately 1,0 clo  Category I | 21 °C | |
| Summer season, approximately 0,5 clo  Category II | 26 °C | |
| Winter season, approximately 1,0 clo  Category II | 20 °C | |
| | | |
| Tolerance exceedings for operative temperature | | BR18, Section 19, Guide * |
| Above 26 °C | 100 Hours | |
| Above 27 °C (only public functions) | 50 Hours | |
| Above 28 °C (only dwellings) | 25 Hours | |
| | | |
| **Indoor Air quality** | | |
| $CO_2$ concentration max . ppm.  (Classroom) | 800 ppm | |
| $CO_2$ concentration max. ppm. | 1000 ppm | BR18, Section 22, Guide ** |
| | | |
| **Visual Comfort** | | |
| Daylight | 300 lux | BR18, Section 18*** |
| Visual access to the surrounding context (work space) | | Arbejdstilsynet (8. Udsyn) |
| | | |
| **Acoustic Comfort** | | |
| Reverberation time - Auditorium | 0,7-1,1s on 500 Hz | SBi:137 Rumakustik pp. 49 |
| Reverberation time  - Dinning room | 0,9s on 125 Hz | BR18, Section 17, Guide **** |

*BR18, Section 19 - Termisk indeklima og installationer til varme- og køleanlæg (§385 - §392), Guiding chapter 1,0

**BR18, Section 22 - Ventilation (§420 - §452), Guiding chapter 1,7

***BR18, Section 18 - Lys og udsyn (§377 - §384)

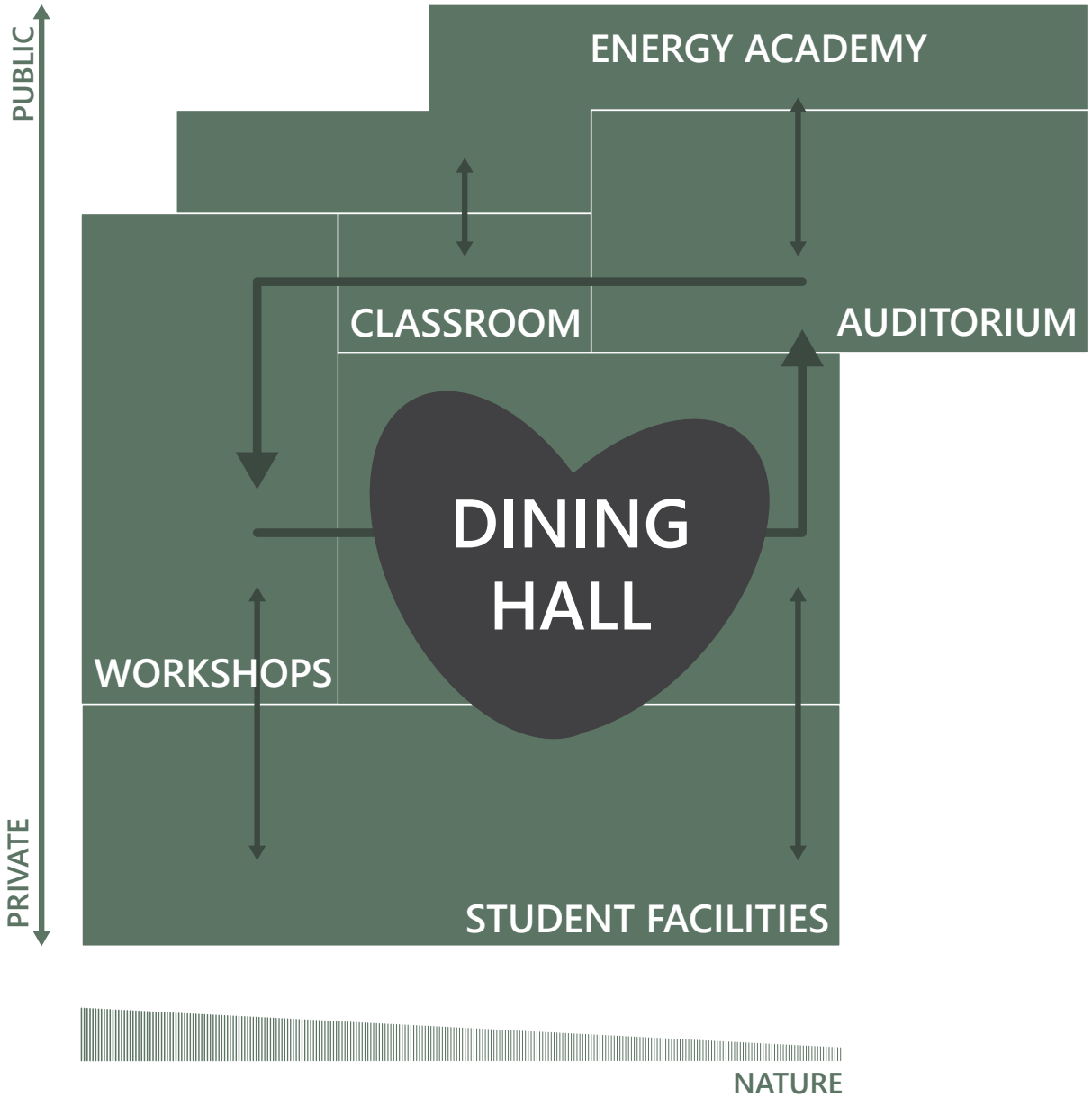
****BR18, Section 17 - Lydforhold (§368 - §376), Guiding chapter 2,5

Illu. 29 Thermal comfort

# ROOM PROGRAM

| Room | Category<br>Level of expectation | Quantity | Ceiling height<br>[m] | Area<br>[m²] | Area total<br>[m²] | Occupants<br>Seated | Ventilation<br>Minimum req. | <br>$CO_2$<br>[ppm] | Daylight<br>[lux] | | BR18 Temp.<br>Guiding<br>[ Hours < °C] | | Operative temperature<br>Winter<br>[°C] | <br>Summer<br>[°C] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1 School facilities** | | | | | **616** | | | | | | | | | |
| Auditorium | High | 1 | 4 | 148 | 148 | 90 | 4,90 | 800 | Visual access | 300 | 100 h < 26 °C | 50 h < 27 °C | 21 | 25,5 |
| Classroom | High | 1 | 4,5 | 35 | 35 | 12 | 2,73 | 800 | Visual access | 300 | 100 h < 26 °C | 50 h < 27 °C | 21 | 25,5 |
| Sprout room | Medium | 1 | 4 | 40 | 40 | 30 | 5,88 | <1000 | - | 300 | - | - | - | - |
| Library | High | 1 | 4 | 70 | 70 | 30 | 3,66 | 800 | - | 300 | 100 h < 26 °C | 50 h < 27 °C | 21 | 25,5 |
| Dining hall | Medium | 1 | 4 | 250 | 250 | 100 | 3,81 | <1000 | Visual access | 300 | 100 h < 26 °C | 50 h < 27 °C | 20 | 26 |
| Industriual kitchen | Medium | 1 | 4 | 13 | 13 | 15 | 8,68 | <1000 | Visual access | 300 | - | - | - | - |
| Scullery | Medium | 1 | 4 | 20 | 20 | | 0,69 | - | - | - | - | - | 16 | - |
| Niches | | | 4 | 12 | 0 | 2 | 1,85 | - | - | - | - | - | 16 | - |
| Depot | | | 4 | 12 | 0 | | 0,69 | - | - | - | - | - | 16 | - |
| Technical room | | 1 | 4 | 60 | 60 | | 0,69 | - | - | - | - | - | 16 | - |
| **2 Administration** | | | | | **96** | | | | | | | | | |
| Office | High | 1 | 2,5 | 40 | 40 | 4 | 2,22 | 800 | Visual access | 300 | 100 h < 26 °C | 50 h < 27 °C | 21 | 25,5 |
| Meetingroom | High | 1 | 2,5 | 14 | 14 | 8 | 7,44 | 800 | Visual access | 300 | 100 h < 26 °C | 50 h < 27 °C | 21 | 25,5 |
| Staffroom | Medium | 1 | 4 | 30 | 30 | 8 | 2,54 | <1000 | Visual access | 300 | 100 h < 26 °C | 50 h < 27 °C | 20 | 26 |
| Depot | | 1 | 4 | 12 | 12 | | 0,69 | - | - | - | - | - | 16 | - |
| **3 Workshops** | | | | | **180** | | | | | | | | | |
| Wood | Medium | 1 | 4 | 40 | 40 | 20 | 4,15 | <1000 | Visual access | 300 | 100 h < 26 °C | 50 h < 27 °C | 20 | 26 |
| Metal | Medium | 1 | 4 | 40 | 40 | 20 | 4,15 | <1000 | Visual access | 300 | 100 h < 26 °C | 50 h < 27 °C | 20 | 26 |
| Creative | Medium | 1 | 4 | 40 | 40 | 20 | 4,15 | <1000 | Visual access | 300 | 100 h < 26 °C | 50 h < 27 °C | 20 | 26 |
| Technical room | | 1 | 4 | 60 | 60 | | 0,69 | - | - | - | - | - | 16 | - |
| **4 Other** | | | | | **120** | | | | | | | | | |
| Assembly room (fest lokale) | Medium | 1 | 4 | 120 | 120 | 50 | 3,58 | - | - | 300 | - | - | 20 | 26 |
| **5 Student facilities** | | | | | **1234,7** | | | | | | | | | |
| Student room | Medium | 40 | 2,3 | 9,4 | 376 | 2 | 3,77 | - | Visual access | 300 | 100 h < 27 °C | 25 h < 28 °C | 20 | 26 |
| Toilets | | 1 | 2,3 | 3,4 | 6,7 | 1 | 4,75 | - | - | - | - | - | - | - |
| Bath | | 6 | 4 | 5 | 30 | 1 | 2,08 | - | - | - | - | - | - | - |
| Kitchenette | Medium | 8 | 4 | 3 | 24 | | 0,69 | 1000 | - | 300 | 100 h < 27 °C | 25 h < 28 °C | 20 | 26 |
| Living room | High | 1 | 2,3 | 46 | 46 | 6 | 2,77 | 1000 | Visual access | 300 | 100 h < 27 °C | 25 h < 28 °C | 21 | 25,5 |
| Technical room | | 8 | 4 | 20 | 160 | | 0,69 | - | - | - | - | - | - | - |
| Laundry, dry room | | 8 | 4 | 50 | 400 | | 0,69 | - | - | - | - | - | - | - |
| Cleaning equipment room | | 8 | 4 | 12 | 96 | | 0,69 | - | - | - | - | - | - | - |
| Depot | | 8 | 4 | 12 | 96 | | 0,69 | - | - | - | - | - | - | - |
| **6 Teacher facilites** | | | | | **200** | | | | | | | | | |
| Familiy House | Medium | 1 | 4 | 90 | 90 | 4 | 1,00 | 1000 | Visual access | - | 100 h < 27 °C | 25 h < 28 °C | 20 | 26 |
| Familiy House | Medium | 1 | 4 | 110 | 110 | 4 | 0,94 | 1000 | Visual access | - | 100 h < 27 °C | 25 h < 28 °C | 20 | 26 |

## ROOM DIAGRAM




Illu. 30 Room diagram

## DESIGN CRITERIA

1. A variety of common spaces must be created in the buildings and in the urban space to create different degrees of social spaces.

2. Relation between the Energy Academy and the folk high school must be created for cohesion while creating an identity for the folk high school itself.

3. Flexible building typology that enhances the present and future needs of the folk high school.

4. Rational architectural design that avoids material waste and unnecessary ornament.

5. Building envelope that consists of biobased materials with low $CO_2$ impact.

6. Sustainable solutions must be applied and incorporated into the design to educate students on sustainable living.

7. Create a dining hall that would be the heart of the folk high school where all the different users gather.

8. Creating a homelike environment and avoiding an institutional atmosphere, with the ability to express personality, ownership and safety.

9. Choosing materials based on optimal LCA calculations without compromising architectural vision, expression and phenomenology.

10. Minimal footprint and optimal area use.

11. The folk high school must also be a workspace with the possibility of visual access and a good indoor environment for concentrated work.

12. Live up to the standards of the low energy frame of the BR18 and reach net-zero energy definitions.

13. Must accommodate high-quality indoor climate based on passive strategies such as natural ventilation, passive solar heating and fixed solar shading.

15. The common areas must be designed with good acoustics, easy access to nature and a comfortable indoor climate without overheating.

Illu. 31 Tiny vacation houses, Ballen

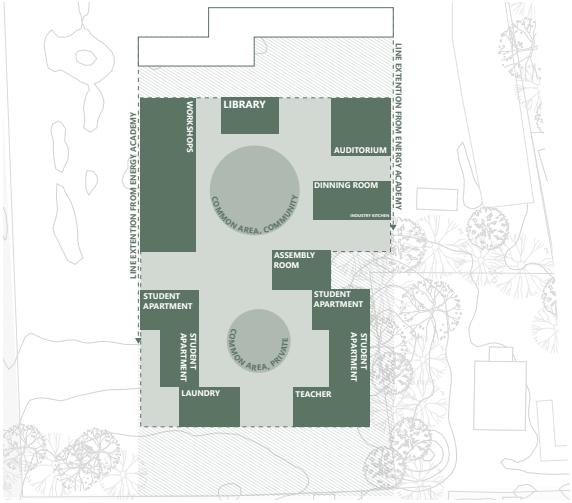
# THE DESIGN PROCESS

The design process is divided into categories: The overall master plan, private zone and public zone with various subcategories. The technical- and architectural aspects are all merged to show how these disciplines are affected by each other and in what way the output has affected the final design. The master plan was the starting point of the design process with the mentioned criteria below.

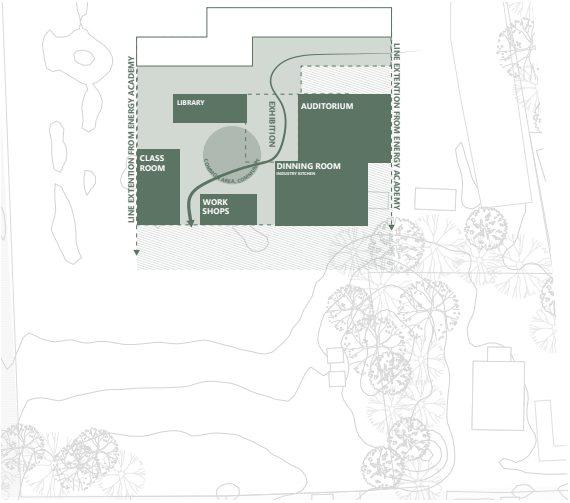
***Criteria*** 1. Creating common urban spaces for community, 2. Relation between Energy Academy and the folk high school, 3. Relating to the surrounding context, and 4. Flexible building typolgy.


Illu. 32 Concept 1


Illu. 33 Concept 2




Illu. 34 Concept 3




Illu. 35 Concept 4

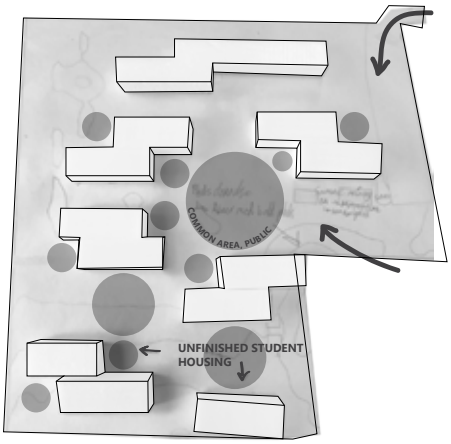
# MASTER PLAN

The design process commenced by formulating the necessary functions, sizes, and functional requirements into a room program (Synthesis p. 54). Analysing and acknowledging the Energy Academy was essential to ensure a relation between the building and the upcoming folk high school. In the initial sketches, two main concepts were tested: Having individual buildings for each function or gathering the functions into one building. Concepts 1 and 2 showed single buildings with urban spaces in between (Illu. 32-33), whereas concepts 3 and 4 showed merged functions surrounding and defining the exterior space (Illu. 34-35).

By having the whole school under one roof, the building became large, heavy and dominating in the surrounding context. The school did overshadow the Energy Academy, which is deemed the site's landmark (Energy Academy p. 33). Having single buildings created many spaces to gather, reinforcing the ethos of folk high schools, defined by the community (theoretical framework p. 21). The disadvantage was the possibility of creating too many meeting points washing out the social life with many small communities that undermined the larger-scale community. Concept 1 and 2 of placing the functions in individual buildings was chosen to ensure that the folk high school adapted to the place's scale but still works further by creating more defined urban spaces for different characteristics of social meetings.

From the initial master plan sketches, form studies were conducted based on the concept of dispersing the functions into individual buildings.

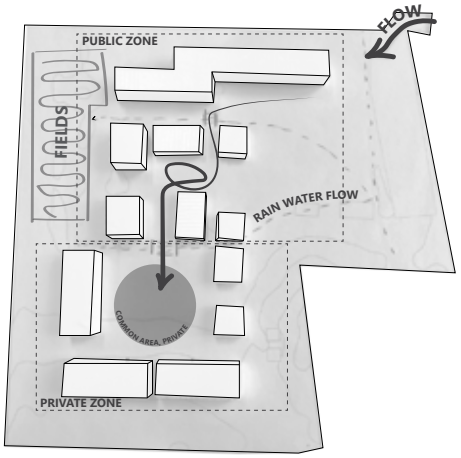
**Iteration 1**
The connection to the Energy Academy was vital, leading to investigating the same building form. The Z-shaped buildings showed potential in the natural formation of gathering niches on different scales. There was a clear connection between the Academy and the school. However, the connection created anonymity rather than an identity to the folk high school (Illu. 36).




Illu. 36 Iteration 1

**Iteration 2**
Iteration 2 consisted of breaking the buildings into smaller volumes and placing them on the site with the input of the microclimatic analysis (Climatical condition p. 42). The downpour, consequent flooding and water flow across the site created a natural division. The division was translated into a public and private zone of the site (Illu. 37).

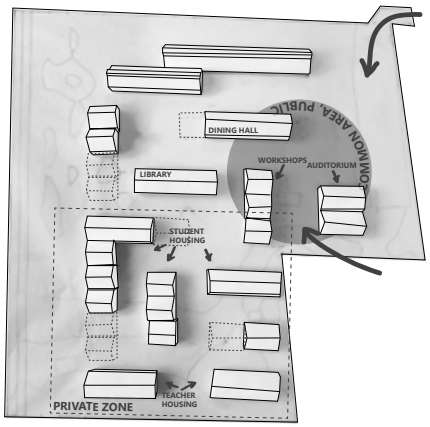
The immense scale of the gathering was situated in the private zone, but it was an open space without enclosed niches for the smaller communities. In the north of the site, the public zone is still introverted by turning its back on The Academy instead of including it in the urban fabric.




Illu. 37 Iteration 2

**Iteration 3**
The connection between The Academy and the school was considered again without mimicking too much. The pitch of the roof, the building width and the directionality of the building were derived from The Academy into rectangular shapes (Illu. 38). The exterior spaces are defined by bringing out the internal functions of the urban spaces.

The buildings were placed closer to the private zone, which created a range of different meeting points. It was tested out if other functions needed to be enhanced more than others. The auditorium could, in this case, have another shape to underline that the building is flexible to be used by several users (user-centred design p. 46). Additivity in architecture was generated according to the rectangular-shaped building and how it can create a flexible building design growing with the school's needs.

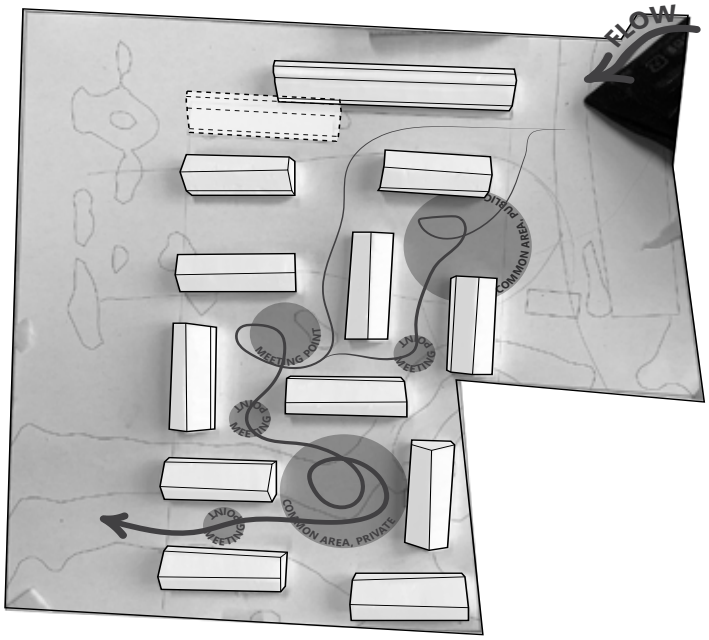



Illu. 38 Iteration 3

## STUDENT HOUSES

The private zone was, throughout the process, placed on the southern part of the site, in the vicinity of the established private atmosphere of the detached houses and away from the main access points of the site (Ballen p. 15). Several requirements have been set to be met during the design process. The design process of the private zone started from the decision of working with individual buildings on the site and making space for working with the additive principle of extending the student housings as the need arises.

***Criteria*** 1. Space for 80 students to live, 2. Different scales of community, 3. Direct access to the outdoors, 4. Minimal footprint and optimal area use, 5. Possibility for self-build, 6. Flexibility, 7. Clear distinction between public and private zone, 8. Homely atmosphere, 9. Sustainable materials for internal claddings, and 10. Homely atmosphere.

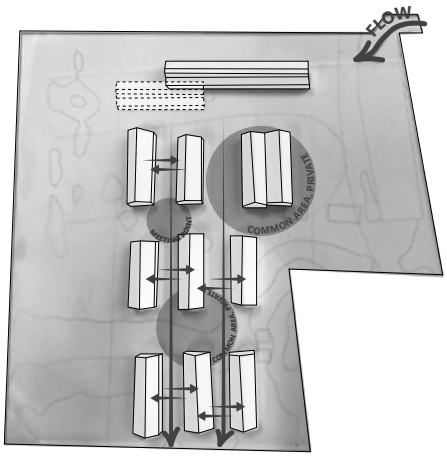



Illu. 39 Iteration 3

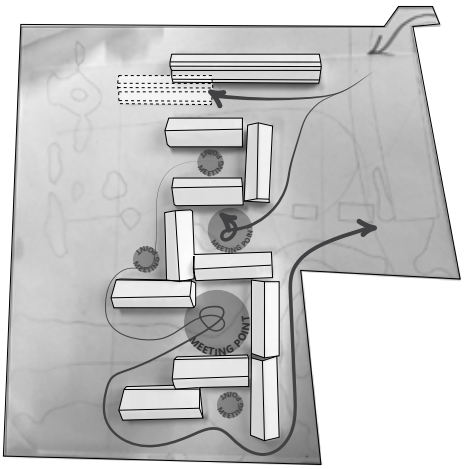
**Iteration 1**
A system of rectangular buildings facing north/south was established to break the area between the buildings into smaller niches (Illu. 40). Even though a line of sight was created from The Academy towards the southern part of the site, the urban spaces in between were equally divided, which removed the hierarchy of social spaces. By facing the gables towards the north/south, plenty of sunlight could reach the space between the buildings by keeping sunlight corridors (Appendix 06, iteration 2).

**Iteration 2**
Breaking the linear structure and placing the buildings in different directions helped create different scales of communities (Illu. 41). Placing the buildings in relation to each other created a total building mass which drives attention away from the Energy Academy. The compact urban spaces created difficulties in letting the sun enter the outdoor areas. Likewise, the buildings would be shaded for each lowering the potential for natural light inside (Appendix 06, iteration 3).

**Iteration 3**
The rectangular structure was maintained by spreading the volumes smoothly, transitioning between the Energy Academy and the folk high school (Illu. 39). Balanced graduation of big and small gathering spaces was created, where the hierarchy of social spaces was met. By scattering the buildings, plenty of sunlight could reach most outdoor spaces while creating spaces of shade in the summertime (Appendix 06, iteration 4).




Illu. 40 Iteration 1




Illu. 41 Iteration 2

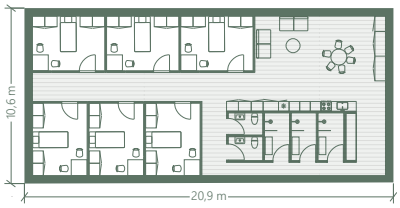
# DETAIL OF STUDENT HOUSINGS

Simultaneous with the master plan, the plan structure of the rectangular volume was investigated. Based on investigating Kalø Højskole (User-centred design p. 44), it was estimated to create a folk high school for a maximum of 80 students. Each rectangular building was defined to house around 12 students with six shared bedrooms.

**Iteration 1**
Six shared bedrooms were placed in the middle of the space, where a hallway was created from the entrance to the common area (Illu. 42). By placing the shared spaces, a free choice was made for the students to join gathering arrangements in the common room or not. A sustainable design contains a minimal footprint and utilises every square meter, which was not fulfilled in this proposal by having hallway waste space.

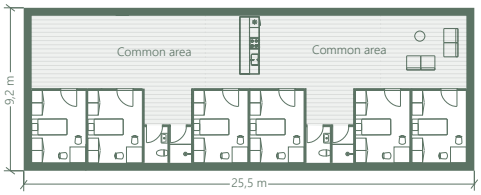

Illu. 42 Iteration 1

**Iteration 2**
The second iteration kept the monofunctional hallway to create a zone of privacy away from the common room, which now featured a technical core for bathrooms and kitchen, resulting in even more waste space (Illu. 43).



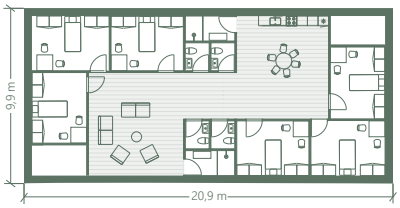

Illu. 43 Iteration 2

**Iteration 3**
The third iteration was based on incrementally extending the volume as the number of students increases (Illu. 44). The bedrooms were placed on one side and the common area on the other side, replacing the monofunctional hallway. With this arrangement of functions, there is no semiprivate or semi-public zone between private and public. Instead, the space invites the student to engage in the community as they leave their room. The common area was narrow and complicated to furnish, especially when the building grew longer.




Illu. 44 Iteration 3

**Iteration 4**
The fourth iteration focused on reducing the length of the building while keeping the common room as the centre. This proposal established a clear subdivision of the common area, with a kitchen zone and a living room zone, which was undesired because of the wish to extend the volume (Illu. 45).




Illu. 45 Iteration 4

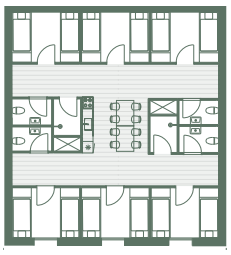
Even though rectangular volumes created good urban spaces, they potentially created complications with interior planning. The following iterations took a step back, investigating other types of volumes to analyse whether they could create a more optimal plan with a minimal footprint.

## PLAN STUDIES OF DIFFERENT VOLUMES

**Iteration 1**
The length of the rectangle was reduced by limiting the footprint of the shared student room from 12 $m^2$ to 9$m^2$ (Illu. 46). Two of the bedrooms were placed in front of the others, defining a common area. With the present iteration of the rectangular shape, this proposal had a sufficient building length with a minimal hallway space.

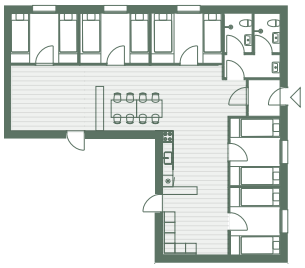
Illu. 46 Iteration 1

**Iteration 2**
The square plan structure divided the block into two zones with each hallway, where the common area was placed in the middle between two technical cores (Illu. 47). The building length was reduced, but the common room was minimal for the number of residents and had no direct access to the outdoors or natural lighting.



Illu. 47 Iteration 2

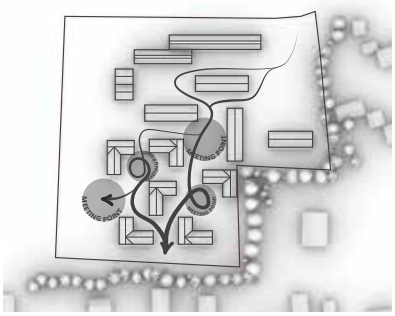
**Iteration 3**
The third iteration consisted of an L-shaped building with technical functions and an entrance in the bend with the possibility of a large common room growing from either side of the technical corner (Illu. 48). The common area was still to be optimised to avoid waste space, but there was the potential of extending the volume. The next process would be based on the L-shaped and the rectangular plan with a focus on avoiding waste space and optimising the common area.



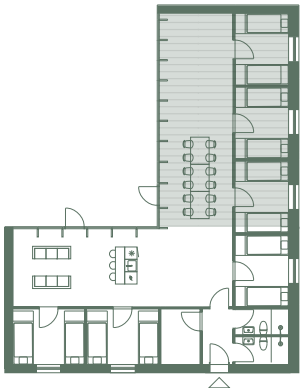
Illu. 48 Iteration 3

## MASTER PLAN

By using the L-shape, more dynamic space is created in between the housings (Illu. 49). Along the trails, different communities are created for different sizes of meetings. Sunlight analysis revealed adequate sunlight between most buildings (Appendix 06, iteration 5). The social spaces had other sunlight characteristics, some with much, some with little qualities depending on the weather. The L-shaped building volumes would be further utilised and challenged according to the wish to extend the building.

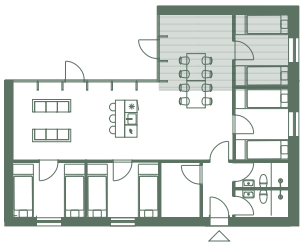


Illu. 49 L-shape

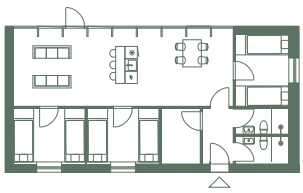


Illu. 54 Extention 3

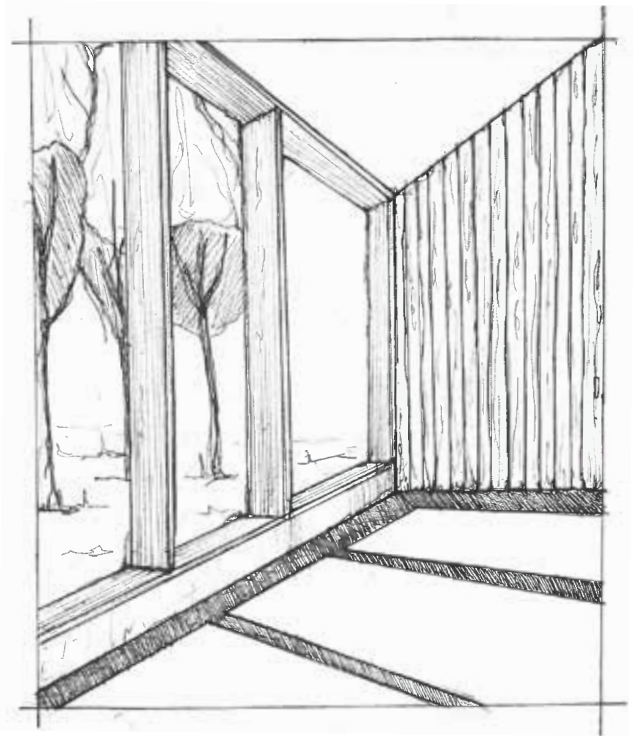
Illu. 53 Extention 2



Illu. 52 Extention 1



Illu. 51 Base

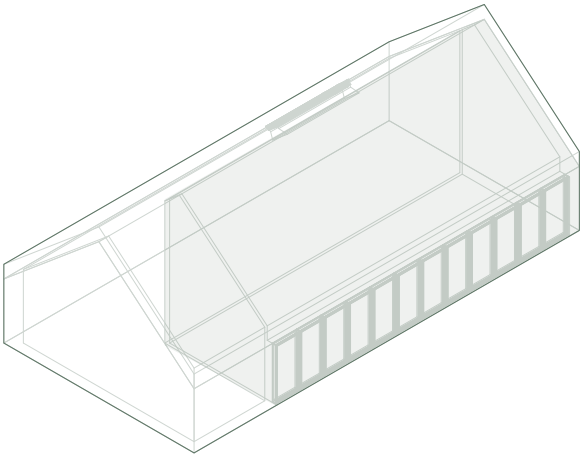


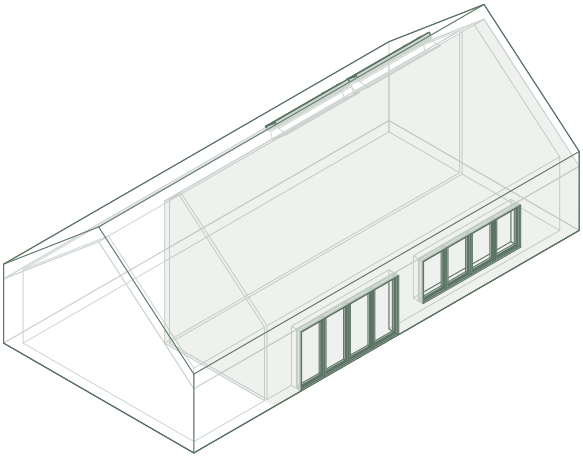
Illu. 50 Transparency

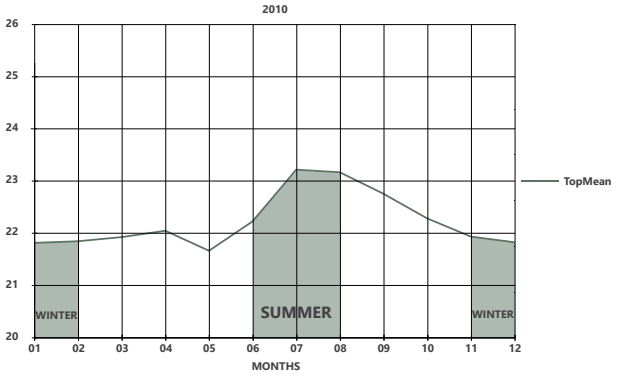
## ADAPTABILITY

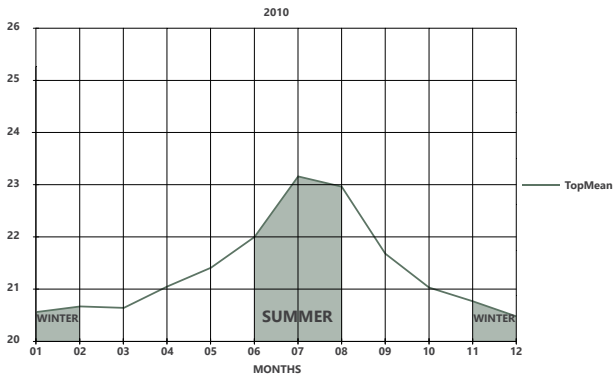
By letting the school's extension be part of the curriculum on teaching the student how to build sustainably, a clear and rational construction concept was thought of with a focus on self-build. The idea took inspiration from The Primitive Hut, where the architecture's purpose is to protect the human body (theoretical framework p. 27). Extending the student block was based on a rectangular base unit, which could be incrementally developed with three bedrooms (Illu. 51). The downside to the extension was the added excess common area. This planning proposal was worked in detail, including placing windows and how the building blocks should relate to the surrounding context. The concept included big windows to create transparency between in and out to extend the community to the urban spaces. Further investigations reveal the possibility of a curtain wall façade according to the indoor comforts through energy- and interior quality simulations.

# INDOOR CLIMATE SIMULATION








| | BSim test | Recommendation |
|---|---|---|
| Hours above 27 °C | 1247 | 100 |
| Hours above 28 °C | 942 | 25 |

| | |
|---|---|
| Window area in facade | 22,68 m² |
| Window area in roof | 1,5 m² |
| tOp mean | 23,3 C |
| AirChange | 4,5 /h |

Illu. 55 First simulation

| | BSim test | Recommendation |
|---|---|---|
| Hours above 27 °C | 89 | 100 |
| Hours above 28 °C | 42 | 25 |

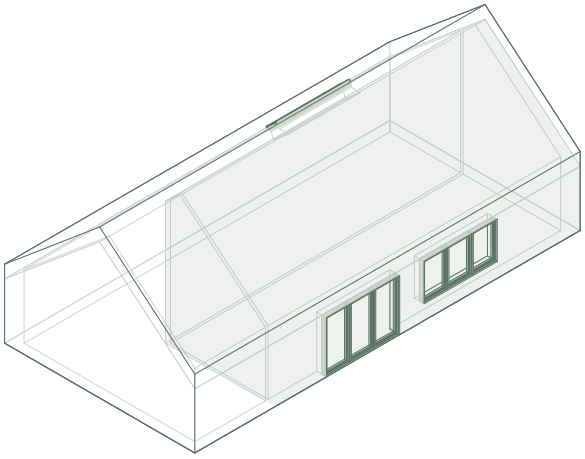
| | |
|---|---|
| Window area in facade | 12,96 m² |
| Window area in roof | 3 m² |
| tOp mean | 21,4 C |
| AirChange | 6,1 /h |

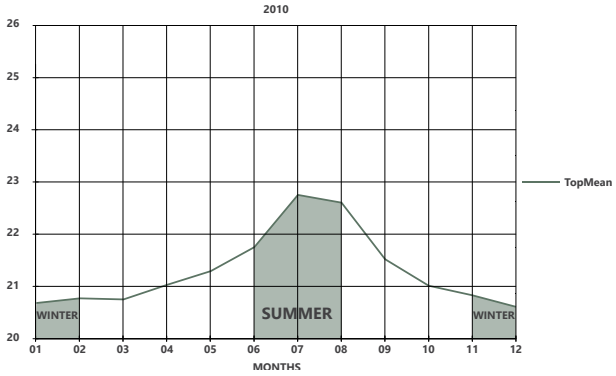
Illu. 56 Second simulation

The common space has been chosen to be simulated with the tool and program BSim because the area was small and needed to accommodate a community, to start with, consisting of 6 students. Therefore, the indoor environment is required to be sufficient. The BSim model was set up with the assumption that most activities in the room will be in the morning and the evening before and after school time. The indoor simulations were focused on reaching the defined operative temperature and the BR18 recommendations for overtemperature (Synthesis p. 53).

In the first simulation, a curtain wall of windows was tested, resulting in significant overheating (Illu. 55). Different passive solutions were tested out, solar shading, natural ventilation, and various overhangs. None of these small interventions had a definitive effect on the overheating in the room. The first test resulted in a need to reduce the glass area.

The second simulation reducing the glass area resulted in a top mean temperature in the summer and winter periods being below what was set as a requirement. Overheating is still a problem throughout the year, with 42 hours above 28 °C in the summertime (Illu. 56). It could be concluded that even






| | BSim test | Recommendation |
|---|---|---|
| Hours above 27 °C | 49 | 100 |
| Hours above 28 °C | 16 | 25 |

| | |
|---|---|
| Window area in facade | 10,68 m² |
| Window area in roof | 1,5 m² |
| tOp mean | 21,3 C |
| AirChange | 5,8 /h |

*Solutions:*
*1: All windows can be opened.*
*2: Skylight, to enable stack ventilation, which is the most efficient form of natural ventilation.*
*3: Overhang or side fins.*
*4: Outdoor solar shading, with a shading coefficient 0,1 on the windows facing the south and east.*

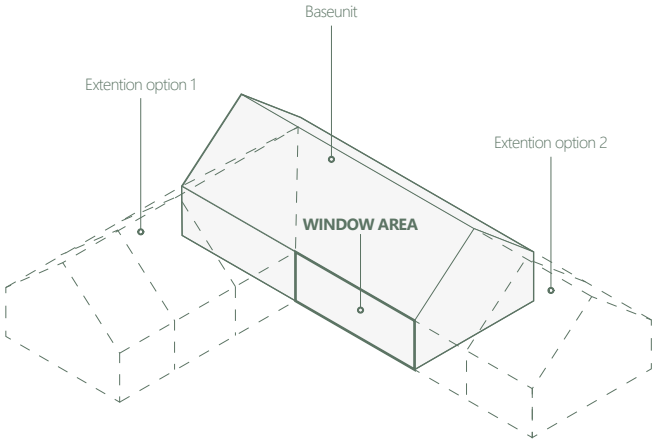
| | |
|---|---|
| Room volume | 109 m³ |
| Floor area | 38 m² |

Illu. 57 Third simulation

reducing the window area to approximately half of the starting point was not enough to meet the requirements, but enough to meet the demands from DS/EN 16798-1:2019 (Synthesis p. 53).

A further reduction in window area was tested (Illu. 57). The result showed that the requirements and the recommended overheating hours were fulfilled by having external solar shadings consisting of curtains with a shading coefficient of 0.1. The curtains are blocking 90% of solar radiation from entering the building. An extended explanation of the parameters in the BSim model can be seen in appendix 01.

Comparing the second and the third test with the original starting point, the concept of creating transparency in the entirety of the room was no longer a possibility. The connection with the outdoor was re-evaluated, and the subsequent design iteration focused on the facades for the student housings trying to maintain visibility and connection between the blocks.




Illu. 61 Extension princip

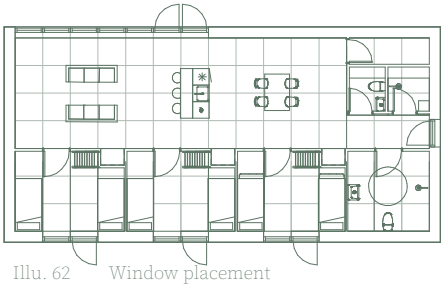
# FACADES

The concept of self-build extensions for the student houses created a problem with the placements of the windows. Certain areas in the base unit need to be held free, for added ease when disassembling the wall and extending the building (Illu. 61).

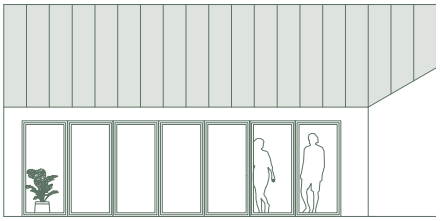
**Iteration 1**
The first iteration consisted of a glass area covering almost the total available area (Illu. 58). The connection between inside and outside was strong, but the glass area was too high according to the BSim results (Design process p. 69).

**Iteration 2**
The first iteration consisted of a glass area covering almost the total available area (Illu. 59). The connection between inside and outside was strong, but the glass area was too high according to the BSim results.

**Iteration 3**
The first iteration consisted of a glass area covering almost the total available area (Illu. 60). The connection between inside and outside was strong, but the glass area was too high according to the BSim results (Design process p. 67)

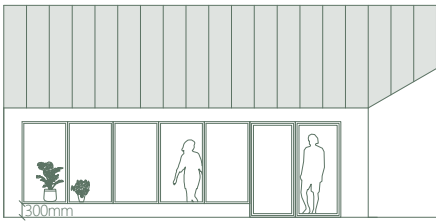


Illu. 62 Window placement



**GLASS AREA 14,7 m²**

Illu. 58 Iteration 1

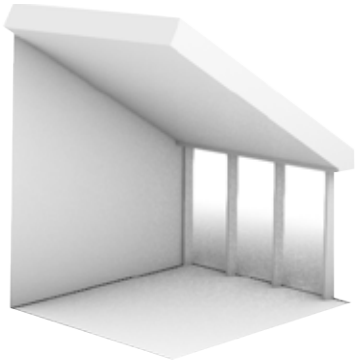



**GLASS AREA 12,5 m²**

Illu. 59 Iteration 2


**GLASS AREA 10,5 m²**

Illu. 60 Iteration 3



Illu. 63 Inner claddings

| Walls | Celing | Floor | Requirement | Reverberation |
|---|---|---|---|---|
| Plaster | Plaster | Wood | 0,9s | 0,57s (125 Hz) |
| Plaster | Plaster | Linoleum | 0,9s | 0,67s (125 Hz) |

## ATMOSPHERE

The inner claddings of the student housings have been investigated, focussing on how to create a homely environment (Illu. 63). The first investigation was made with only white plaster walls, which gave a cold and anonymous expression. Afterwards, wood cladding was added to the walls, ceiling and floor. The atmosphere became warm and inviting. Having wood slats on the ceilings might give a good acoustic environment. Therefore, a calculation has been made to investigate the necessity of wood slats on the ceiling (Appendix 05). The investigation showed that walls and a ceiling with plaster still accommodate a good acoustic environment with a reverberation time under 0,9 s. Even though wood slats create a homely atmosphere, they will be a material waste. Because the building envelope consists of Ecococon panels, it is recommended to have clay plaster on the inner walls as a humidity regulating material and resulting in a permeable construction (Ecococon 2022). Clay cladding has a light brownish nuance, which still brings warmth to the space together with the wooden floor.


| | Material | A1-3 | A4 | A5 | B4 | C3 | C4 | D | Sum (before D) | Sum (After D) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Gypsum | -1,59E+01 | 0,00E+00 | 0,00E+00 | 2,94E+00 | 2,87E+01 | 3,09E-01 | -7,94E+00 | 1,61E+01 | 8,11E+00 |
| 2 | Wooden planks | -3,17E+01 | 0,00E+00 | 0,00E+00 | 3,03E+00 | 4,34E+01 | 6,82E-05 | -1,57E+01 | 1,48E+01 | -9,23E-01 |
| 3 | Unburned clay bricks | 1,06E+01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 4,52E-01 | 0,00E+00 | -2,10E-01 | 1,10E+01 | 1,08E+01 |
| 4 | Wooden lammellas | -2,19E+01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 3,20E+01 | 1,80E-02 | -8,84E+00 | 1,01E+01 | 1,27E+00 |
| 5 | Hemp & clay boards | -1,92E+01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,88E+01 | 6,82E-05 | -8,00E+00 | 9,58E+00 | 1,58E+00 |
| 6 | Perforated plywood | -1,08E+01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,84E+01 | 6,82E-05 | -1,65E+00 | 7,63E+00 | 5,98E+00 |

Illu. 64 Inner wall and ceiling claddings

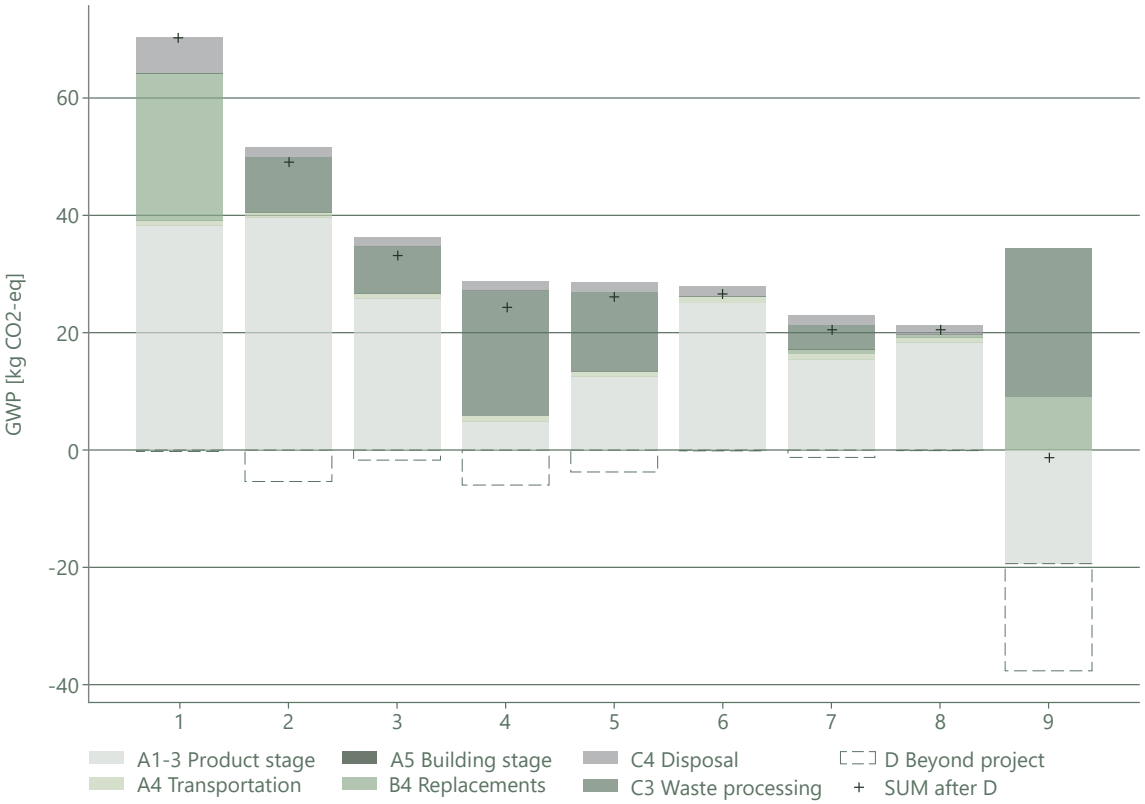
## LIFE CYCLE ASSESSMENT

The internal surfaces of the buildings have been investigated according to their carbon footprint, with an LCA divided into three categories: floors, interior walls, and ceilings (Illu. 64 & 65).

The floor materials are compared between conventional solutions for materials of a long lifetime to ensure as little maintenance is needed as possible. However, the lifetime of wooden flooring is less than that of the durable counterparts such as linoleum or vinyl. The negative carbon footprint of the wooden flooring is worth the added maintenance and ultimate replacement.

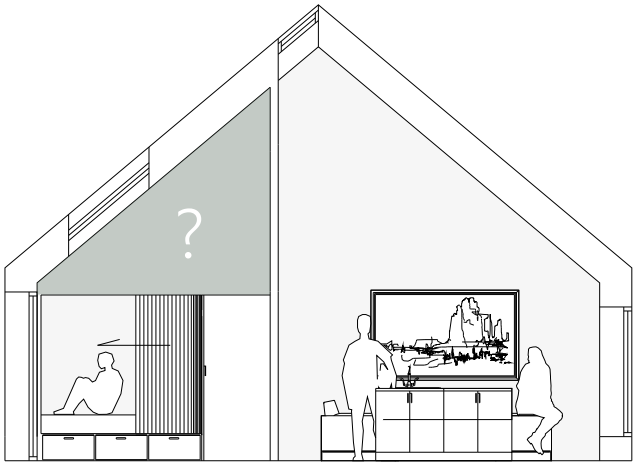
For the inner surfaces of the Ecococon elements, it is recommended to plaster with clay. As the internal walls are not loadbearing, an analysis is made of the finishing materials based on a light wooden construction with wood-fibre insulation. The chosen solution is elements of clay with hemp as reinforcement, finished with clay plaster. The clay is an environmentally sustainable solution and creates a comfortable indoor environment. The benefit of using clay plaster is the ease of maintenance and the seamless connection to the cladding of the Ecococon elements.

The material of the ceilings is similarly compared between the same finishing materials with a light wooden construction holding up the ceiling. Again, clay and hemp boards with clay plaster were utilised, ensuring an environmentally sustainable and comfortable indoor environment. Wooden planks have been chosen for the floor finish as the most sustainable material (Illu. 65) and create a homely atmosphere.




| | Material | A1-3 | A4 | A5 | B4 | C3 | C4 | D | Sum (before D) | Sum (After D) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Carpet | 3,82E+01 | 8,74E-01 | 0,00E+00 | 2,51E+01 | 1,45E-01 | 6,00E+00 | -2,51E-01 | 7,03E+01 | 7,01E+01 |
| 2 | Plastic flooring | 3,96E+01 | 8,95E-01 | 0,00E+00 | 0,00E+00 | 9,48E+00 | 1,62E+00 | -5,37E+00 | 5,16E+01 | 4,62E+01 |
| 3 | Vinyl flooring | 2,58E+01 | 8,83E-01 | 0,00E+00 | 0,00E+00 | 8,02E+00 | 1,62E+00 | -1,72E+00 | 3,63E+01 | 3,46E+01 |
| 4 | Glued parquet floor | 4,78E+00 | 9,57E-01 | 0,00E+00 | 0,00E+00 | 2,15E+01 | 1,63E+00 | -5,98E+00 | 2,88E+01 | 2,28E+01 |
| 5 | Laminate flooring | 1,25E+01 | 9,28E-01 | 0,00E+00 | 0,00E+00 | 1,35E+01 | 1,62E+00 | -3,75E+00 | 2,86E+01 | 2,48E+01 |
| 6 | Floortiles | 2,50E+01 | 1,07E+00 | 0,00E+00 | 0,00E+00 | 1,47E-01 | 1,67E+00 | -1,46E-01 | 2,79E+01 | 2,78E+01 |
| 7 | Linoleum | 1,54E+01 | 8,92E-01 | 0,00E+00 | 8,40E-01 | 4,14E+00 | 1,63E+00 | -1,26E+00 | 2,29E+01 | 2,17E+01 |
| 8 | Cork flooring | 1,83E+01 | 8,68E-01 | 0,00E+00 | 5,01E-01 | 2,91E-02 | 1,63E+00 | -1,04E-01 | 2,13E+01 | 2,12E+01 |
| 9 | Wooden flooring | -1,94E+01 | 1,28E-01 | 0,00E+00 | 8,88E+00 | 2,53E+01 | 6,82E-05 | -1,83E+01 | 1,49E+01 | -3,33E+00 |

Illu. 65 Floor claddings




Illu. 66 Problem

## UTILISING WASTE SPACE

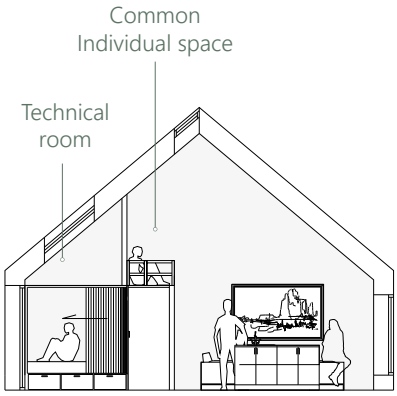
From the beginning of the design process, the connection to the Energy Academy was ensured by mirroring the pitch of the roofs. When studying the building volumes, the roof pitch was 40 degrees for all the buildings. However, investigating the structure in the section, it was acknowledged that there was a lot of wasted space which did not need the tall ceiling height (Illu. 66). This could be avoided by choosing other roof slopes or utilising the area better. Different iterations were made using the space rather than changing the pitch, thereby washing out the connection to The Academy.

**Iteration 1**

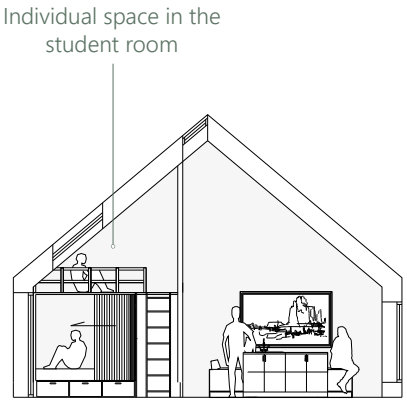
The first iteration consisted of dividing the space into a technical room and individual niches in the common area for introverted spaces. The con of having the introverted space placed in connection to the common room, was the inherent lack of privacy (Illu. 67).

**Iteration 2**

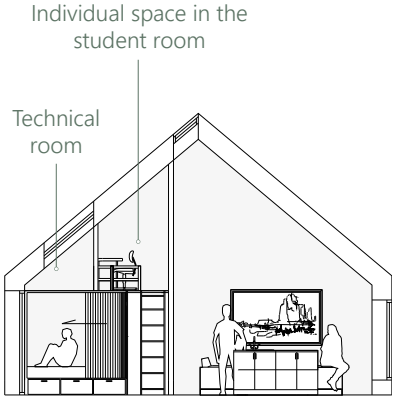
The next iteration looked at the possibility of having private niches in the individual bedrooms. The concept showed potential for both a common space in the bedrooms for roommates and a space for individuality to retreat from the common. Because of the low ceiling height, some of the space will be utilised for ventilation piping running by the façade (Illu. 68 & 69).



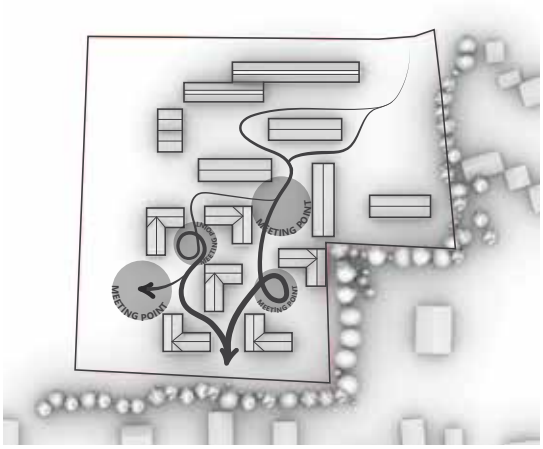

Illu. 67 Iteration 1



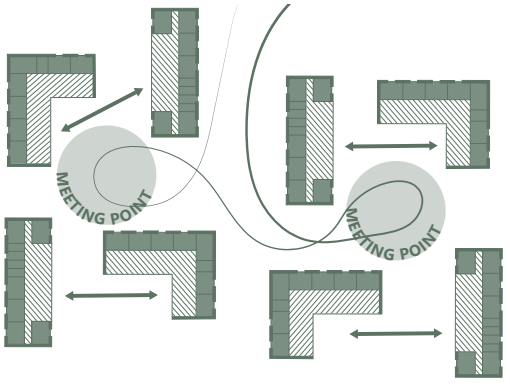

Illu. 68 Iteration 2 individual space



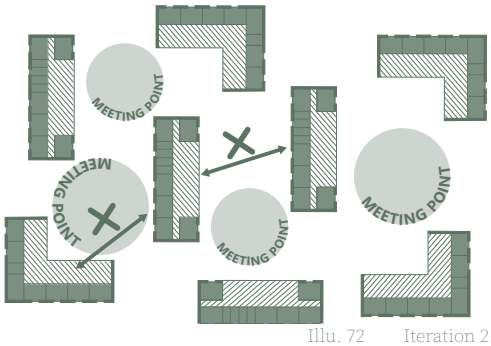

Illu. 69 Iteration 2 individual space with tecnical room



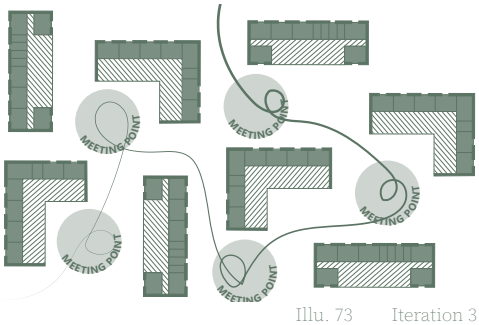

Illu. 70 Master plan, L shaped




Illu. 71 Iteration 1




Illu. 72 Iteration 2



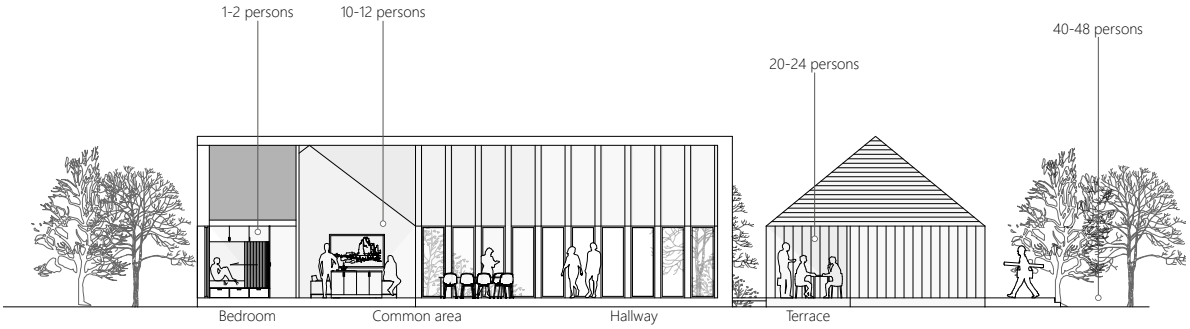

Illu. 73 Iteration 3

## CREATING URBAN SPACES

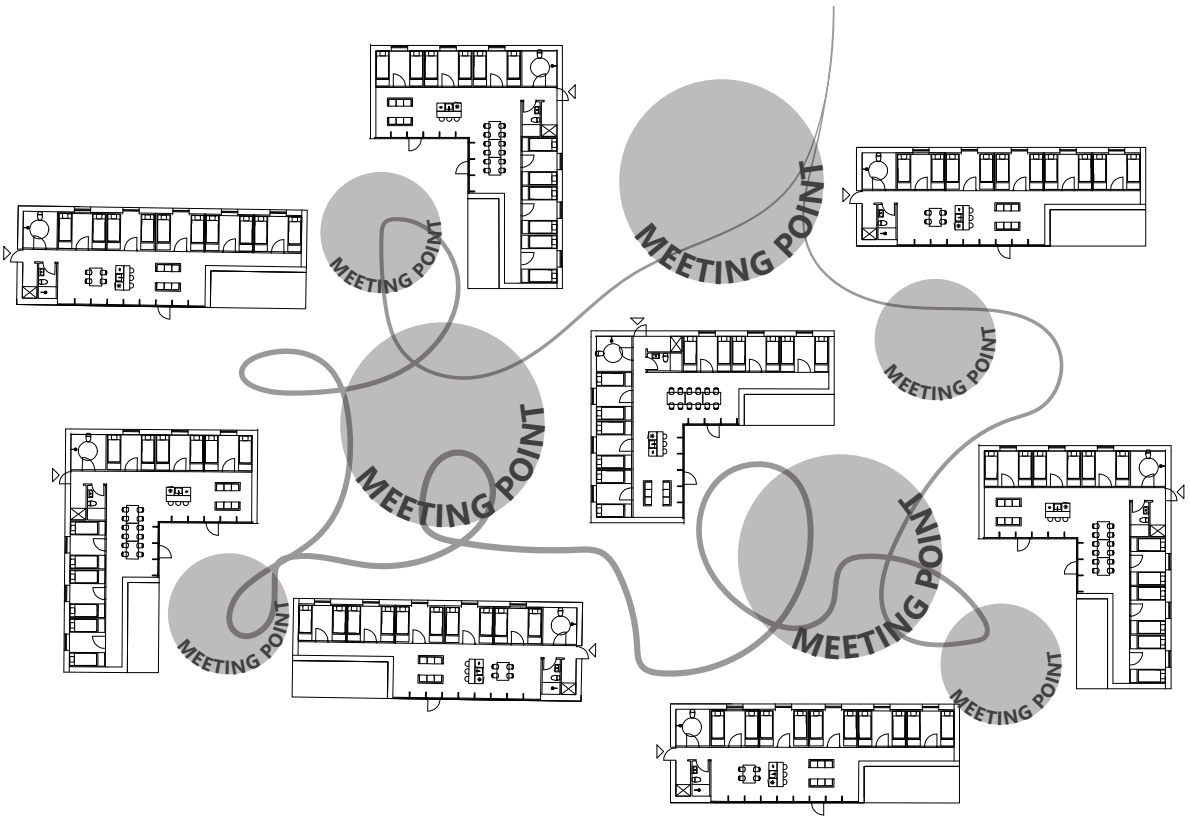
The L-shaped building typology was tested to investigate the relation between the common space and the surrounding context. The L-shaped building has several potentials, where the volumes can create a semi-enclosed cluster, potentially limiting the connection between the blocks. The necessary step was to take a few steps back in the design process to reconsider whether a different typology was needed. The rectangular building was re-evaluated as an additional typology based on the same basic expansion unit to create better urban spaces with different sized social zones, adequate sunlight in the outdoor areas, and on the roof faces for photovoltaics (Appendix 06).

**Iteration 1 & 2 & 3**

Two clusters were created with four blocks in each, with a gathering space in each cluster (Illu. 71). In each cluster, the buildings were placed to create a visual connection between the common indoor areas. The rectangular buildings were facing north/south, which reduced the roof area for solar panels. This was the same problem for iteration 2, where three of the rectangular blocks were facing north/south (Illu. 72). In iteration 2, three meeting points were created where the middle one has the potential to spoil privacy by facing the student rooms towards the common areas of the neighbouring block. In iteration 3, the buildings were replaced again, focussing on having as much roof and facades facing south as possible (Illu. 73). In this iteration, smaller meetings points were created, but the bigger community spaces were missing. The solar availability of the exterior spaces for all three iterations has been analysed (Appendix 06, iteration 5-7).




Illu. 74 Communities



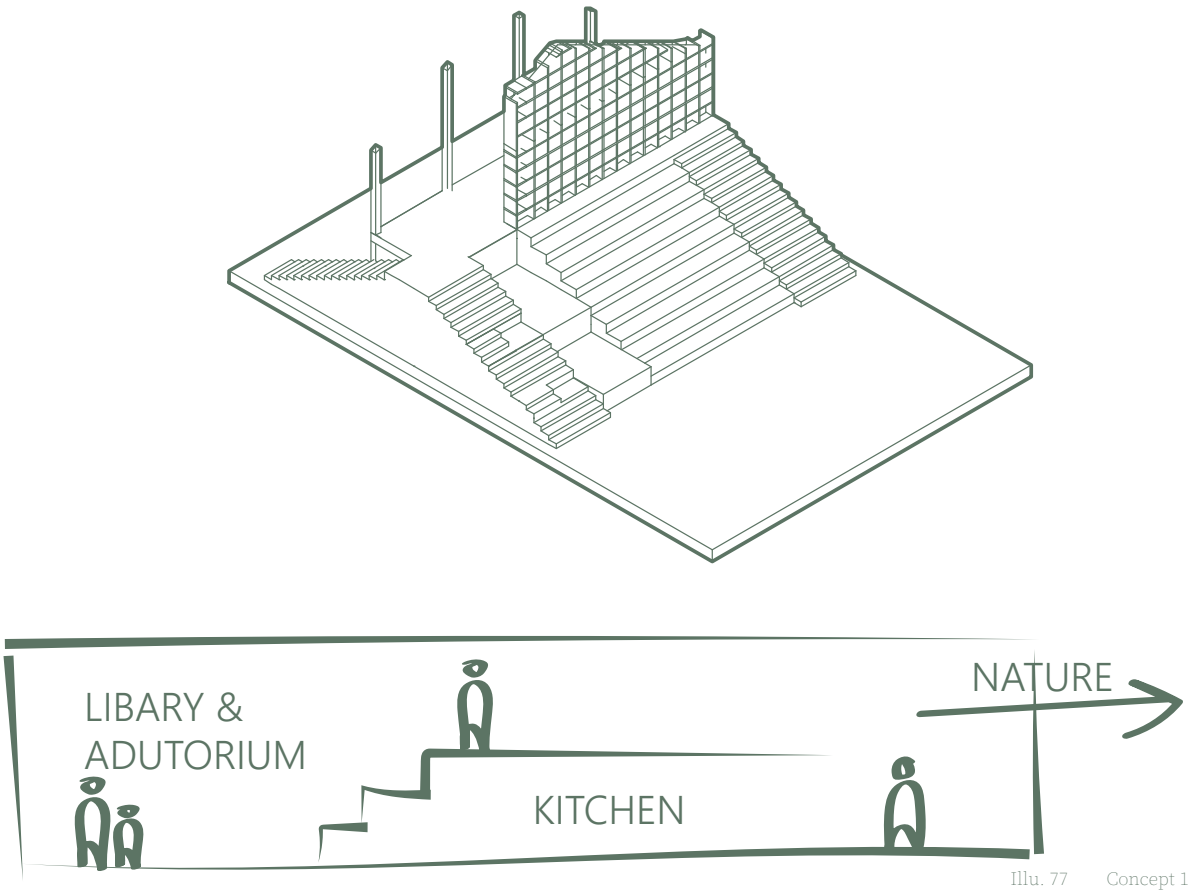

Illu. 75 Master plan

**Iteration 4**

To accompany the issue with the different sizes of communities and how these should be placed inside out, a terrace was tested out to see its impact on the master plan. The terrace solved the problem of waste area inside the building while also creating a stepping-stone before entering the extensive community in between the houses. A clear gradation of community sizes is evident from the smallest communities in the bedrooms to the biggest cluster communities of half the school (illu 74). With only east/west facing rectangular buildings, sufficient roof area for the solar panels is ensured. The solar availability of the exterior spaces has been analysed and deemed sufficient for the final iteration (Appendix 06, iteration 8).

# PUBLIC ZONE

The following section will explain the design process of the social functions. The design process of the social functions has been separated into three subsections for each building: the auditorium, the dining hall, and the classroom.




Illu. 77 Concept 1

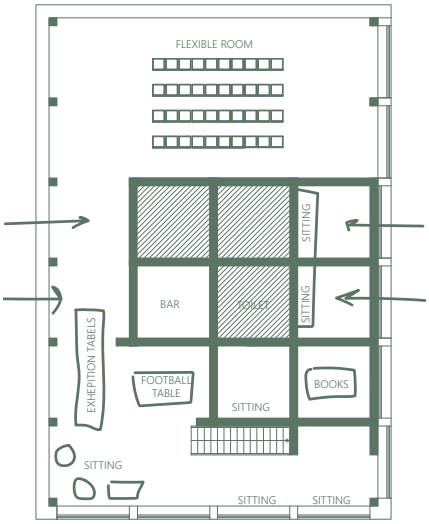
## LIBRARY AND AUDITORIUM

***Criteria*** 1. Space for 80 students, 2. Informal and formal meetings 3. Space to study, and 4. Flexible design

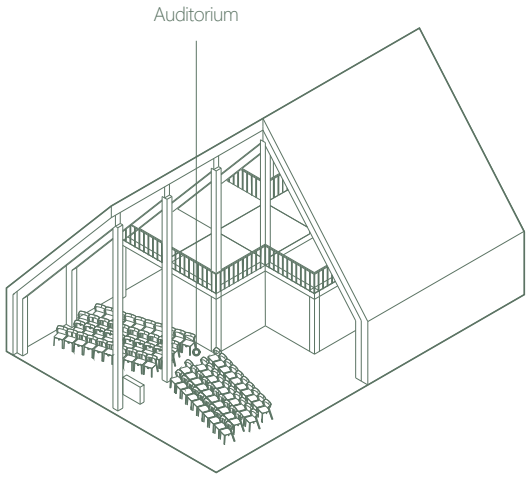
The auditorium and library were merged into one building to avoid too many individual buildings and limit the footprint on the site. Two concepts for the auditorium and library were developed to create a flexible, spacious gathering space. The space must contain smaller social settings and more significant formal meeting points hosting events such as the morning assembly or public debates.

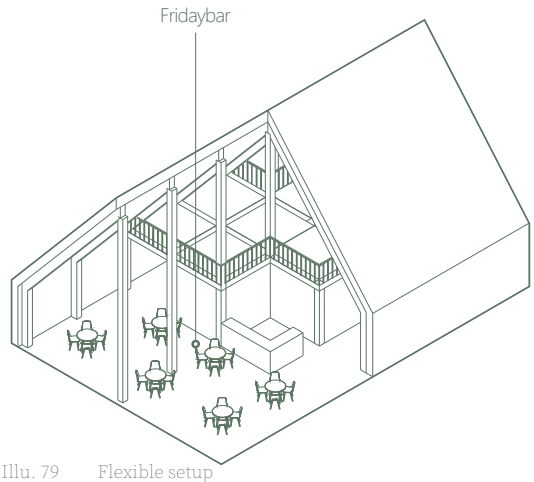
**Concept 1 Horizontal division**

The building was divided by a giant staircase, splitting the building in two while functioning as the technical core. The idea was to merge the kitchen, auditorium and library. The staircase worked as a room divider, and the space underneath would be used for functions not requiring daylight as storage and technical facilities. The pros of creating a staircase were that it secures visibility for everyone participating in the auditorium, creating a ceremonious and formal character for the room. However, the building structure became very complex and fixed with a lack of flexibility.




Illu. 78 Gridsystem




Illu. 79 Flexible setup

**Concept 2 Vertical division**

Instead of the staircase as a dividing piece of furniture, the building was divided both vertical and horizontal by a wooden grid construction (Illu. 79). This created a mix of introverted and extrovered spaces, utilising the height of the building. By placing the auditorium on a single floor, instead of across floors, the setting was more informal and multifunctional. The space could be remodelled as a study hall in extension to the library or host different events for the Energy Academy, the folk high school, or the local community. As with concept 1, the building is still centred around a core, where facilities such as the toilets and depots are placed.

The wooden tectonic grid of concept 2 would be further developed, on the conceptual level, to create the proper expression and optimise the material used. The first concept's staircase as a piece of furniture might create too fixed and official of an atmosphere. A folk high school is very much an informal place.

Creating a wooden grid inside the building still presented a tectonic division of the functions while using less material. The grid would serve as inspiration for simple building techniques for students and visitors, with the added benefit of a more flexible setup, leaving the auditorium up for conversion depending on the spatial needs.

# MULTIROOM

***Criteria** 1. Multifunctional, 2. Informal and formal meetings, 3. Space to study, and 4. Flexible design*

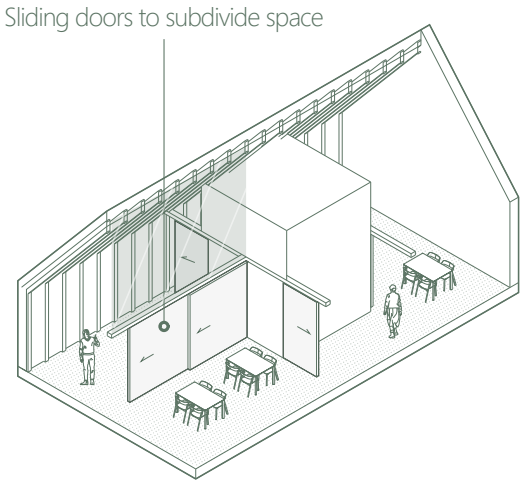
The education in the folk high school is, in general, relatively unstructured, where the need for facilities for formal instruction is rarely needed. As the multifunctional auditorium might serve this purpose initially with few students, the need for additional classrooms might arise as the school grows.

### Concept 1

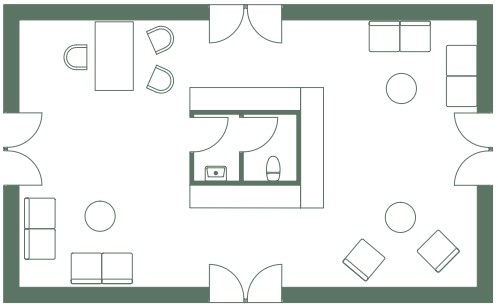
The multiroom concept was to keep it as open as possible so that the space could be multifunctional to serve other functions besides instruction (Illu. 80). The first concept was to divide the room with its furniture allowing for more informal instructions. Information from the informal interview with students of Kalø Højskole stated that there was a wish for more structure at times (Appendix 04). This was taken into consideration, and the concept of multifunctional was re-evaluated.

### Concept 2

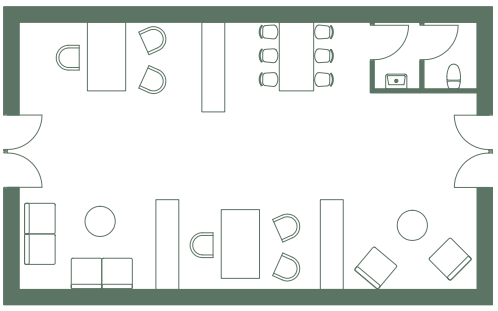
The concept was to keep the space open, with the option to subdivide the space into smaller rooms (Illu. 82). The multifunctional room could contain different functions such as meeting rooms, exhibition spaces and classrooms. The technique of subdividing space is also seen in the Energy Academy, where cores are placed in the middle of the building, with sliding doors to subdivide the building. Concept 2 seemed to fulfil the criteria and was developed further.



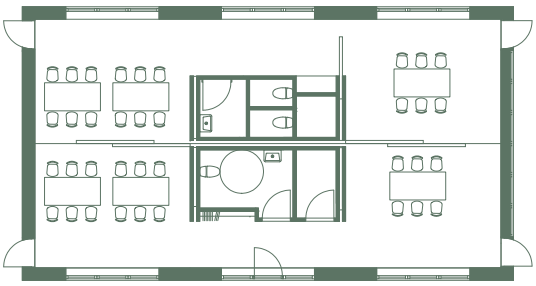

Illu. 83 Concept 3 in 3D



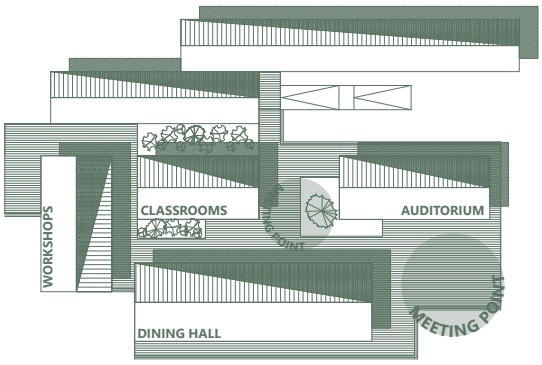
Illu. 80 Concept 1 with a technical core



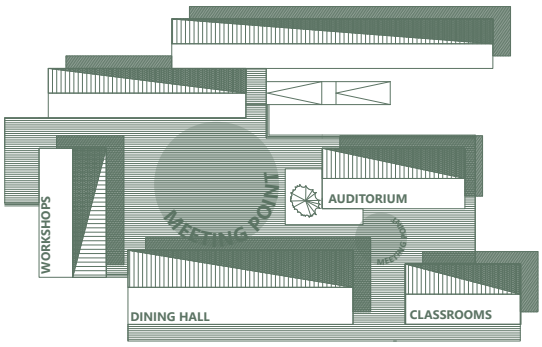
Illu. 81 Concept 1 with several niches



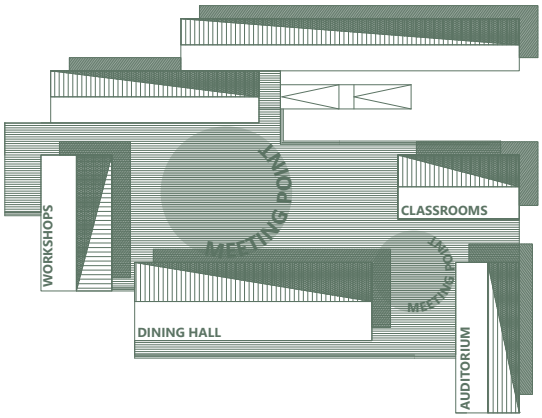
Illu. 82 Concept 2



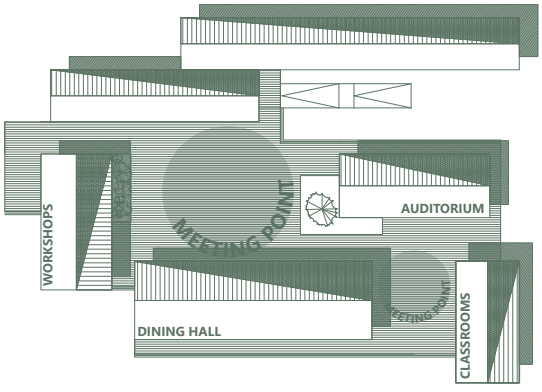

Illu. 84 Iteration 1




Illu. 85 Iteration 2




Illu. 86 Iteration 3




Illu. 87 Iteration 4

## Placement of multiroom

### Iteration 1

In the first iteration of the master plan, the multiroom was placed centrally, which might have had a shielding effect on the Energy Academy, blocking both solar availability (Appendix 06, iteration 9) and the Energy Academy from relating to the folk high school (Illu. 84).

### Iteration 2

The multiroom was moved and placed in the southeast corner of the public zone (Illu. 85). Moving the multiroom created a bigger space in the middle of the social area, inviting the Energy Academy to be an equal part of the urban fabric between the buildings. Although the central square of the zone was improved, it impeded the critical meeting point between the dining hall and the auditorium.

### Iteration 3

In the third iteration, the buildings were flipped with the multiroom facing the north instead (Illu. 86). The spaces became very slim with potential inefficient solar radiation in the rooms and the outdoor areas (Appendix 06, iteration 11). By placing the auditorium as this iteration, the connection with the Energy Academy was broken. The central square became unprotected and vaguely defined before the multiroom building was erected.

### Iteration 4

The buildings were switched back, and the classroom rotated to create a bigger gathering space between the dining hall, auditorium and the future multiroom (Illu. 87). Instead, the multiroom made a gathering point and an entry point on the site when one was coming from the student facilities. A natural gate from the private to the public zone was created while conserving the connection between the Energy Academy and the auditorium.

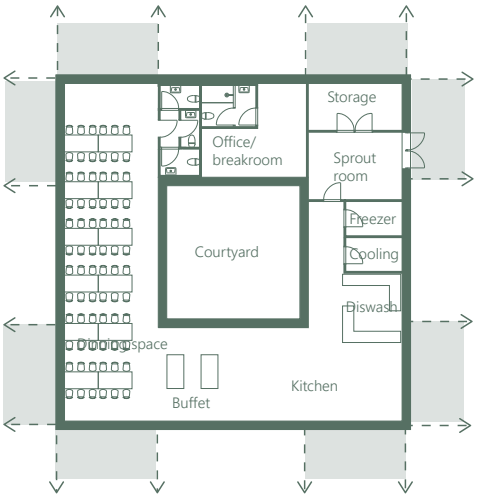
# DINING HALL

***Criterias*** 1. Have to be the heart of the school, 2. Have a homely atmosphere, 3. Workspace with visual access 4. Educational space, 5. Transparency between inside and out, and 6. Opportunity to bring the gatherings outdoors.

### Concept 1

The dining room was one of the central buildings for the folk high school, which aims to bring all the different users into one place. This includes staff from the Energy Academy, teachers, students and guests.

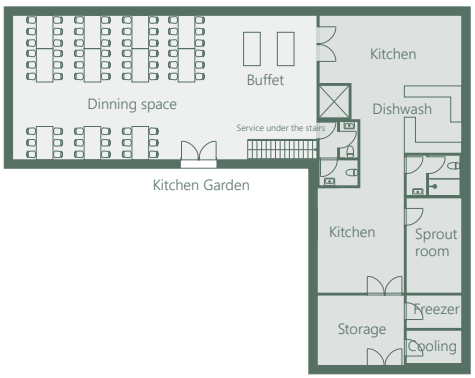
The first concept was designed as a square with a courtyard in the middle (Illu. 88). This proposal made it possible to extend the building when the folk high school grows. Having a courtyard invites all the users to gather in one place. However, this space is somewhat introverted and closed off from the rest of the school, which was not the purpose. The circulation for this concept is inadequate with a lot of hallway space and hard to furnish for the necessary facilities.




Illu. 88 Concept 1

### Concept 2

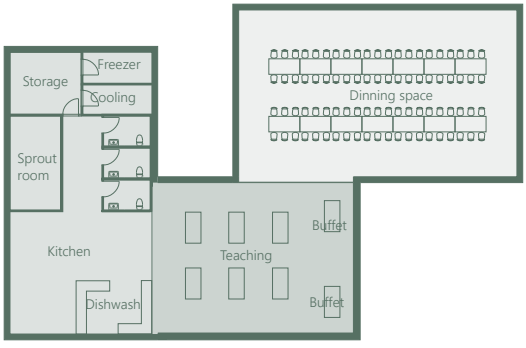
The L-shape building volume was tested inspired by the housings volume studies (Design process, p. 64). Having an L-shape created a bigger and more open outdoor space (Illu. 89). There was a better division of the kitchen workspace and the dining room. An educational space where students could learn about cooking sustainable food was missing in this concept. The kitchen facilities were hidden, rather than part of the dining hall experience, and as an open lab in sustainable gastronomy.



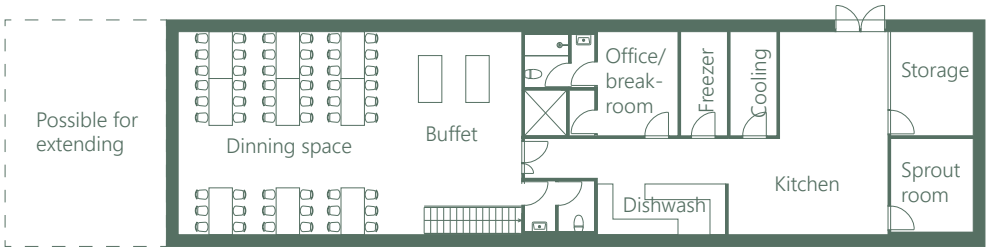

Illu. 89 Concept 2

### Concept 3

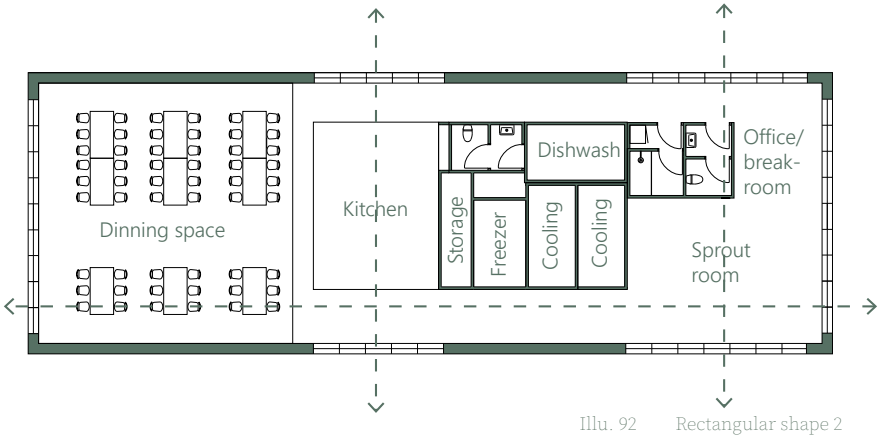
A division of dining, kitchen and educational space was evident in this concept (Illu. 90). The idea was to have three different atmospheres when entering the different areas. Creating a central heart of the building was lost in this concept, where the functions were separated. Opening the kitchen up for exploration was lost again in this concept, where the kitchen was hidden in the back. The function of the education space between the kitchen and dining hall might have too big of a designated area, rather than utilising the kitchen and dining hall as multifunctional spaces to house the educational aspect between meals.




Illu. 90 Concept 3




Illu. 91 Rectangular shape 1

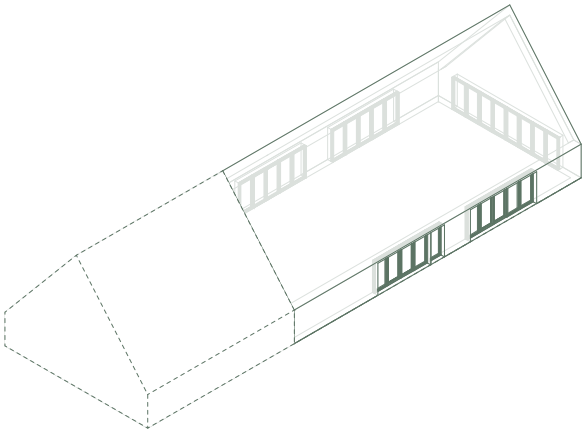


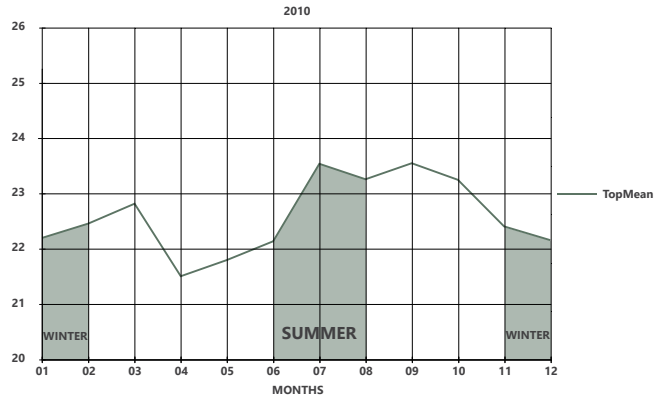

Illu. 92 Rectangular shape 2

**Concept 4**

A rectangular-shaped building typology was created to connect to the Energy Academy (Illu. 92). The concept of functional cores in the middle of the building, found in the Energy Academy and the rest of the social buildings, was reprised in this iteration, making it possible to create transparency throughout the building. The kitchen is opened towards the dining hall, and with an open education space in the sprout room at the end of the building, the whole building is included in the curriculum of sustainable cooking.

# INDOOR CLIMATE SIMULATION

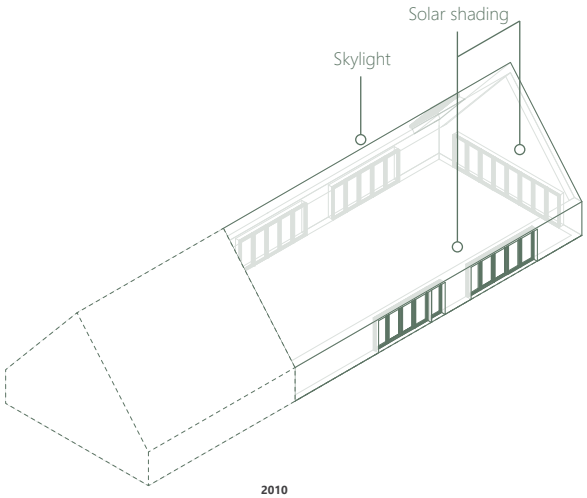


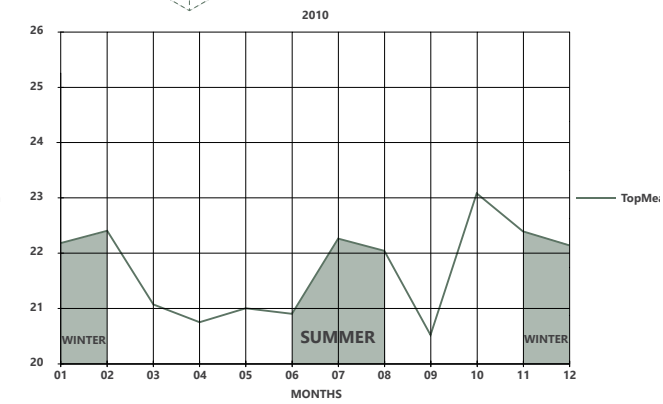



| | BSim test | Recommendation |
|---|---|---|
| Hours above 26 °C | 497 | 100 |
| Hours above 27 °C | 319 | 50 |

| | |
|---|---|
| Window area South | 27 m² |
| Window area North | 27 m² |
| Window area East | 21,6 m² |
| Window area in roof | 0 m² |
| tOp mean | 22,5 C |
| AirChange | 4,1 /h |

Illu. 93 First simulation




| | BSim test | Recommendation |
|---|---|---|
| Hours above 26 °C | 385 | 100 |
| Hours above 27 °C | 257 | 50 |

| | |
|---|---|
| Window area South | 27 m² |
| Window area North | 27 m² |
| Window area East | 21,6 m² |
| Window area in roof | 8 m² |
| tOp mean | 22,4 C |
| AirChange | 4,0 /h |

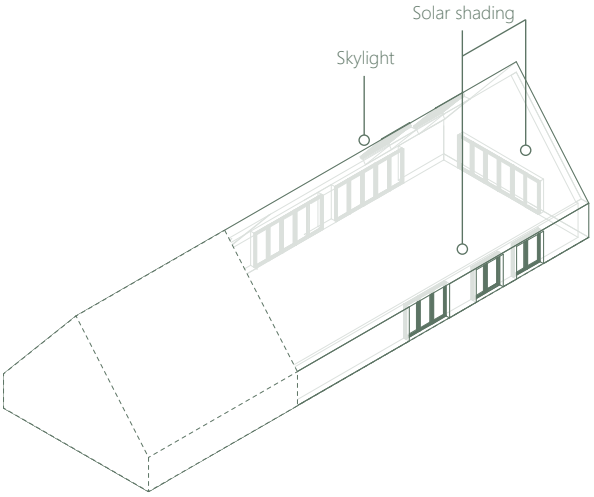
Illu. 94 Second simulation

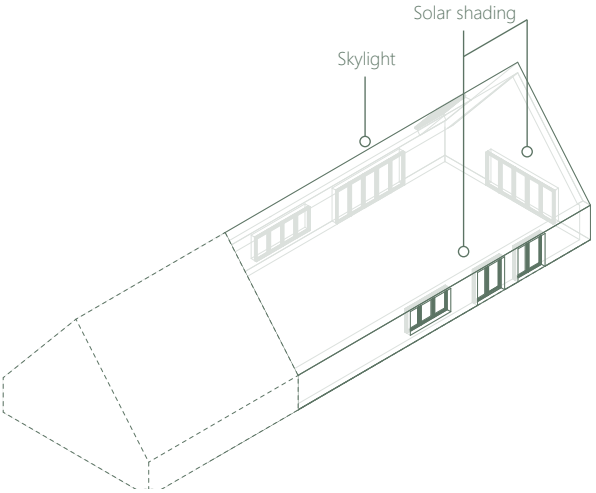
| | |
|---|---|
| Room volume | 993,6 m³ |
| Floor area | 179 m² |

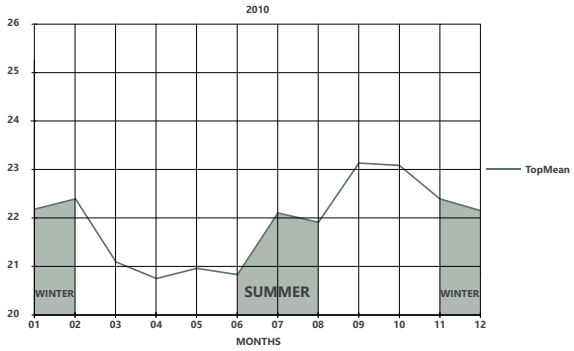
The quality of the indoor climate of the dining hall has been simulated using BSim. The model was set up with the wish for as much transparency as possible to reinforce the dining hall as the heart of the folk high school. The placement of the building was very central, and the dining hall functions as the connection between the public and private parts of the folk high school. The transparency was essential on the south and east-facing walls to activate the outdoor areas during the summer and enable people to see activity from the pathway.

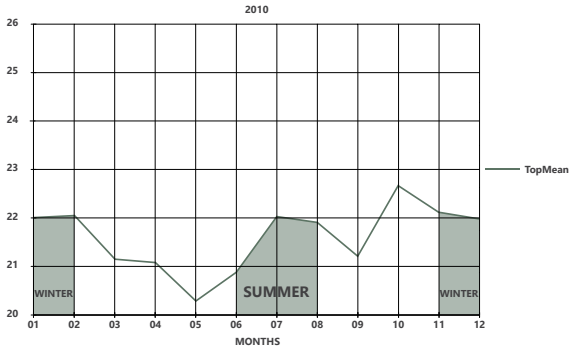
**Simulation 1 + 2**

Based on the wish for as much transparency as possible, the first simulation served as a baseline (Illu. 93). The same number of windows was used in the façade with added solar shading and a skylight for




| | BSim test | Recommendation |
|---|---|---|
| Hours above 27 °C | 207 | 100 |
| Hours above 28 °C | 117 | 50 |

| | |
|---|---|
| Window area South | 17,4 m² |
| Window area North | 22,3 m² |
| Window area East | 13,5 m² |
| Window area in roof | 8 m² |
| tOp mean | 21,7 C |
| AirChange | 5,1 /h |

Illu. 95 Third simulation

| | BSim test | Recommendation |
|---|---|---|
| Hours above 27 °C | 102 | 100 |
| Hours above 28 °C | 50 | 50 |

| | |
|---|---|
| Window area South | 17,2 m² |
| Window area North | 17,2 m² |
| Window area East | 9,4 m² |
| Window area in roof | 8 m² |
| tOp mean | 21,6 C |
| AirChange | 5,1 /h |

Illu. 96 Fourth simulation

optimised natural ventilation for the second simulation (Illu. 95). The solar shading consists of an external screen with a shading coefficient of 0,1. The dining hall lived up to the formal requirements, but it did not meet the recommendations from the BR18 (synthesis p. 53).

**Simulation 3 + 4**

The window area was reduced for the third simulation, but it was still insufficient to meet the recommendations (Illu. 95). A fourth simulation was made and the windows were reduced by 30% and the recommendations were met (Illu 96).

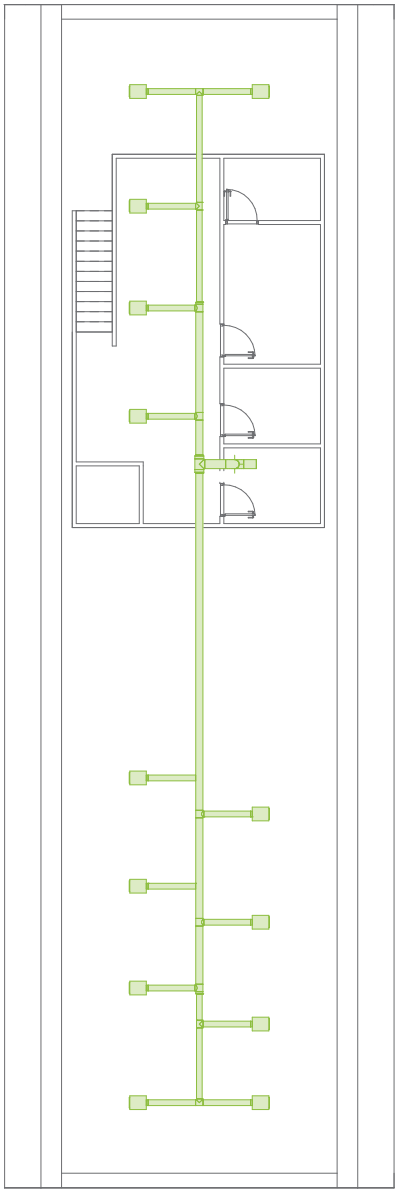
## CONSTRUCTION / VENTILATION

The student housings are based on a 1 m system to ease the incremental extension of housings as the need for additional rooms arises. To create a shared identity between all the buildings relating to the folk high school, the same 1 m grid system based on Eco-cocon elements is utilised in the public and private housing.

With the significant focus on creating a satisfying indoor climate, the ventilation need of the highly populated dining room was of high priority. By integrating the routing of the ventilation systems and the placement of technical facility rooms in the plan studies and by incorporating a focus on creating a satisfying indoor climate, the ventilation need of the highly populated dining room was of high priority. An integrated tectonic solution was secured by integrating the routing of the ventilation systems and the placement of technical facility rooms in the plan studies and combining the ducting in the expression and function of the roof construction (Illu. 97).

With the wish to view the ridge in all the buildings, hereby avoiding suspended ceilings, the structure was the main element to hide the ventilation ducts partially. The construction investigations were centred around the dining hall, where the room's characteristics were to have a homelike feeling.

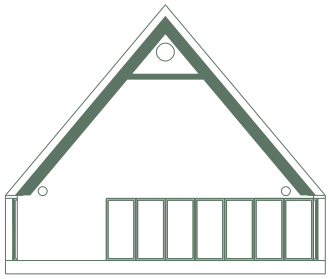
Ventilation plans were based on having a central core in the building for all technical functions from where the ventilation ducting will branch out. The main ventilation pipes will run the length of the building from the central core (illu. 97). Different concepts for the specific run of the ducts are made.



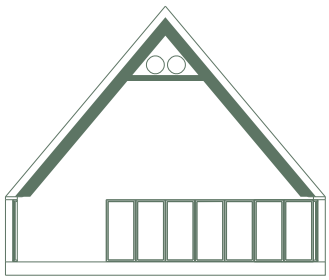
Illu. 97 Ventilation strategy

Illu. 98 Straight element in the middle

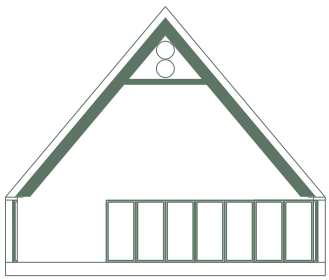
Illu. 99 Curved A-frame



Illu. 100 Iteration 1



Illu. 101 Iteration 2



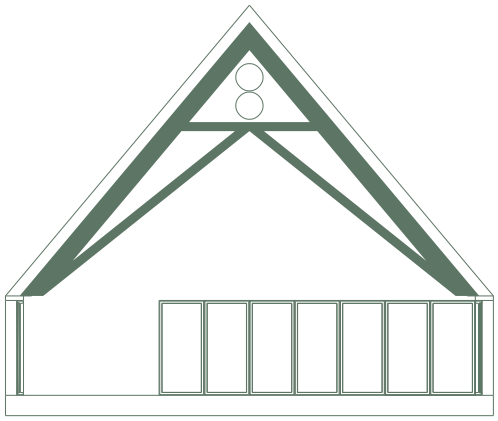
Illu. 102 Iteration 3

**Iteration 1**
The first concept consisted of the supply pipe along the ridge and the extraction pipes along the outer walls. Though the supply pipe was placed rationally near the faces of the ceiling, the extraction pipes were not placed optimally (Illu. 100).

**Iteration 2**
The second iteration consisted of placing both main pipes side-by-side by the ridge. Though the extraction pipe was placed ideally by the ridge of the ceiling, the branching of the supply pipes was not ideal, as the one side of the branch would have to bypass the extraction pipe (Illu. 101).

**Iteration 3**
The third iteration presented placing the supply and extraction pipes of the ventilation one above the other. The top duct will be for the air supply near the ceiling, where the ceiling diffusers will branch out from the central pipe. Underneath the supply duct is the extraction duct, where fittings along the duct will extract the contaminated air. The roof construction will have to accommodate the piping of the ventilation system, with the estimated sizes based on preliminary calculations in MagiCAD and SystemAirCAD (Illu. 102).

**Construction concept**
Along with the final iteration of the ventilation system piping, several iterations of construction principles were made with different expressions. The first iterations were based on the simple A-frame with either a curved or straight element in the middle (illu. 98 and 99). The stability of the members was in question with this configuration, which led to the second iteration with a variation of the familiar scissor frame (illu. 103 p 88). With this configuration, the space at the top of the frame conceals the pipes while creating stability.



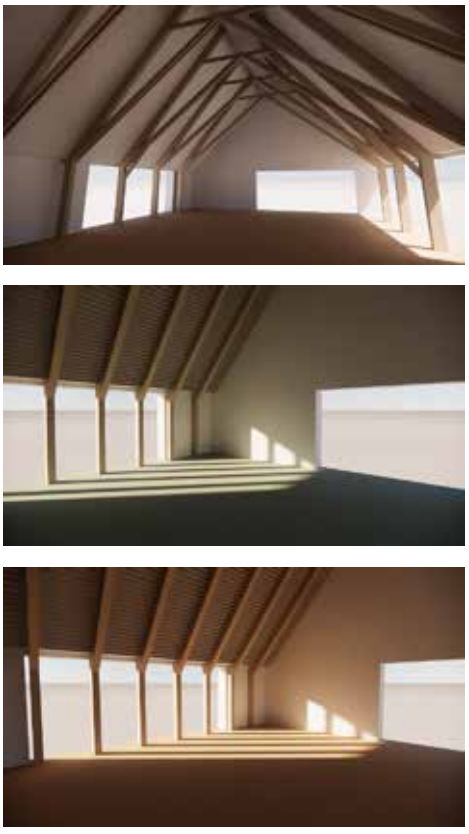
Illu. 103 A-frame

**Interior quality**

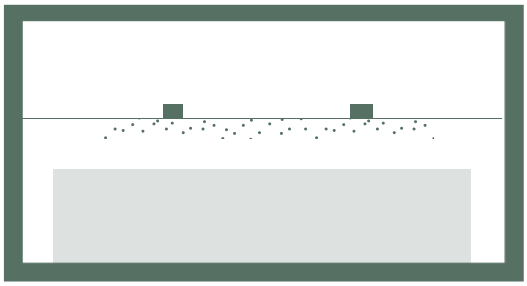
The acoustic characteristics of the dining hall were investigated to help quantify which materials should be used for the interior faces. The reverberation time analysis revealed a need for wooden slats on the ceiling (illu. 104).

The former LCA, acoustic calculations and interior studies determined the walls were clad in clay with wooden flooring. When trying alternative colours for the flooring in colder tones made the room appear unappealing and slightly unsettling with the cool colours of the floor reflecting on the walls. The dining hall is meant to be calming and homelike, creating a sense of belonging, not as an institution.

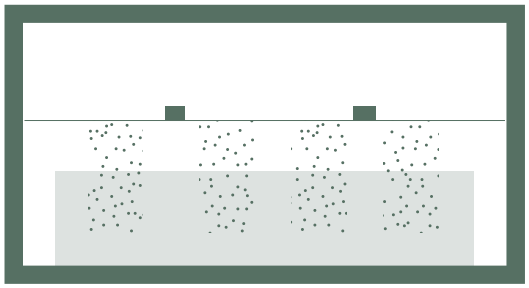
| Walls | Celing | Floor | Requirement | Reverberation |
|---|---|---|---|---|
| Clay plaster | Clay plaster | Linoleum | 0,9s | 2,01s (125 Hz) |
| Clay plaster | wood slats | Linoleum | 0,9s | 1,10s (125 Hz) |
| Clay plaster | wood slats | Cork | 0,9s | 1,13 (125 Hz) |
| Clay plaster | wood slats | Wood | 0,9 s | 0,93 (125 Hz) |



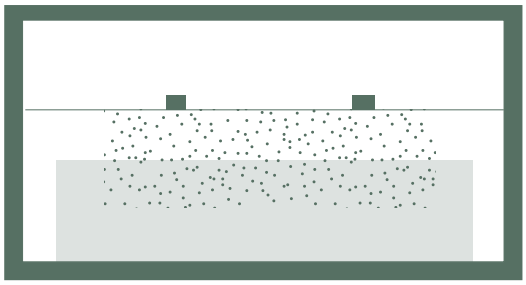
Illu. 104 Renderings of different constructions



Illu. 106 Rotation fixtures

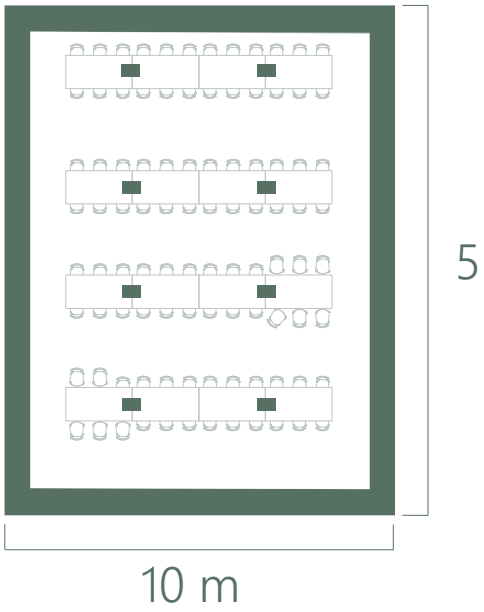


Illu. 107 Two-way fixtures



Illu. 108 Four-way fixtures

| Types of ceiling fixtures | Ventilation type | Throw length | Velocity | Total Pressure loss |
|---|---|---|---|---|
| Rotation | Mixing | 0,8 m | 0,9 m/s | 6 Pa |
| Two-way | Mixing | 2,2 m | 1,8 m/s | 5 Pa |
| Four-way | Mixing | 1,2 m | 1,3 m/s | 4 Pa |




Illu. 105 Placement of the fixtures in the dining room

**Ventilation fixtures**

After making the ventilation plan with eight fixtures for the dining room, a further investigation was made of what fixtures are sufficient with the right throw length into the living area. Different types of diffusers were tested in the program Lindquist, including rotation, two-way and four-way ventilation fixtures. The rotations armature did not spread the air sufficiently with only a throw length of 0,8 m (Illu. 106). The two-way armature was tested out, resulting in a sufficient throw length into the occupied area, but the air was not equally divided (illu. 107). Lastly, a four-way armature was tested out, where the supplied air was spread adequately into the occupied area (Illu. 108).

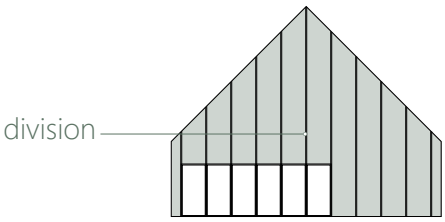
# FACADES

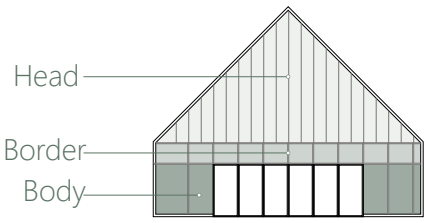
The following section will introduce the overall facade studies for the individual buildings in the private and public zone. Furthermore, the investigations of exterior materials will be presented, and the placement of photovoltaics on the roof and its expression.

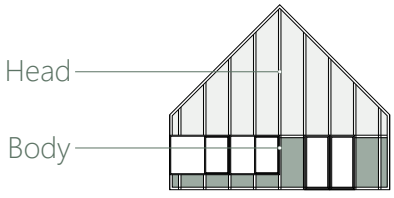
***Criteria*** 1. Buildable 2. Creating a cohesion through the façade expression, and 3. Enhancing the gridsystem

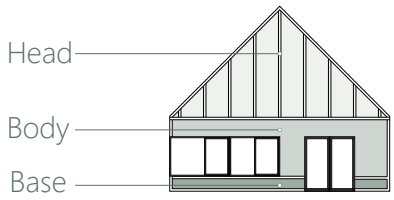
**Cassette Principal**

Having a grid system was decided from the beginning stage of the design process because of the 1m width of the Ecococon panels. In this façade principle, the wish was to express the grid system in the façade with a cassette system for the external cladding (illu. 109). Several iterations were made to subdivide the gable by head, body and base. Some of the selected 2D iterations were tested out in 3D, and it was concluded that the cassette principle helped bring it down in scale and express the grid system. It would be too complex for students to build an elaborate façade system in relation to the self-build concept of the student housings.

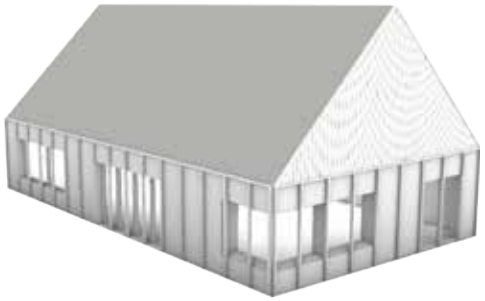


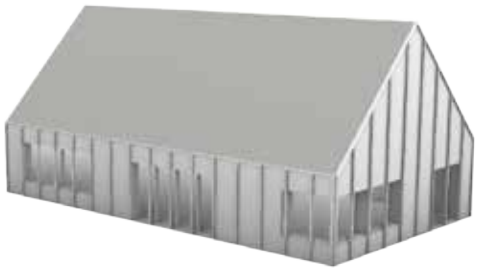



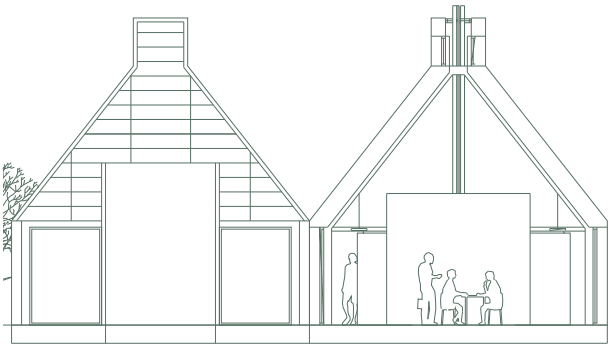

Illu. 111 Facade principles



Illu. 109 Casette system 1



Illu. 110 Casette system 2



Facade principals of the Energy Academy

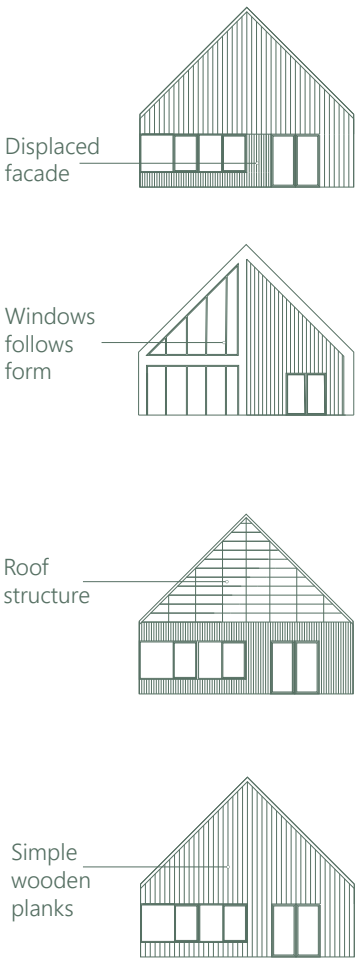
1. The displaced gable
2. The horizontal structure of the roof
3. Subdivision of the facades
4. Windows that follows the form
5. Inserted façade

**Facades inspired by the Energy Academy**

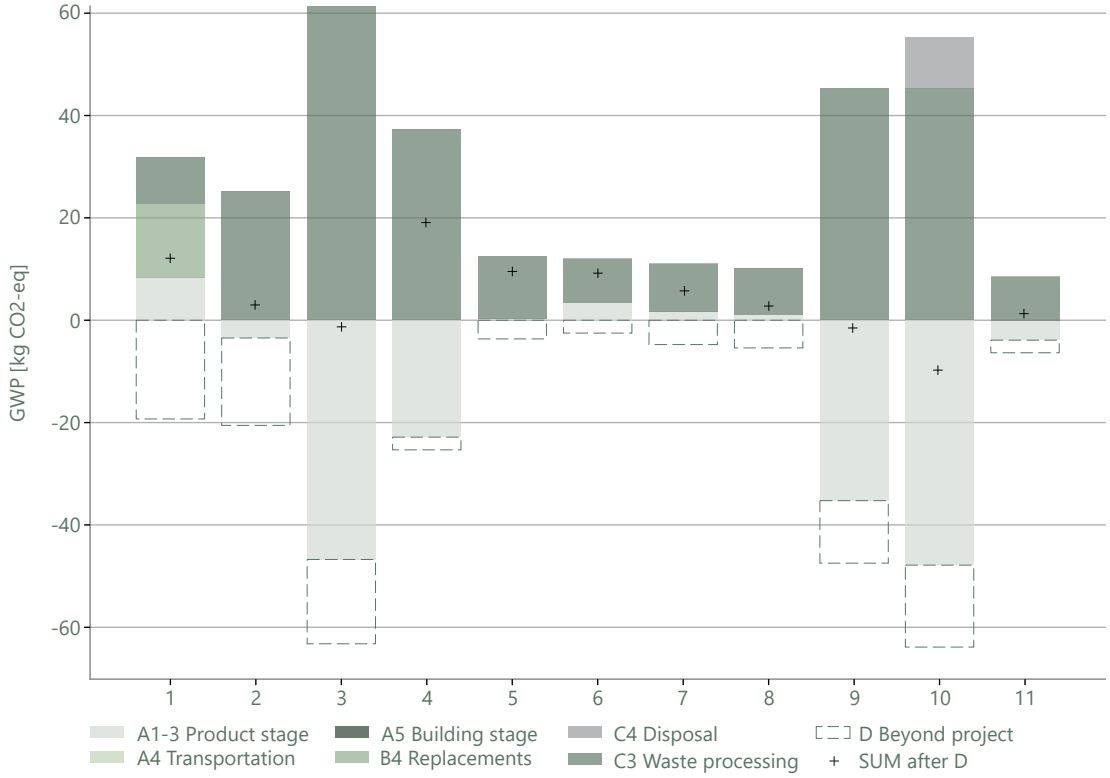
The second iteration was made to draw inspiration from the façade expression of the principles of the Energy Academy. This led to further investigation of the façade, both in its materiality and structure of the façade (Energy Academy p. 35).

The following illustrations showcase the different structures found on the façade of the Energy Academy. Displacing the façade created a focus on the windows. Planks of two different widths are used to highlight the displacement. The disadvantage was the extra layer of cladding needed to create the displacement.

The expression of windows following the shape of the building proved too dominant on the façade, missing the relation to the Energy Academy. Recreating the roof structure on the top of the gable like the Energy Academy made a clear connection between the Energy Academy and the school. The school mimicked the Academy too much and failed to create its own identity (illu. 112). Based on the mentioned iterations, it was decided to keep the expression of the façade simple, underplaying the expression of the school buildings in comparison to the Energy Academy. The choice fell to using vertical planks to avoid waste materials and create a unique identity for the folk school that stands out from the Energy Academy. Having only simple planks makes it much easier for the students to replicate the façade when extending the student houses.




Illu. 112 Facade principles with inspiration from the Energy Academy




| | Material | A1-3 | A4 | A5 | B4 | C3 | C4 | D | Sum (before D) | Sum (After D) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Steel | 8,44E+00 | 0,00E+00 | 0,00E+00 | 1,43E+01 | 9,16E+00 | 3,24E-03 | -1,93E+01 | 3,19E+01 | 1,26E+01 |
| 2 | Zinc | -3,47E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,51E+01 | 1,08E-01 | -1,71E+01 | 2,18E+01 | 4,71E+00 |
| 3 | Wood shingles | -4,67E+01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 6,14E+01 | 1,02E-04 | -1,65E+01 | 1,46E+01 | -1,87E+00 |
| 4 | Heat-treated wood | -2,28E+01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 3,73E+01 | 1,08E-03 | -2,48E+00 | 1,44E+01 | 1,19E+01 |
| 5 | Polycarbonate | 2,92E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,23E+01 | 1,02E-04 | -3,65E+00 | 1,26E+01 | 8,93E+00 |
| 6 | Brick | 3,38E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 8,59E+00 | 1,04E-01 | -2,51E+00 | 1,21E+01 | 9,55E+00 |
| 7 | Glass | 1,70E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 9,33E+00 | 2,56E-02 | -4,76E+00 | 1,11E+01 | 6,30E+00 |
| 8 | DS Steel | 1,03E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 9,06E+00 | 9,21E-04 | -5,41E+00 | 1,01E+01 | 4,68E+00 |
| 9 | Timber | -3,53E+01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 4,53E+01 | 1,02E-04 | -1,22E+01 | 1,00E+01 | -2,19E+00 |
| 10 | Straw reed | -4,79E+01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 4,53E+01 | 1,01E+01 | -1,60E+01 | 7,54E+00 | -8,47E+00 |
| 11 | Reused bricks | -3,90E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 8,47E+00 | 1,04E-01 | -2,46E+00 | 4,68E+00 | 2,21E+00 |

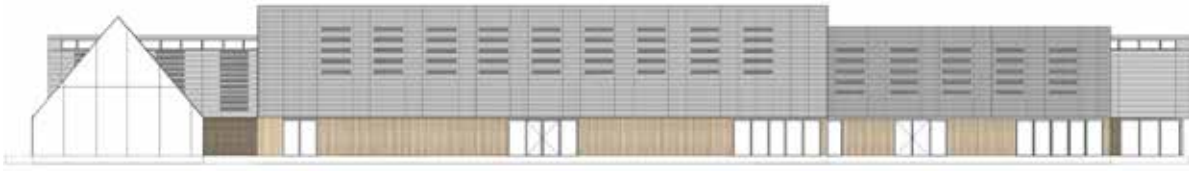
Illu. 113 LCA of external claddings

# LIFE CYCLE ASSESSMENT

Along with investigating the expression of the facades, the carbon footprint of a range of materials for the external surfaces was compared to reveal the optimal material choice. A range of options for walls, curtain walls and roofing materials have been investigated to collect a range of materials used for the cladding of the buildings. The wish is to connect to the Energy Academy in the materiality and the overall building mass while keeping the Energy Academy as the main focal point and landmark for the site. The existing building is primarily clad in zinc, a relatively sustainable material choice based on the great reuse potential and minimal maintenance acquired, though still carbon-heavy in the production phase (Illu. 113). Other parts of the building are clad in wooden planks and energy-efficient windows.

Alternative materials are investigated, both bio-based and artificial, to find the most environmentally sustainable, the correct overall expression for the buildings, and the most buildable building system, making it possible for the students to assemble them themselves.

The lowest scoring materials chosen for the project are the wooden planks, sourced from Nordic forests for most of the facades, and DS-steel, a steel profile system with a high share of reused steel for the roofs. Though the straw reed for the roof or facades scores low in the carbon footprint, the assembly is much more complex and brings a different expression too far removed from the expression of the Energy Academy.



Illu. 114 Iteration 1

Illu. 115 Iteration 2

Illu. 116 Iteration 3

Illu. 117 Iteration 4

# PHOTO VOLTAICS

Active strategies according to BE18 calculations (appendix 10) to live up to the net-zero energy class, integration of photovoltaics on roof faces is a necessity.

**Iteration 1**
The first iteration mirrored the structure of the Energy Academy by laying out the solar panels horizontally. The roof panels are not laying horizontally on the new buildings as on the Academy, this solution would make for panels laying on top of the roof, rather than integrated with the roof face (Illu. 114).

**Iteration 2**
Following the same structure of smaller panels fitting on the faces of the individual roof panels as the academy made for thin strips of solar panels between the seams of the roofs. This expression was deemed too fractured and was still not integrated directly with the roof's surface (Illu. 115).

**Iteration 3**
The third iteration integrated the panels in the roof face in centralised patches. Though the panels were incorporated into the surface, the panels were too clustered, ruining the expression of the roof face (Illu. 116).

**Iteration 4**
The final iteration spread out the panels across the surfaces, making sure to place the panels high on the face to increase the output by avoiding areas shaded by neighbouring buildings and greenery (Illu. 117).

The different design iterations, investigations and analyses of the upcoming folk high school are summarised in this chapter to highlight the arguments behind the final design. In the following chapter, the final design of the folk high school will be presented.

# EARTH ACADEMY

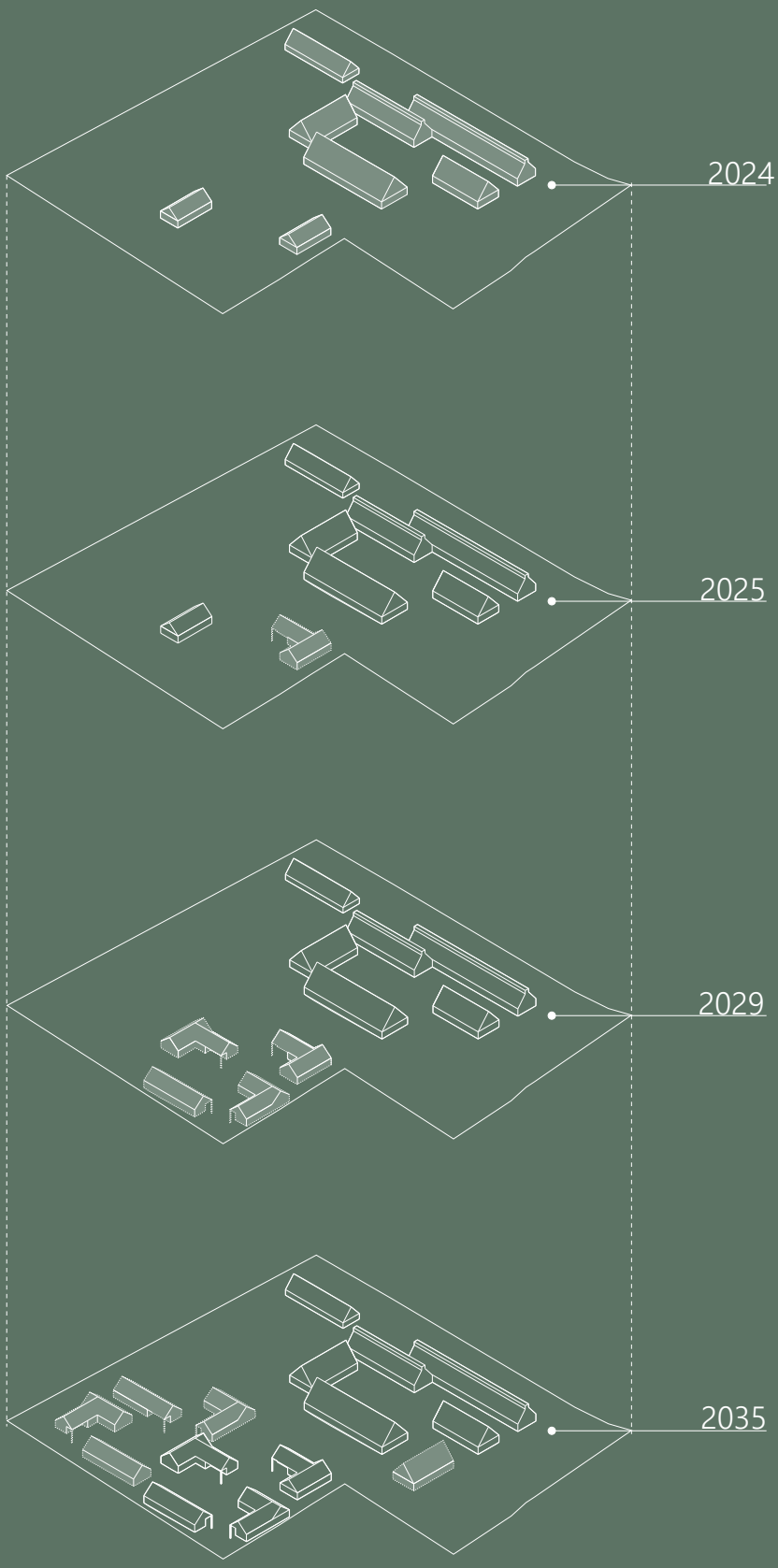
*Du skal plante et træ*
*af Piet Hein*

*1. Du skal plante et træ.*
*Du skal gøre én gerning,*
*som lever, når du går i knæ,*
*en ting, som skal vare*
*og være til lykke og læ.*

*2. Du skal åbne dit Jeg.*
*du skal blive et eneste trin*
*på en videre vej.*
*Du skal være et led i en lod,*
*som når ud over dig.*

*3. Du skal blomstre og dræ.*
*Dine frugter skal mætte*
*om så kun det simpleste kræ.*
*Du har del i en fremtid.*
*For dén skal du plante et træ.*

(Højskolesangbogen 2022)




Illu. 118 Concept diagram, entire site

## ROME WAS NOT BUILD IN ONE DAY

Earth Academy is a living organism; it will evolve with time and change accordingly to the world's needs. The concept of Earth Academy is rooted in an unfinished building mass. The common core functions of the school will be the first to be built as a detached expansion of the Energy Academy. These functions are both heavily needed for the school to function and will improve the operations of the Energy Academy. As the folk high school gains traction and the number of students rises, the need for more housing and additional school facilities manifests itself.

Building sustainably is part of the curriculum, and the students themselves will be involved in expanding the housing.

The master plan of this project is only to be seen as one possible option for the expansion of the folk high school as the school is set to evolve throughout its lifetime. The students will be able to have their say in the configuration, changing the overall layout while building techniques and technologies will evolve, making for even more sustainable solutions than those presented in this master thesis.

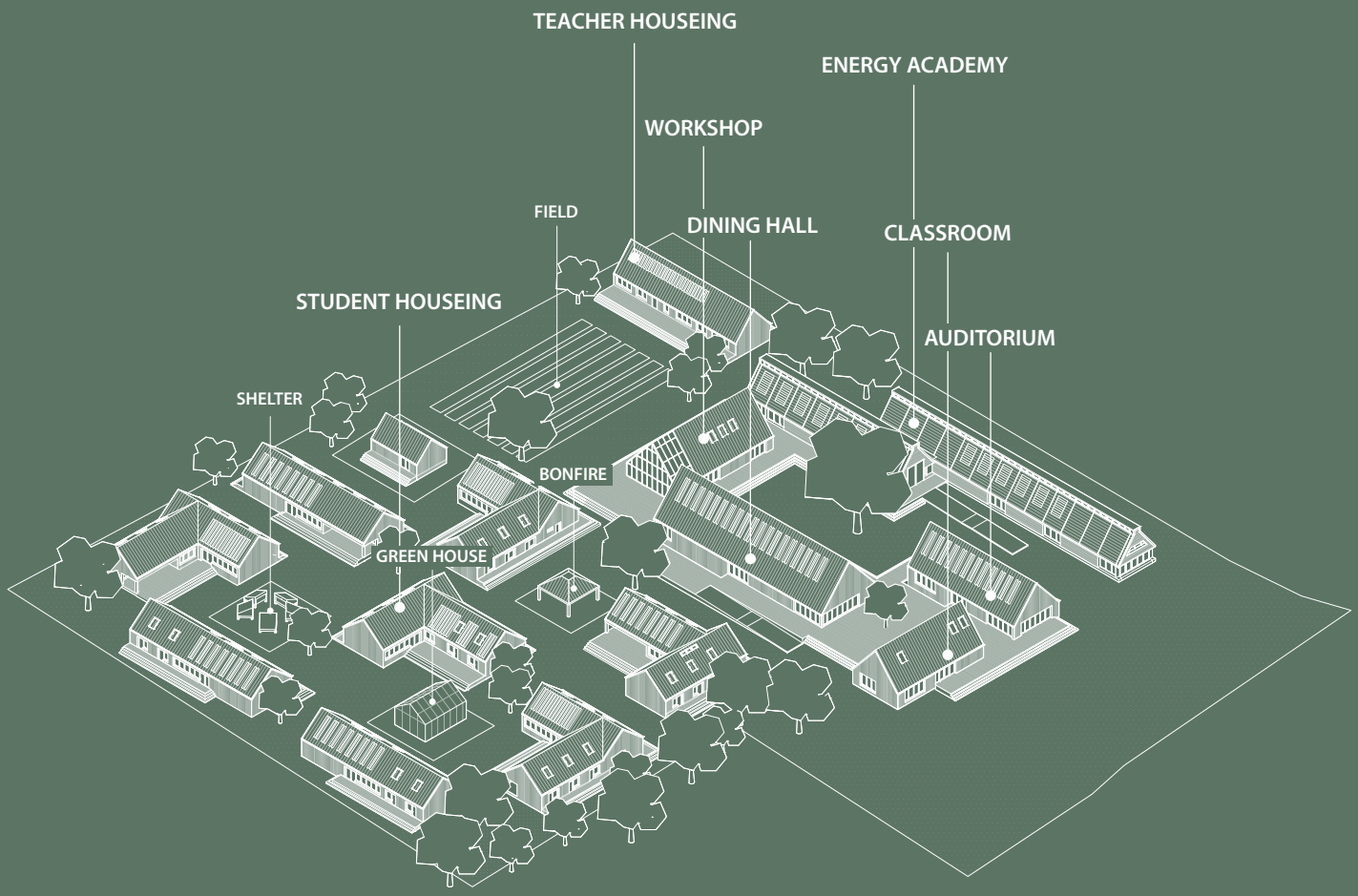
By letting the students define their physical configuration and being involved in every step of building The Earth Academy, *fælledskab* is created. Though the students only stay at the school for a relatively short time, each student will leave a permanent impact on The Earth Academy. Both in the school's physical manifestation, in the knowledge bank the school develops, and in contribution to the definition of a sustainable lifestyle.

## THE ARRIVAL

*“It is like this wild tremble, this – Atmosphere – I felt it immediately, the first time I visited the school, before I started. It is extremely hard to explain – The energy here. My parents commented as well when they dropped me off. It is this pulsating atmosphere, because so much is happening [...] It is quite wild. I went from being quite unhappy, where I was before [Higher education] to being happy right here. It is so enriching on so many levels. I have never experienced something like this before.” - (Rahbek 2019 p.96)*

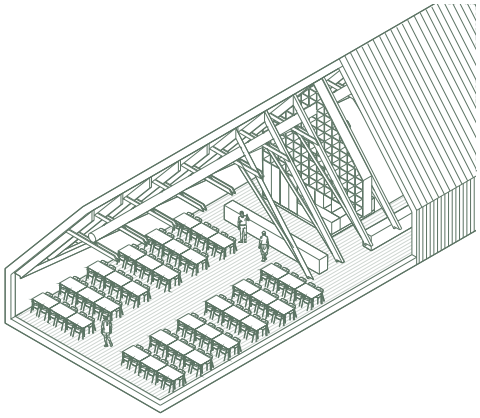
*”Det er sådan en vild sitren, det er her – atmosfæren – jeg følte det med det samme, da jeg første gang besøgte skolen, inden jeg startede. Det er vildt svært at forklare – den energi der er her. Mine forældre kommenterede det også, da de satte mig af. Det er sådan en pulsende atmosfære, fordi der sker så meget [...] Det er ret vildt. Jeg kom fra at være ret ulykkelig der, hvor jeg var før [på en videregående uddannelse] til at være lykkelig her. Det er så berigende på mange forskellige måder. Det har jeg aldrig oplevet før.” - (Rahbek 2019 p.96)*

Illu. 119 Entrance to Earth Academy

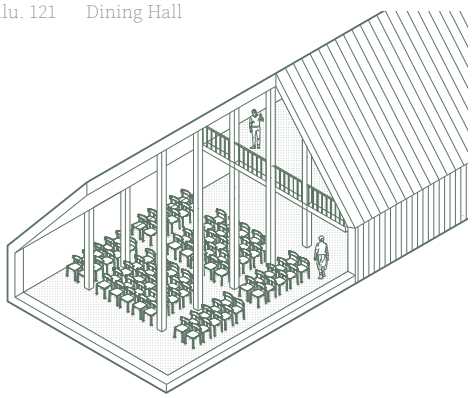



Illu. 120 Isomatric view of entire site

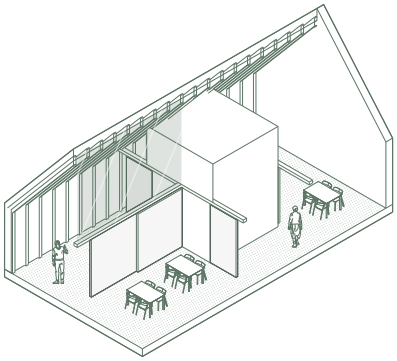
# FUNCTIONS



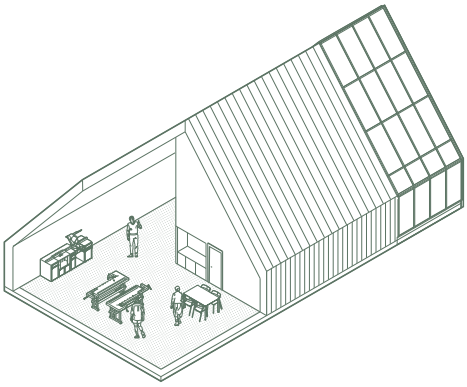
Illu. 121 Dining Hall



Illu. 122 Auditorium



Illu. 123 Multiroom



Illu. 124 Workshop

By avoiding building monofunctional spaces, you avoid building spaces of low use. This has been the ethos in the planning of public functions of the folk high school. The buildings can accommodate all needs of The Earth Academy and the needs of the future users beyond the lifetime of the folk high school. Sustainability is manifested in the flexibility of buildings as they are never meant to be torn down.

***Dining room***

The dining hall is the heart of the school where the students, teachers and employees of The Earth Academy meet, regardless of their role. The fields and the dining hall are instrumental in teaching sustainable food production, limiting food waste, and changing habits.

***Auditorium***

The auditorium is the central public gathering space for the school, the Energy Academy, and the local community. It houses the morning assemblies and classes for the school. It serves as an exhibition space for the Energy Academy, hosting talks and debates for the local community and the students. The auditorium houses an informal library with space for individual work, smaller gatherings, and social events for the students.

***Multiroom***

The multiroom is not meant to be built from the beginning, only later when the number of students and the need for additional space grows. The flexible building will be able to change size depending on the needs by dividing the space, for the meeting-, exhibition-, and learning rooms.

***Workshop***

The workshop is the space for woodworking, arts and crafts, bush crafts etc. It is a free space to explore one's creative and artisanal competencies and learn the basics of sustainable building practice before carrying it out in real life.

# GROUND LEVEL 1:200

### Multiroom

① Multi-space 1 - 24 m²
② Hallway 11 m²
③ Multi-space 2 - 44 m²
④ Handicap toilet 5 m²
⑤ WC equipped with handwash 5 m²
⑥ Storage 9 m²

### Auditorium and library

⑦ Auditorium/Library 142 m²
⑧ Storage 8 m²
⑨ Handicap toilet 7 m²
⑩ WC 3 m²

### Dining room

⑪ Dining room and hallway 186 m²
⑫ Industry kitchen 43 m²
⑬ Cleaning storage 2,2 m²
⑭ Staircase 3,6 m²
⑮ Cold room 5 m²
⑯ Storage 5 m²
⑰ Freezer 5 m²
⑱ Storage 3,5 m²
⑲ Cold room 4,5 m²
⑳ WC equipped with handwash room 6 m²
㉑ Sprout room 37 m²

### Energy Academy

㉖ Office and exhibition space 404 m²
㉗ Staircase 4,5 m²
㉘ Technical room 6,7 m²

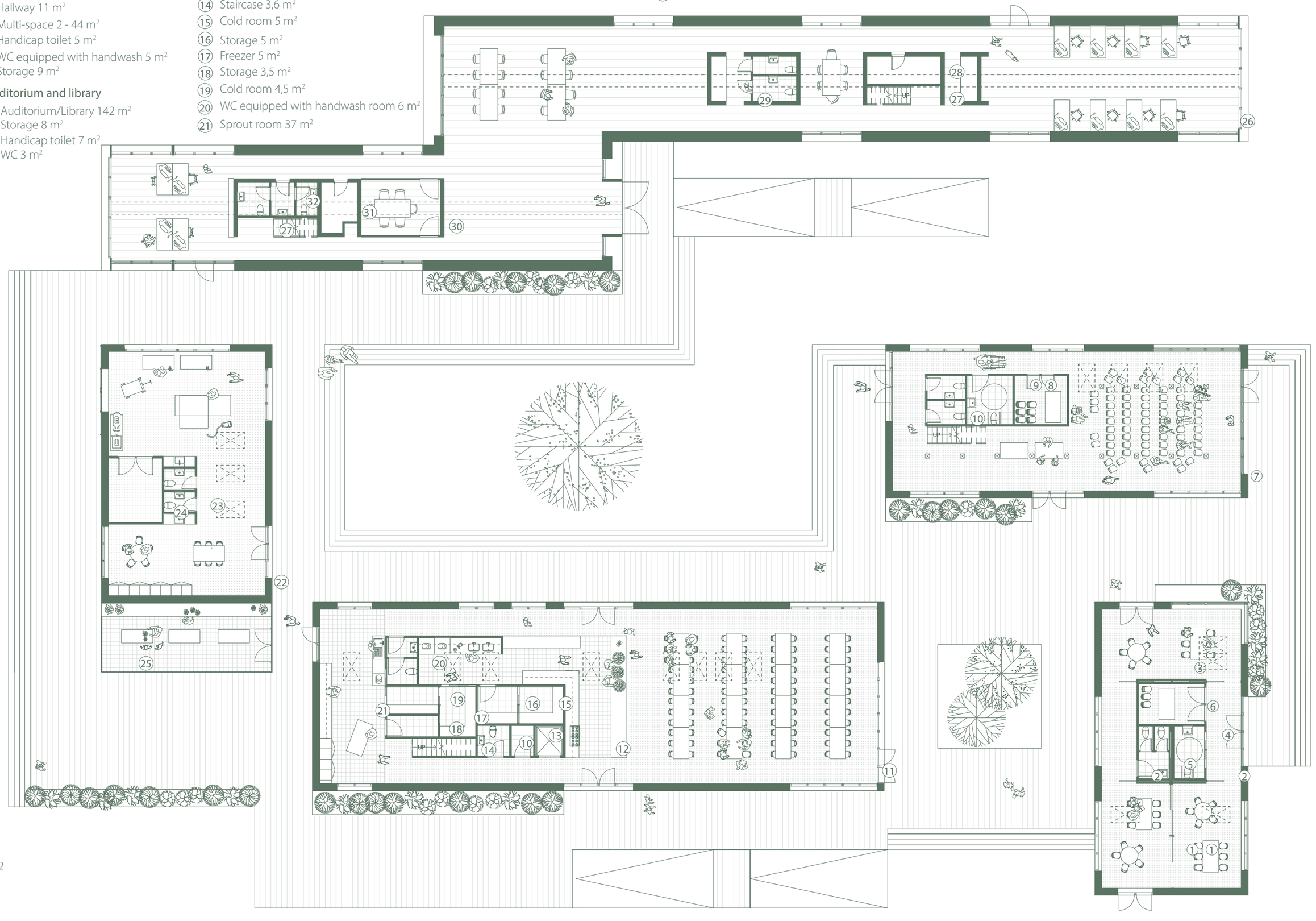
### Wardrobe & toilets 12 m²

㉙ Wardrobe & toilets 12 m²
㉚ Meeting room 14 m²
㉛ Technical room 5,3 m²
㉜ WC's w. handwash 8,7 m²

### Workshop

㉒ Creative workshop 125 m²
㉓ Storage 11 m²
㉔ WC 2 m²

㉕ Greenhouse 37 m²



# FIRST FLOOR 1:200

1. Floor - Auditorium and library

① Technical room - 6 m²
② Library 22 m²

1. Floor - Multiroom

③ Technical room 22 m²

1. Floor - Dining room

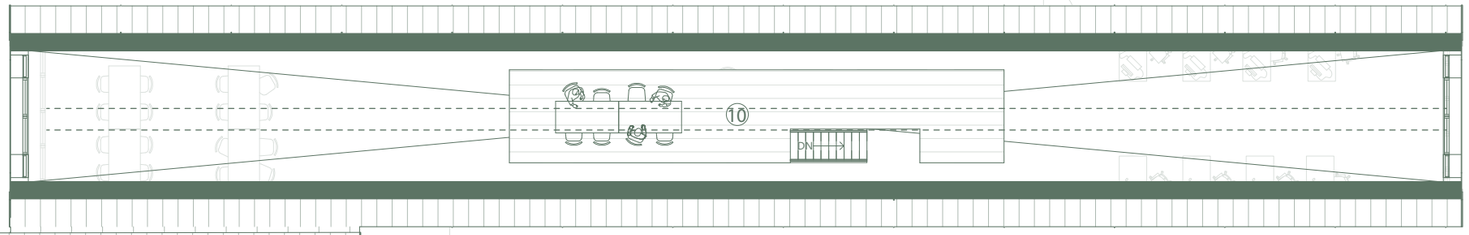
④ Storage 7,6 m²
⑤ Technical room 4,6 m²
⑥ Bathroom 4,3 m²
⑦ Changing room 12 m²
⑧ Break room 30 m²

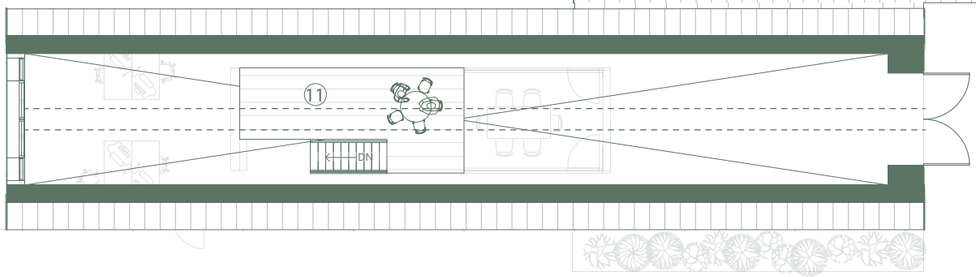
1. Floor - Workshop

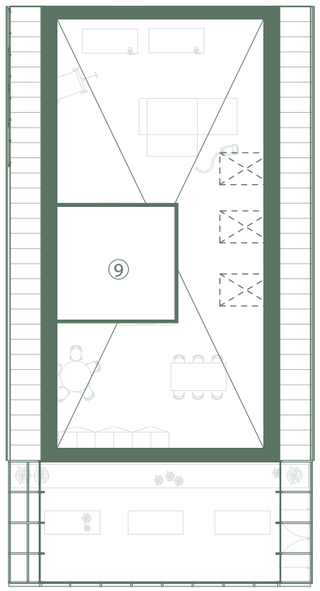
⑨ Storage 14 m²

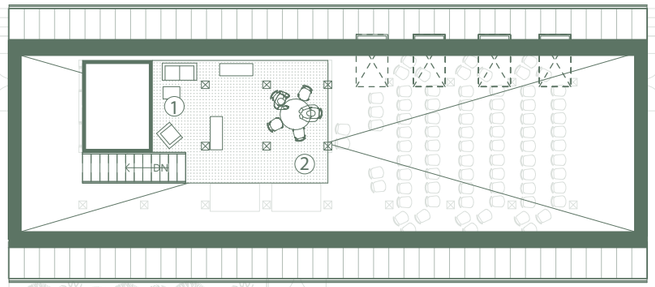
1. Floor - Energy Academy

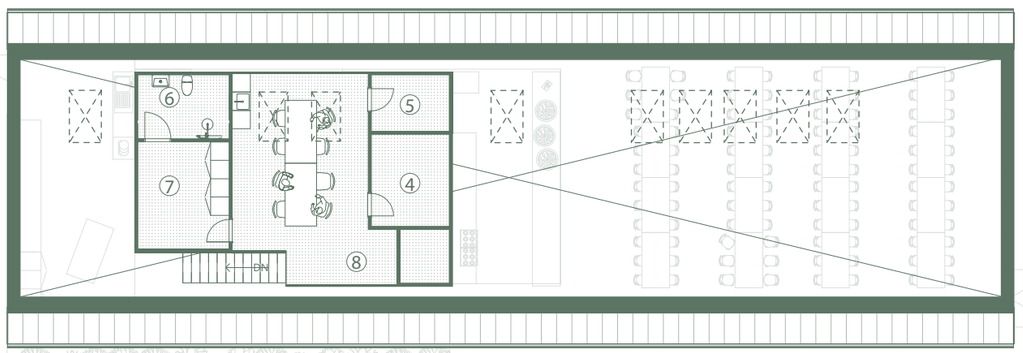
⑩ Meeting room 44 m²
⑪ Meeting room 19 m²

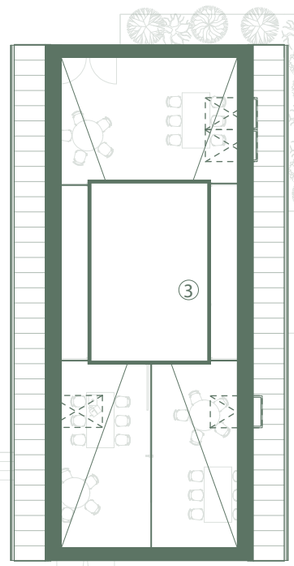


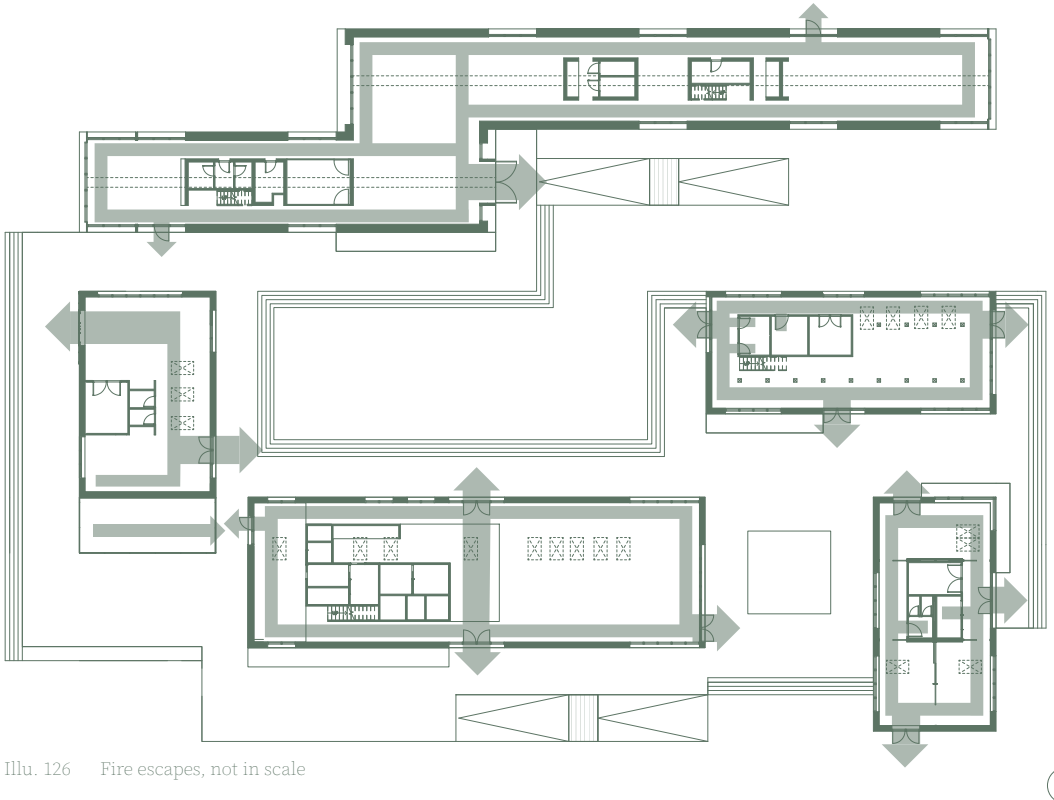



# DAYLIGHT AND FIRE ESCAPE


Illu. 125 Daylight analysis, not in scale

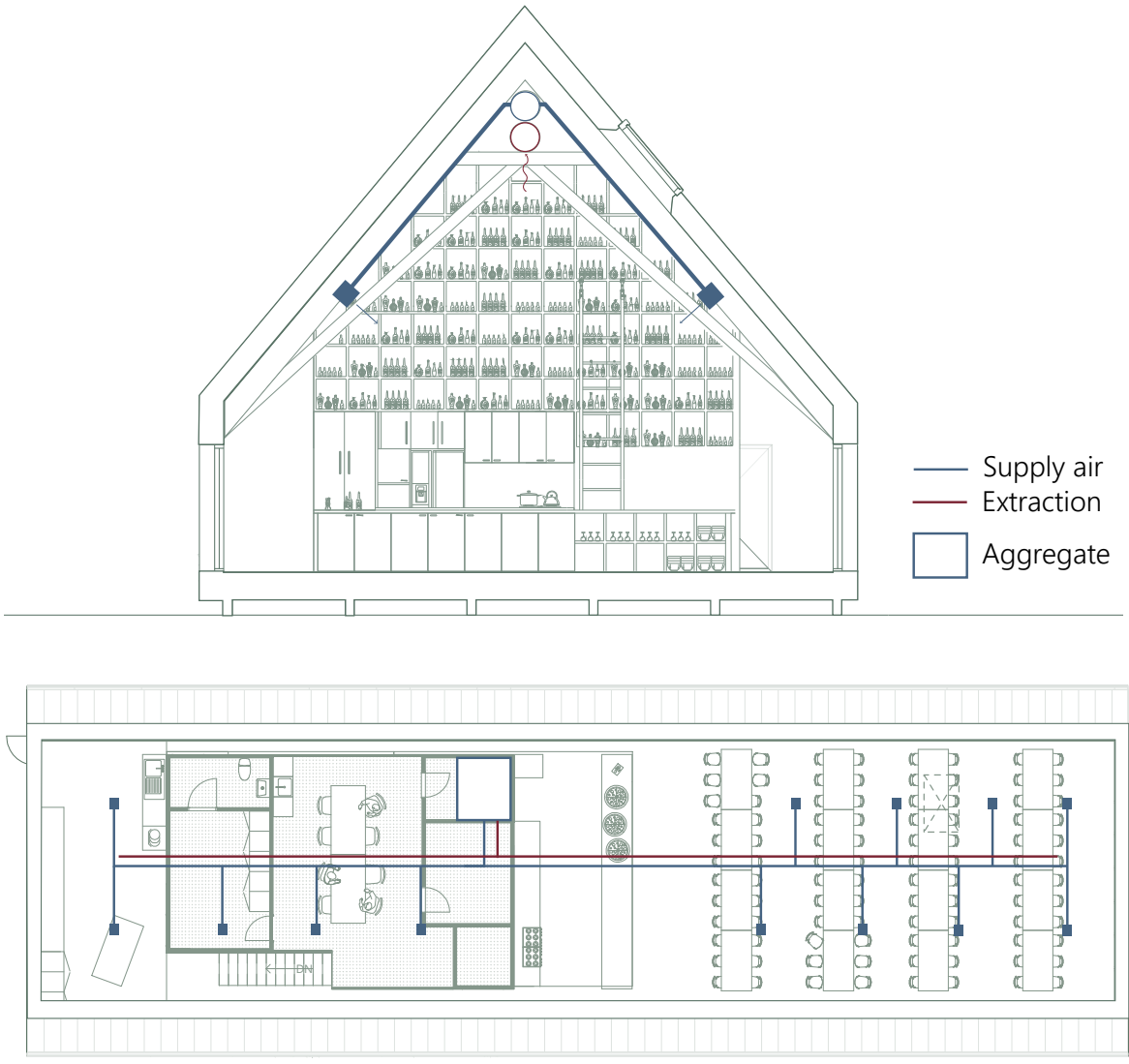


Illu. 126 Fire escapes, not in scale

# VENTILATION

The ventilation system for the dining room consists of one centralised aggregate placed in a technical room in the core of the building. The channels run the length of the building, hidden away between the beams of the roof construction. The ventilation principle is based on mix ventilation with the main channels running along the roof's ridge, with ventilation fixtures halfway down the ceiling. The supply channel is placed closest to the ridge to simplify the subchannels to the supply fixtures. The extraction vents are placed along the length of the channel extracting the warm contaminated air rising from the dining hall below.

*Ventilation fixtures: LCA-160+MBB-160-160-S*
*Air volume: 75 m³/h*
*Channel dimension: 500 mm*
*Subchannel dimension: 160 mm*
*Total Pressure loss: 4 Pa*
*Throw length: 1,2 m*



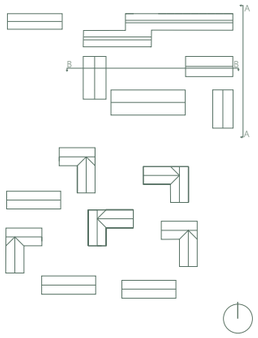

Illu. 127 Ventilation pricipals, not in scale

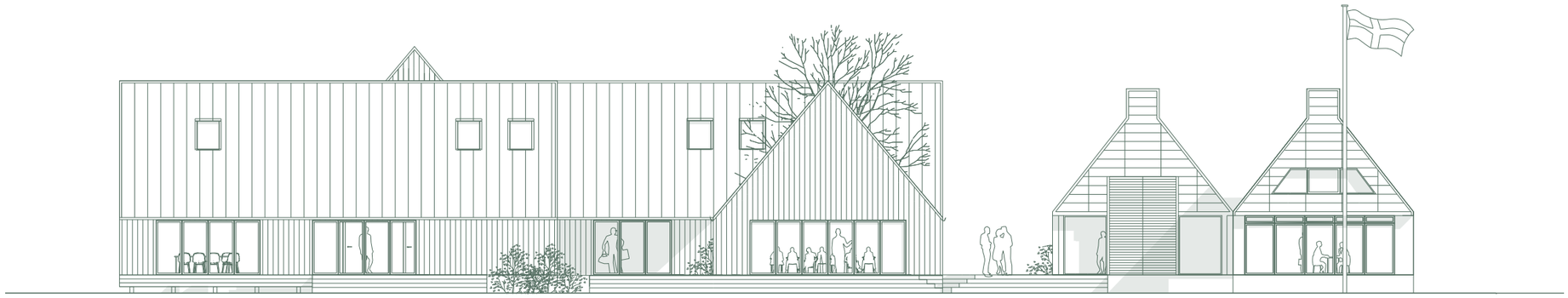
## SECTION AA & BB

Keeping the Energy Academy as the prominent landmark on the site has been a priority by letting both institutions have their own identity, drawing references between the two. The recessed windows in total height, the roof's slope, the materiality etc.

The site's main entrance underlines this relationship between existing and new by guiding the visitor between the two typologies toward the courtyard created between the buildings.

The courtyard between the buildings is the main point of arrival, creating a physical and visual connection between the existing Energy Academy and the folk high school. Inviting the mass of the Energy Academy to close the courtyard underlines the inherent connection between the two institutions.



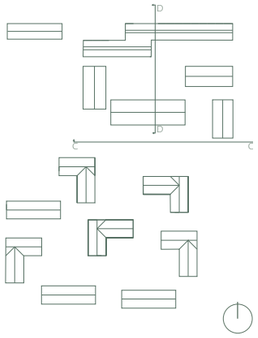



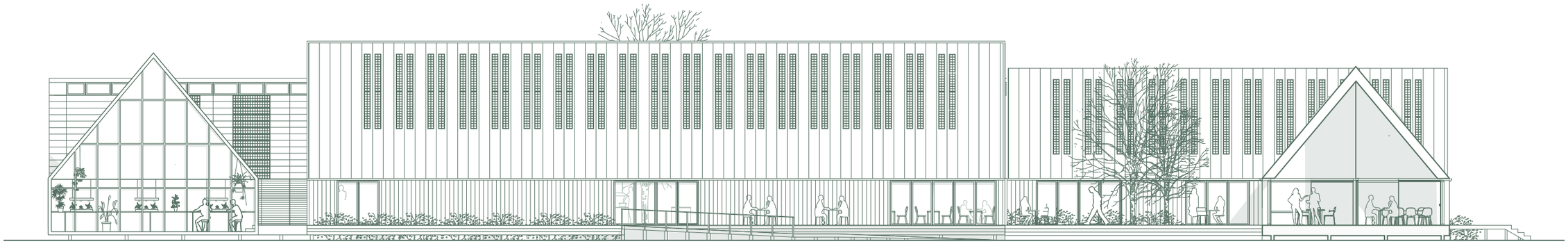

Illu. 128 Section AA, 1:200


Illu. 129 Section BB, 1:200

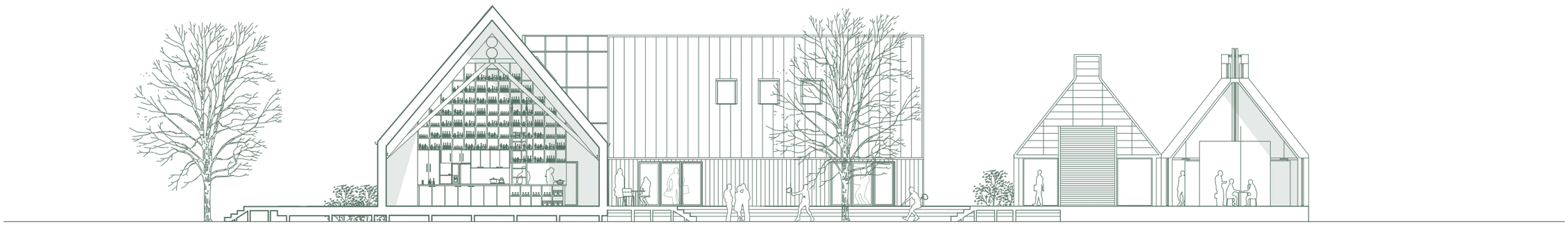
## SECTION CC & DD

The courtyard is the most significant public point of gathering for students, visitors of the school, the Energy Academy, and the locals. In the middle of the courtyard, the tree is a central focal point creating shade in the summer and a natural meeting point.






Illu. 130 Section CC, 1:200

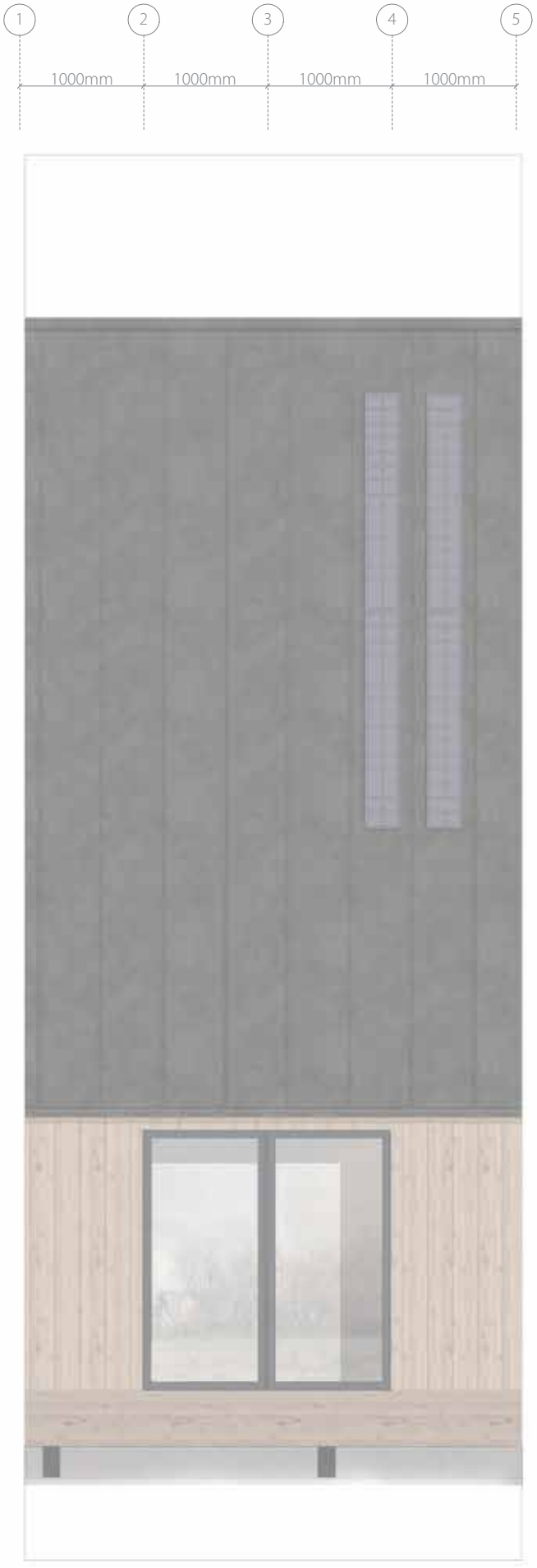



Illu. 131 Section DD, 1:200

## FACADE ZOOM DINING HALL

The expression of the exterior cladding is based on simplicity, inspired by the thought of reducing all means of ornamental. Not seeing the ornament as blurring the image of pure architecture as Laugier but as a waste of material.

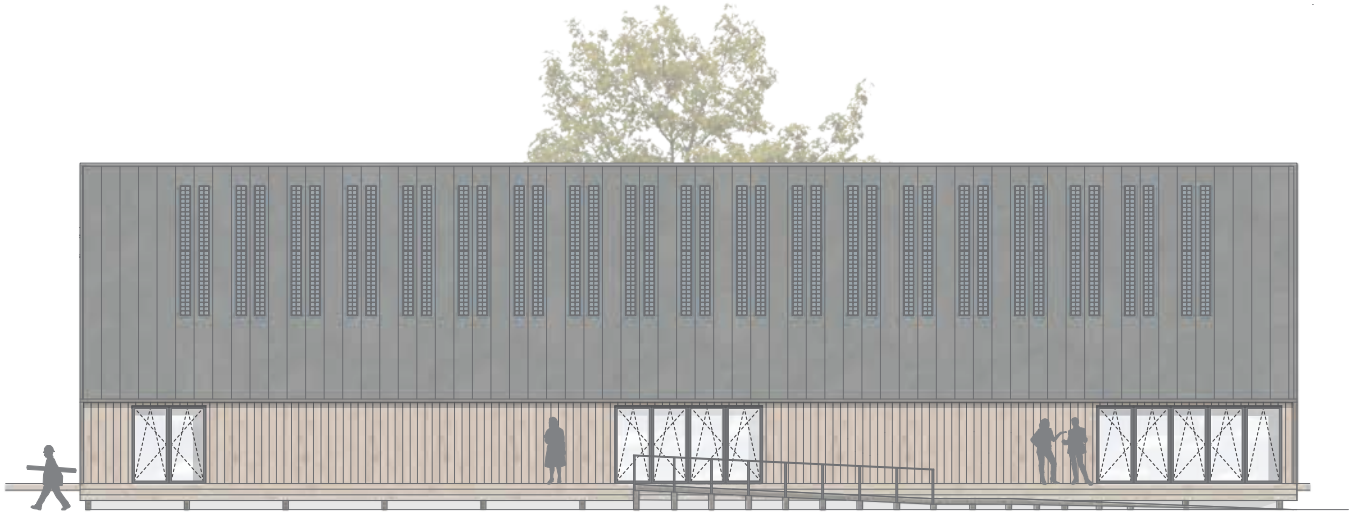
The materials of The Earth Academy are simple: wooden facades and metal roofs. The material choices divide the volume into separate roof, facade, and foundation layers.



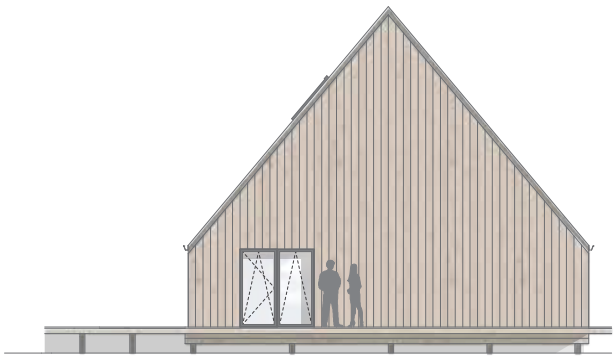

Illu. 132 Facade zoom 1:50

# FACADE, DINING HALL

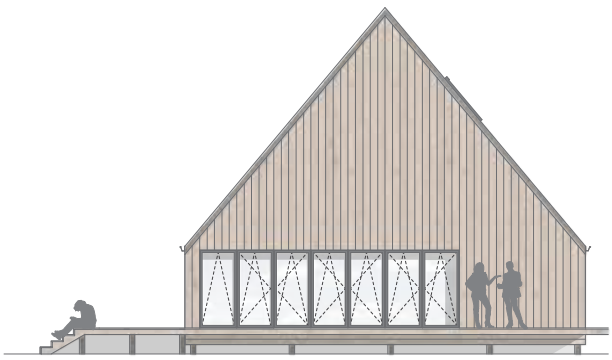
Illu. 133 Dining Hall North, 1:200



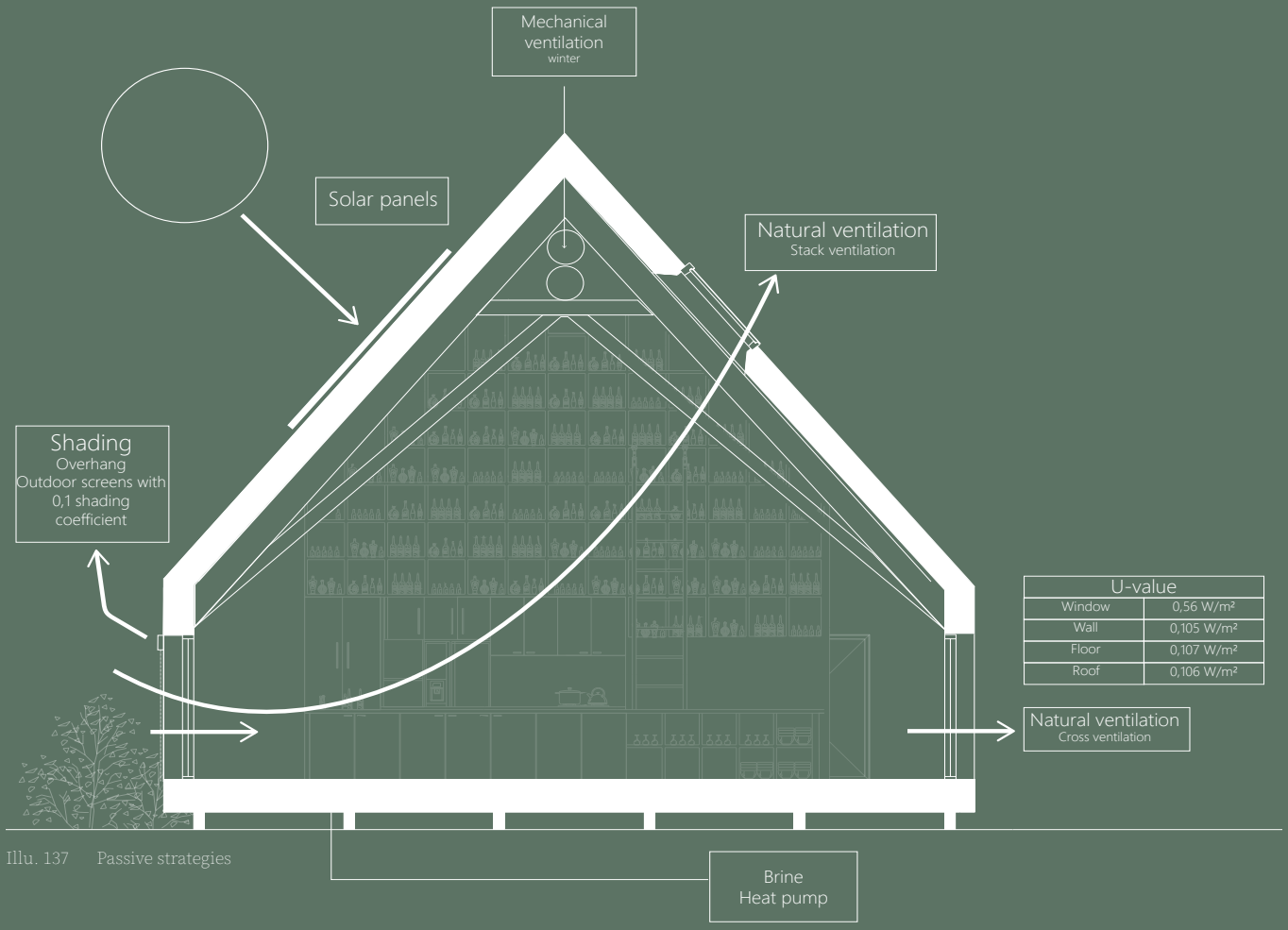
Illu. 134 Dining Hall South, 1:200



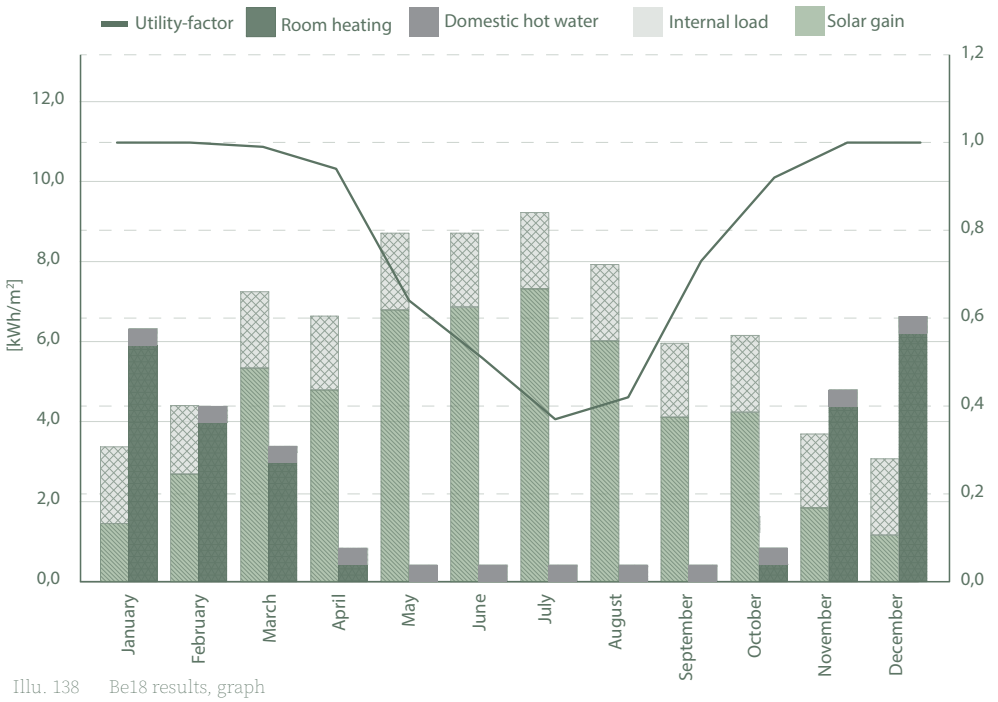
Illu. 135 Dining Hall West, 1:200



Illu. 136 Dining Hall East, 1:200




Illu. 137 Passive strategies




Illu. 138 Be18 results, graph

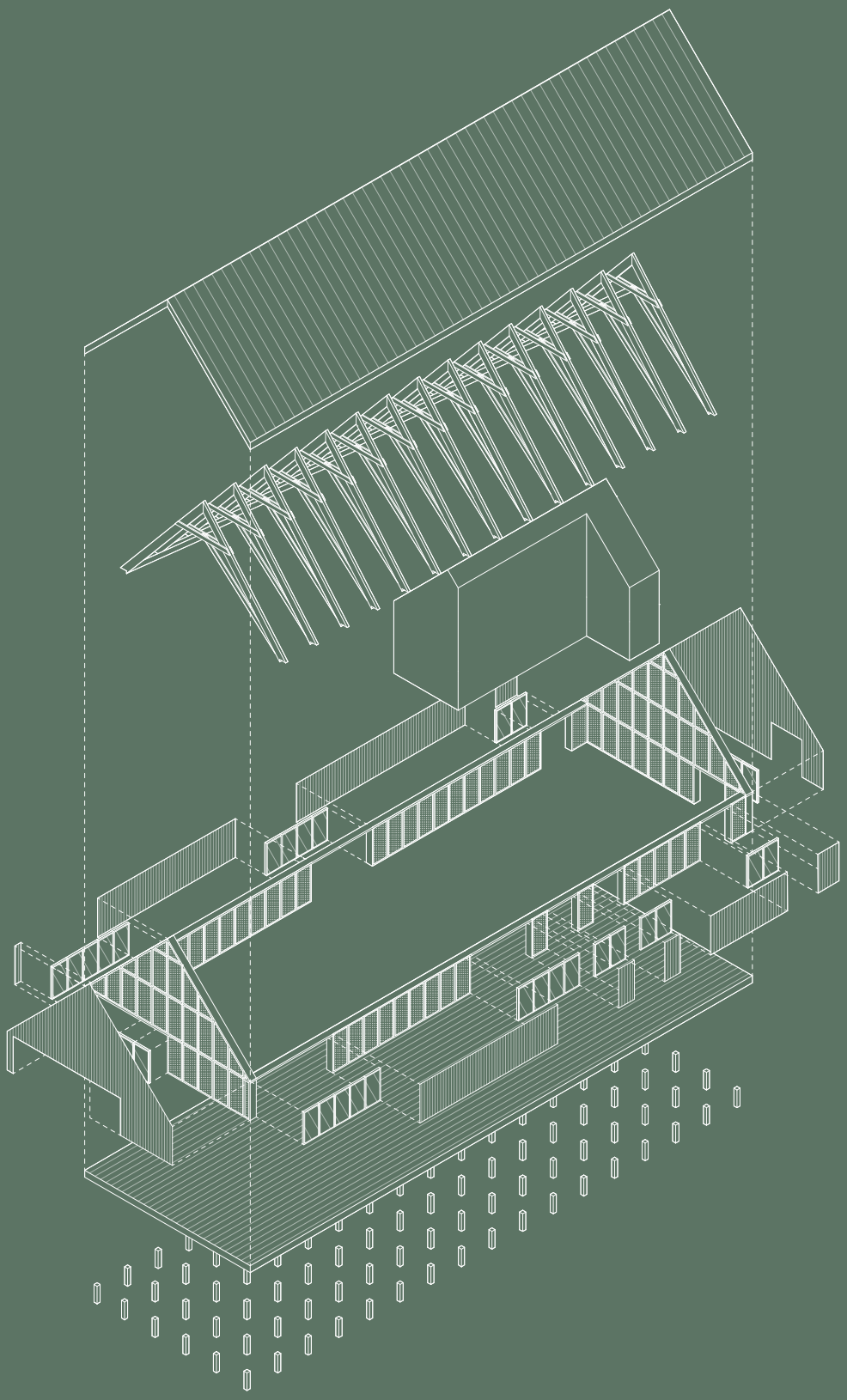
# A SUSTAINABLE BUILDING

Passive strategies have been at the centre of creating the most sustainable buildings. Creating seasonal shading on the windows by placing the windows deep in the wall with curtains and creating optimal possibilities for natural ventilation through the stack- and cross ventilation are parts of the steps to avoid overtemperature in the summer months.

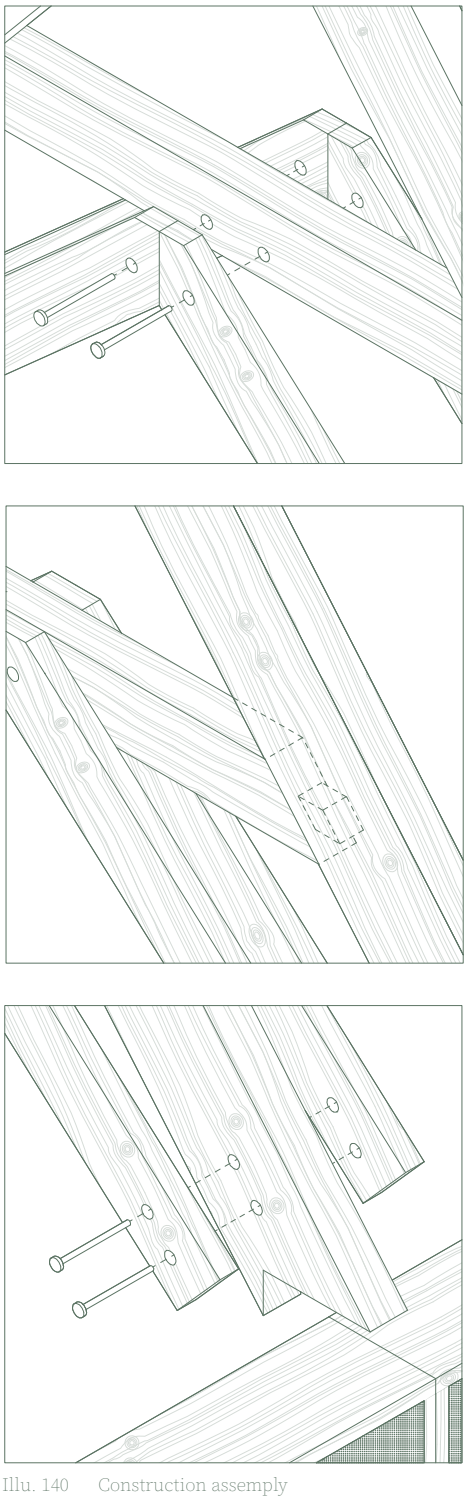
Active strategies enable the buildings to be self-reliant on heating by the heat pump and reach a net-zero power consumption with solar cells.

The sustainability of the buildings has been quantified in a range of simulative tools and investigations, including BE18, BSim, and LCA. The key numbers can be found on the chart to the right.

| **Key numbers BE18** | |
|---|---|
| Energy performance | 0,3 kWh/m² |
| Contribution to energy demands | |
| Heat | 0,0 kWh/m² |
| Electricity to the building | 0,2 kWh/m² |
| Over Temp. | 0,0 kWh/m² |
| **BSim Results** | |
| Hours above 26 °C | 102 hours |
| Hours above 27 °C | 50 hours |
| TopMean summer | 21,6 C |
| TopMean winter | 22 C |
| AirChange | 5,1 /h |
| **Acoustics** | |
| Reverberation time | 0,93s (125 Hz) |



Illu. 139 Exploaded view, dining hall



Illu. 140 Construction assemply

# CONSTRUCTION

The individual buildings of Earth Academy are all based on the same structural principles. Raised floors on point foundations with loadbearing Ecococon wall elements with a self-stabilised roof construction resting on the walls. According to standard measurements in the building industry, the buildings are all built with a strict 1m by 1m grid. The width of the Ecococon elements, doors and windows, spans between rafters, roof materials and façade claddings are all related to the 1m grid system.

For the buildings in the public zone, the facades are held free by placing technical installations and facilities in independent cores. By centralising the fixed technical facilities, the rest of the buildings are kept open and flexible.

The roof construction in the dining room is based on simplicity. The large spans of the building require large glulam elements of 160mm x 400mm. Every element of the construction is obvious, revealing durability and stability without unnecessary ornaments. The joints are tangible, and the whole roof structure can be easily replicated. The exposed rafters of the dining hall downscale the room, creating a homelike environment in what is the heart of the school.

## FÆLLEDSKAB

*“Fælledskaber is the only real source for wealth, happiness, quality of life, and for exhaustion, inconvenience, and despair. On a societal level, it is the common welfare, that creates prosperity and not the other way around, as you often hear. On the local scale, it is fælledskaberne, that creates meaning and direction in the everyday existence.” - (Hermansen and Nørretranders 2011 p. 12)*

*”Fælledskaber er den egentlige kilde til rigdom, til glæde, til livskvalitet og til udmattelse, besvær og fortvivlelse. På samfundsplan er det den fælles velfærd, der skaber velstand, ikke omvendt, som man ofte hører. På det lokale plan er det fælledskaberne, der skaber mening og retning i tilværelsen. Fælledskaber er fremtiden.” - (Hermansen et. Al 2011 p. 12)*

Illu. 141 Inside the dining hall

Illu. 142 Situation plan 1:1000

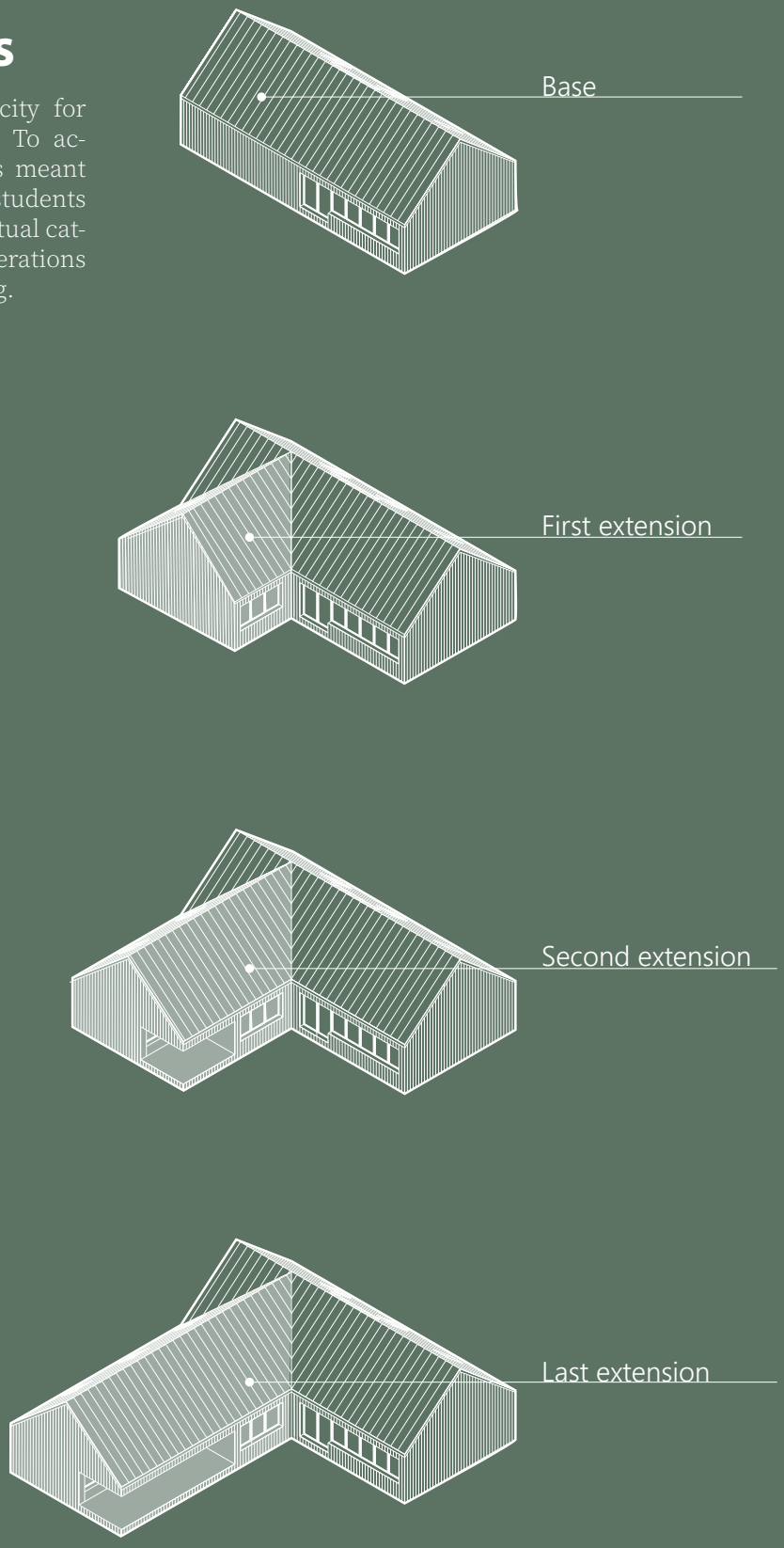
## YEAR 2035

This master plan is one possible outcome of the fully built Earth Academy with a capacity of 90 students. The site is constantly changing throughout its lifetime, where buildings are expanded, and new buildings are built. As the site evolves, priorities might change, and what is valued in this iteration might be completely different in the future.

In this configuration, the student housings are divided into two clusters consisting of four buildings each to accommodate common spaces of different character and sizes for several situations. The variety of shared spaces creates diversity by mixing students across the clusters. The total area of the folk high school is 2780 $m^2$.

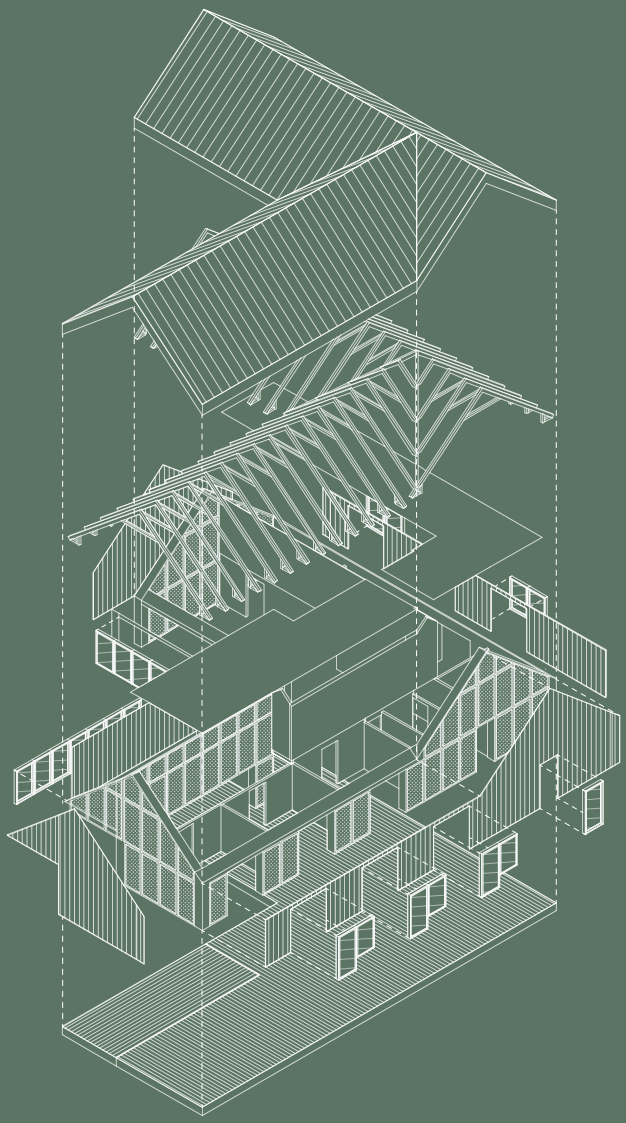
## STUDENT HOUSINGS

As the school grows, the capacity for student housing grows with it. To accommodate this, the housing is meant to be easily expanded by the students themselves. Attached is a conceptual catalogue depicting the order of operations in expanding the student housing.




Illu. 143 Student housing, concept

## SELF-BUILD



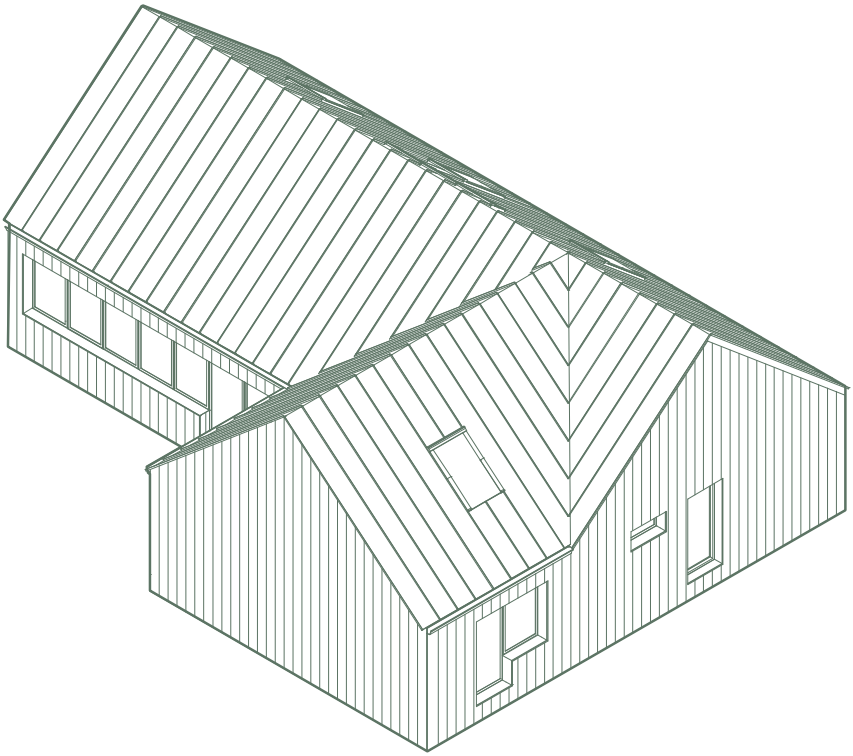
# EXTENSION MANUAL

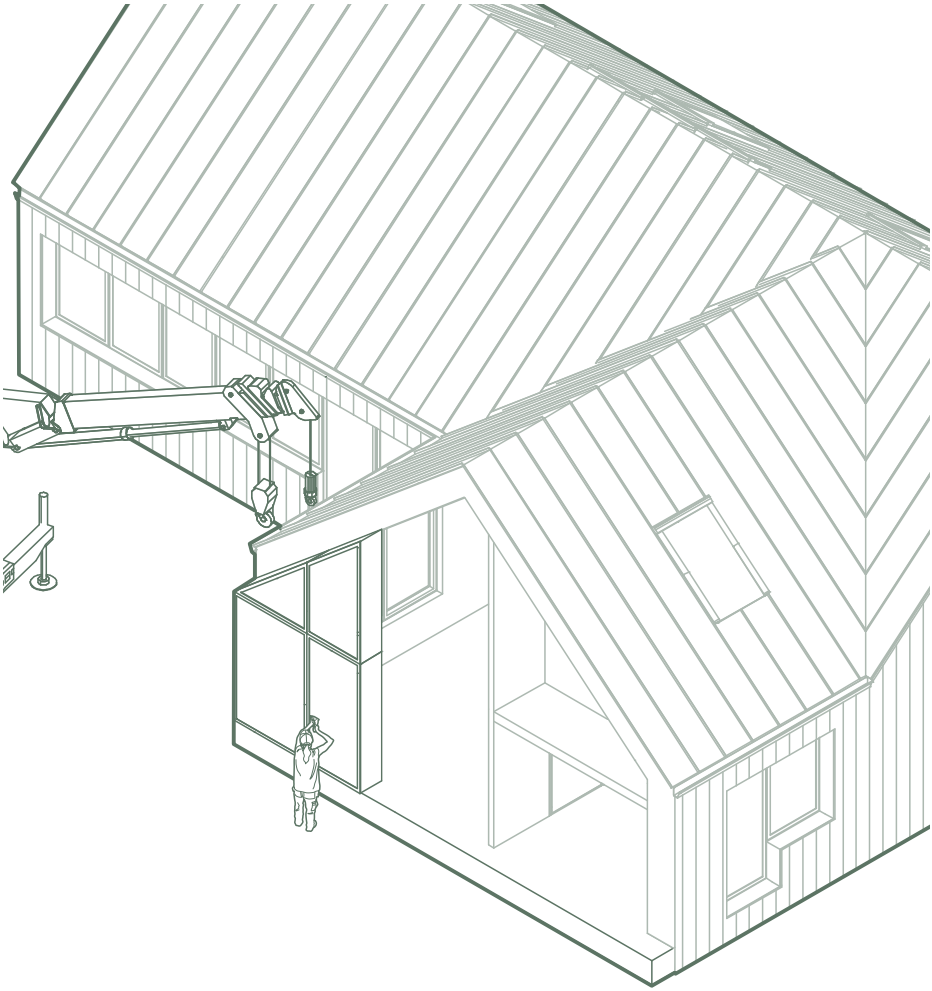
# INTRODUCTION

The student housings are designed to serve as an example of contemporary sustainable building methods and a possible new building standard for the single-family home. The materials and their inherent sustainable profile are based on the most sustainable materials according to the LCA method. This method factors the climatic impact of the materials in the production phase, across the lifetime of the materials, and finally, the impact of waste processing and the reusability of the materials after the building's lifetime is surpassed.

The buildings are created to be easily assembled, making it possible for non-craftsmen to be able to assemble while living up to contemporary building standards and with a good indoor climate. The buildings are based on the Ecococon prefabricated wall elements consisting of a loadbearing wooden frame insulated with straw and cladded with wooden boards. The whole building is laid out from a 1m X 1m grid, based on standard measurements for the wall elements and standards for doors and windows. The foundation is raised on a screw foundation to overcome the challenges of the potential flooding on the site, minimise the use of concrete, and ease the expansion of the buildings. And finally, the roof structure is based on standard wooden rafters with wood fibre insulation and metal roof cladding.

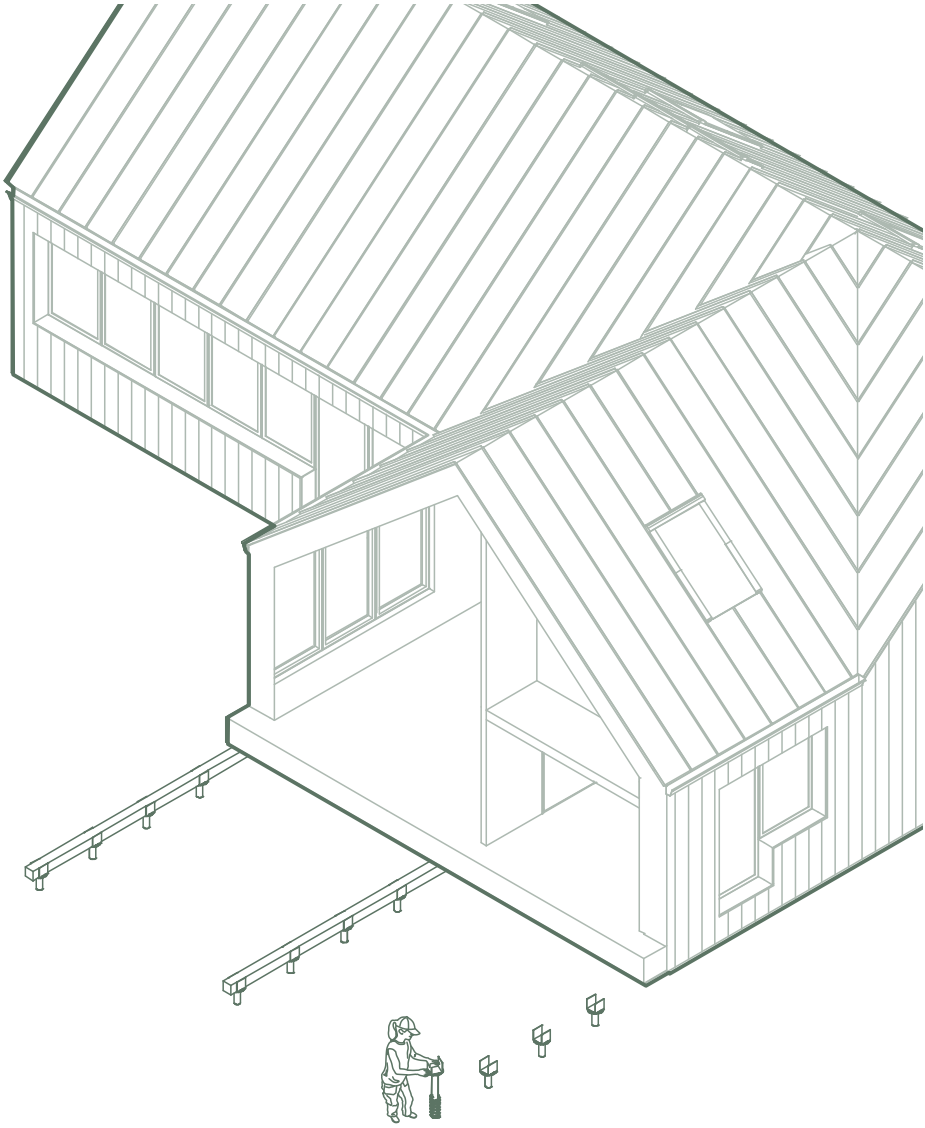
As the building of the student housings will be part of the curriculum for the folk high school, both by expanding upon existing structures and by building from scratch, the ease of building the buildings and the concept of building for disassembly have been defining factors in the design of the housings. The following will present the simple building system and the order of steps to expand the student housing.





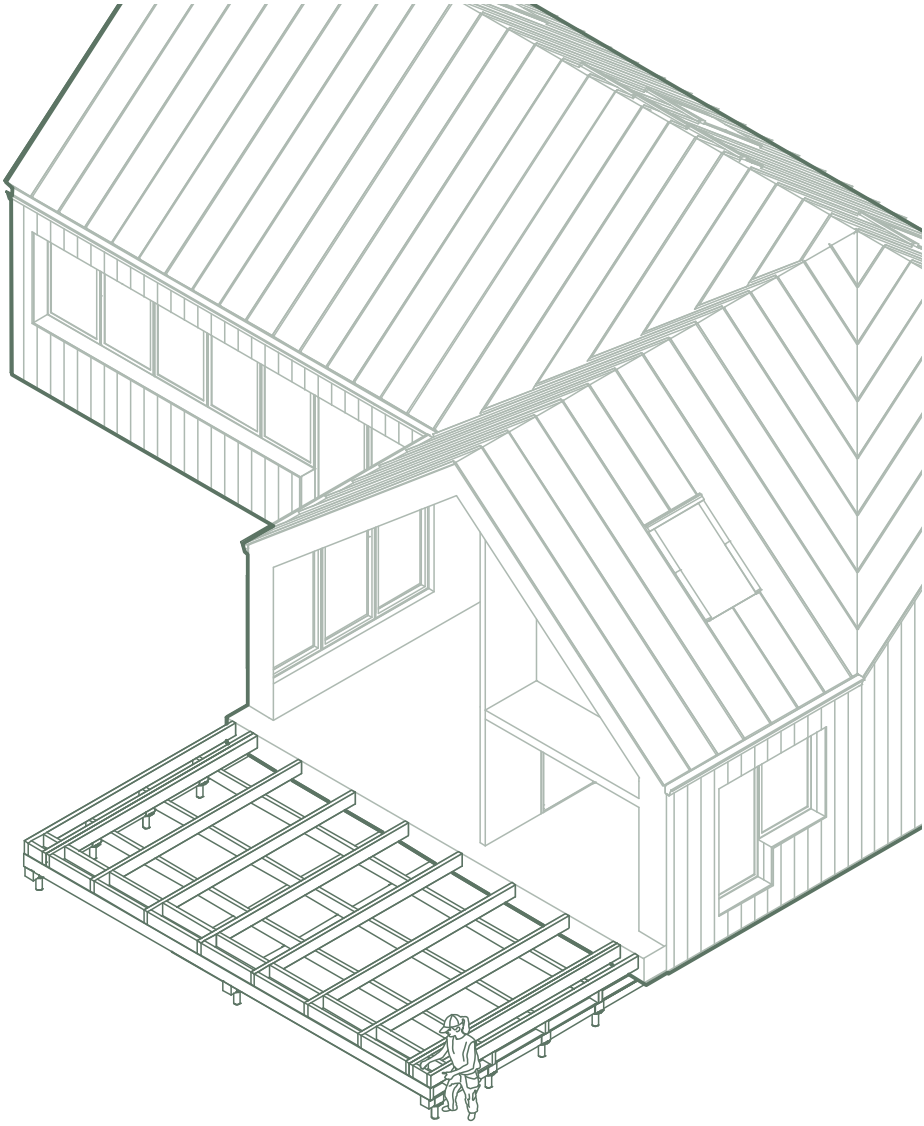
***Step 1 Disassembly of existing gable***

Both claddings and the wall elements will be reused after the extension and must be carefully disassembled.



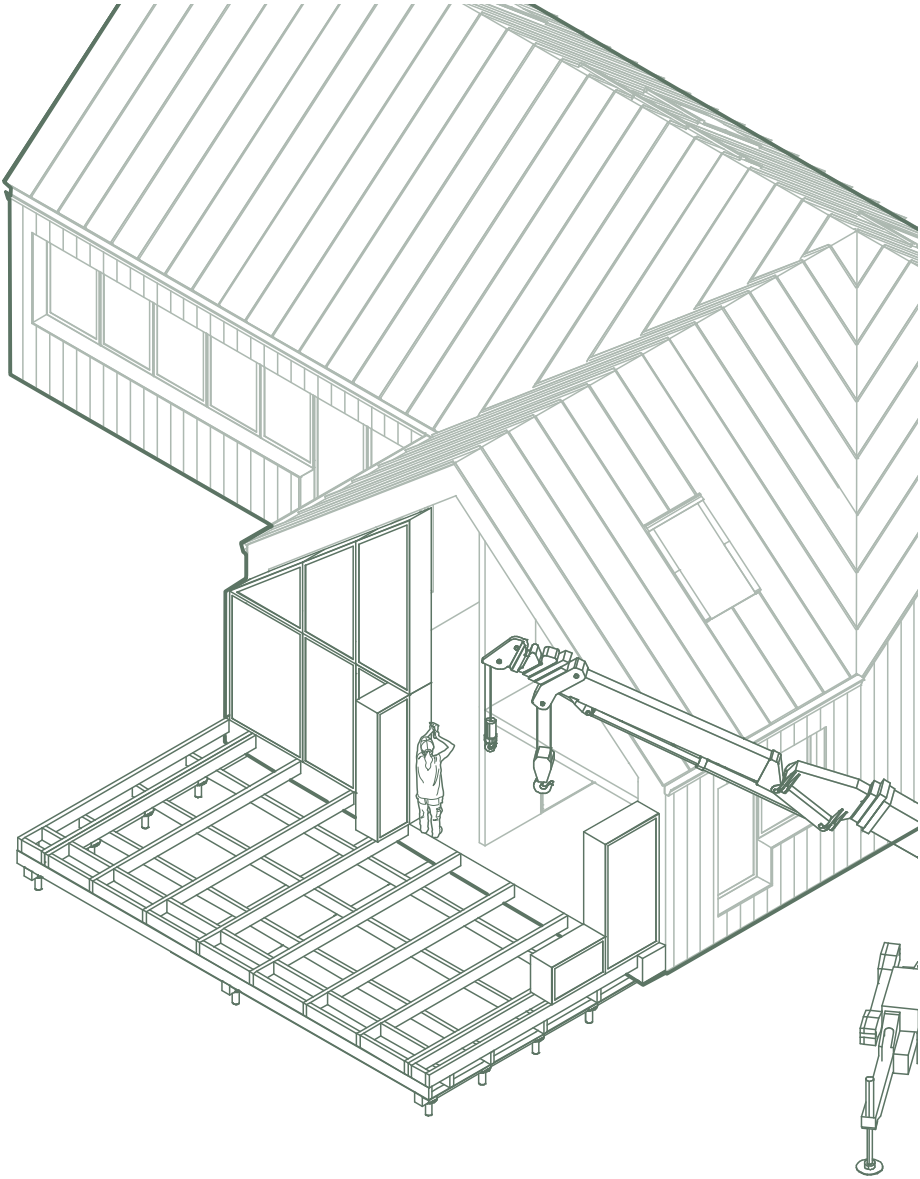
***Step 2 Extension of the screw foundation***

The foundation of the building is extended by adding a row of point foundations for every meter the building is extended.



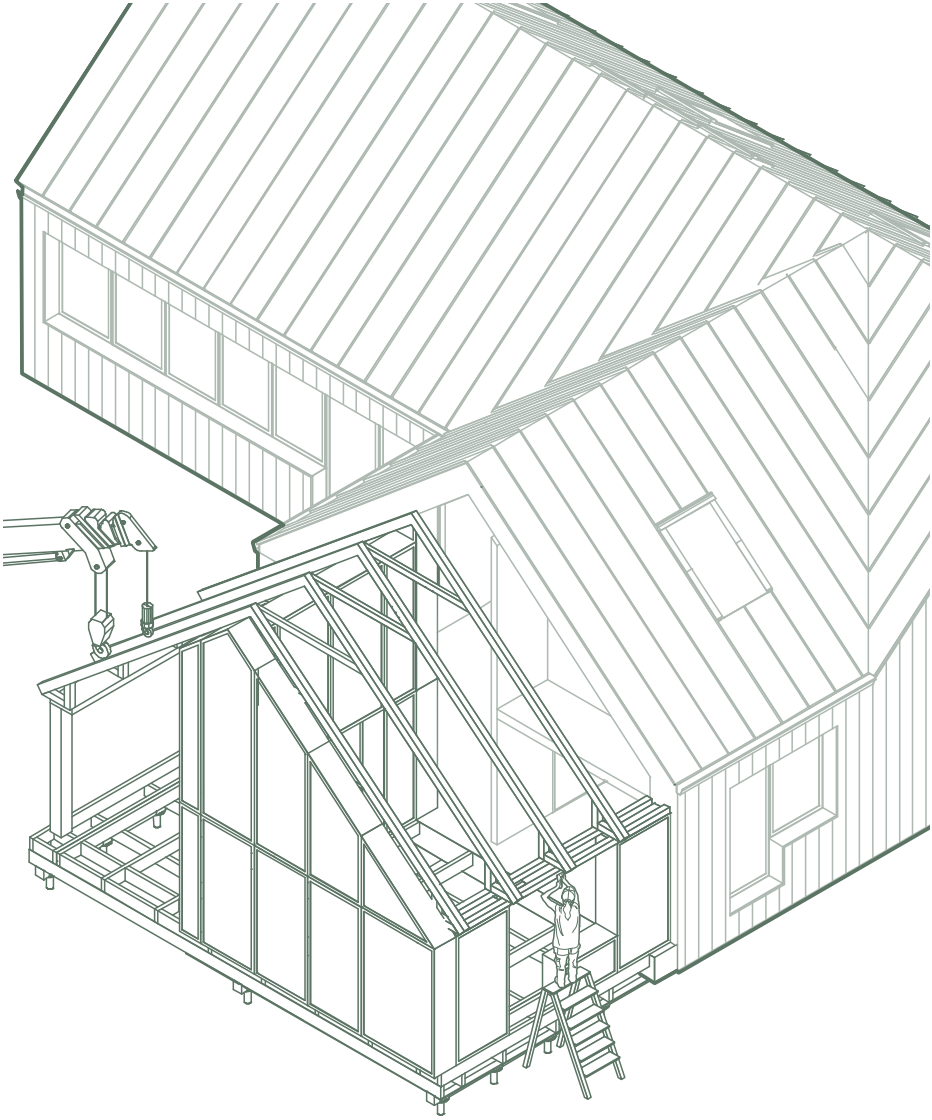
***Step 3 Construction of elevated floor structure***

The simple wooden grid of the floor construction is laid out with reinforcement below the walls and insulated with batts of wood fibre insulation.



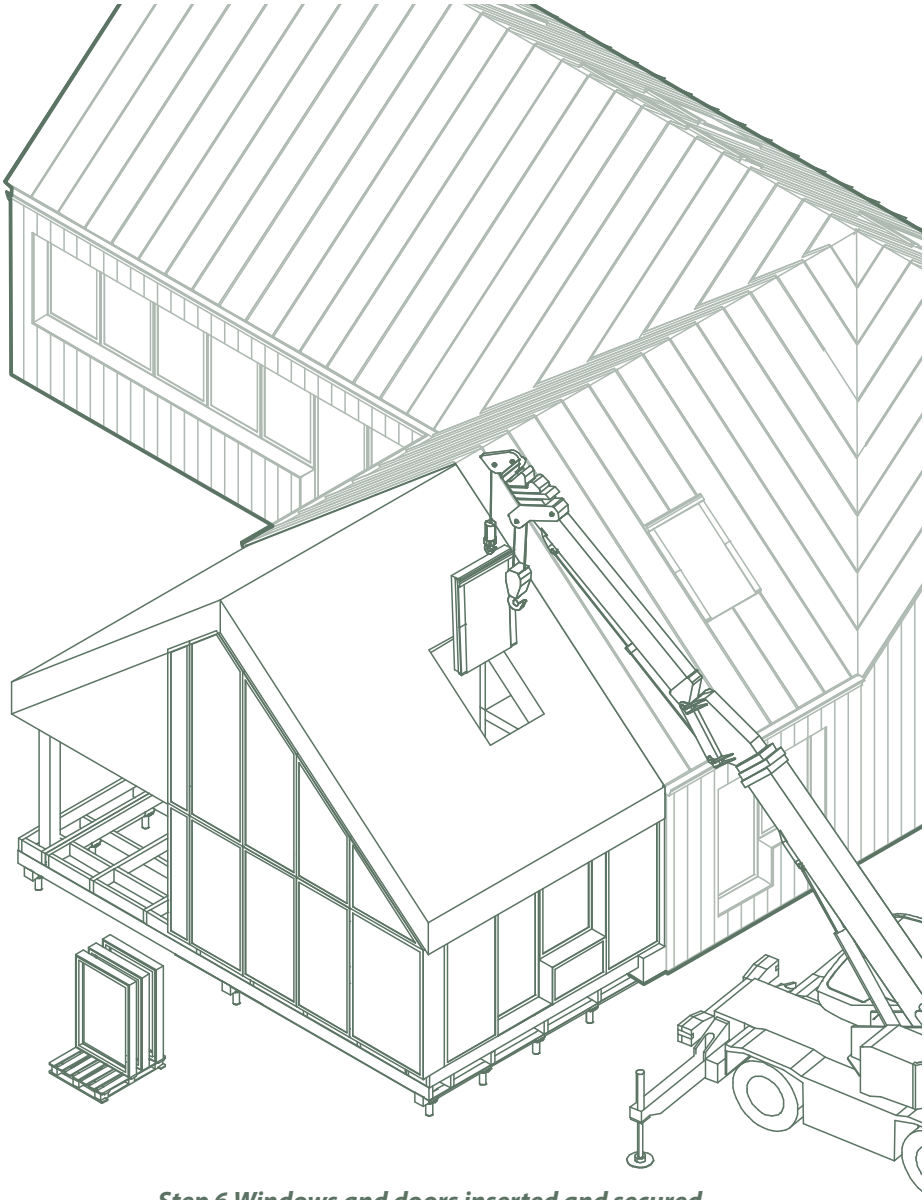
***Step 4 Wall elements placed for the exterior walls***

The walls are placed using a crane to ease the manoeuvrability of the heavy elements and secured to the floor structure.



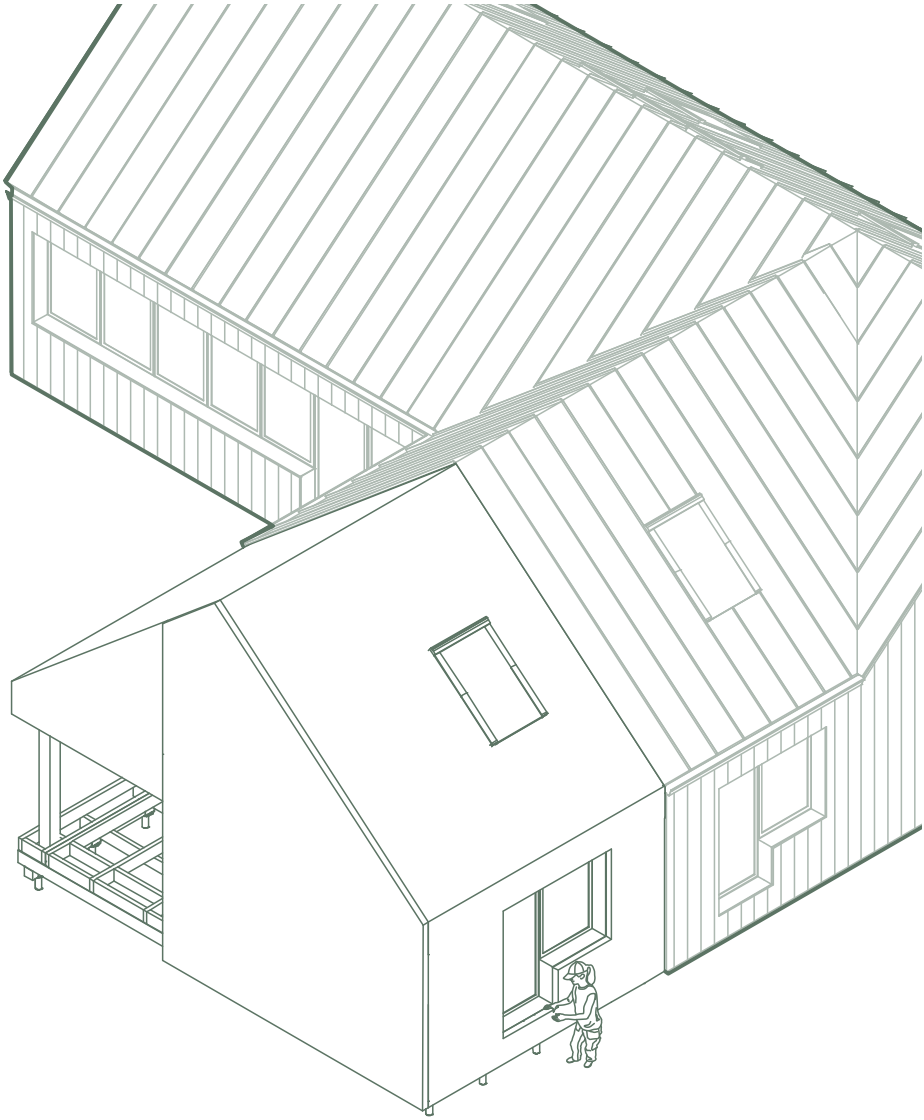
***Step 5 Roof structure placed and insulated***

The frames of the rafters are placed on the head of the wall, with a diagonal grid of I-profile wooden beams supporting the ceiling, insulated with wood fibre batts. fibre batts.



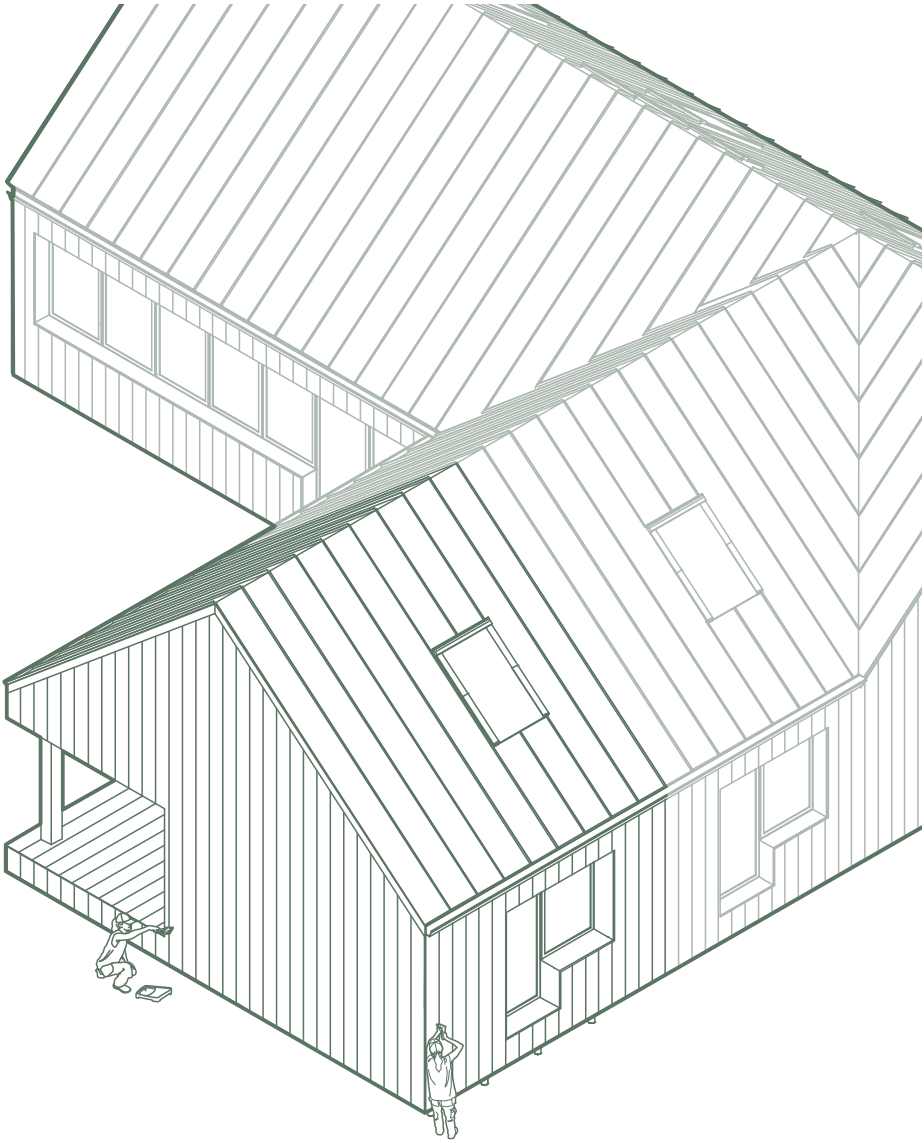
***Step 6 Windows and doors inserted and secured***

Triple glazed windows and doors are placed, securing a low U-value for the façade and adequate natural ventilation potentials.



***Step 7 Closing of the building envelope***

The building envelope is finally sealed with an air-tight membrane, and a final layer of wood fibre insulation covers the walls and foundation.



***Step 8 Cladding on exterior facades***

The final cladding of the building envelope of wooden planks for the façade, metal roofing, and final details as gutters and facia the gable.

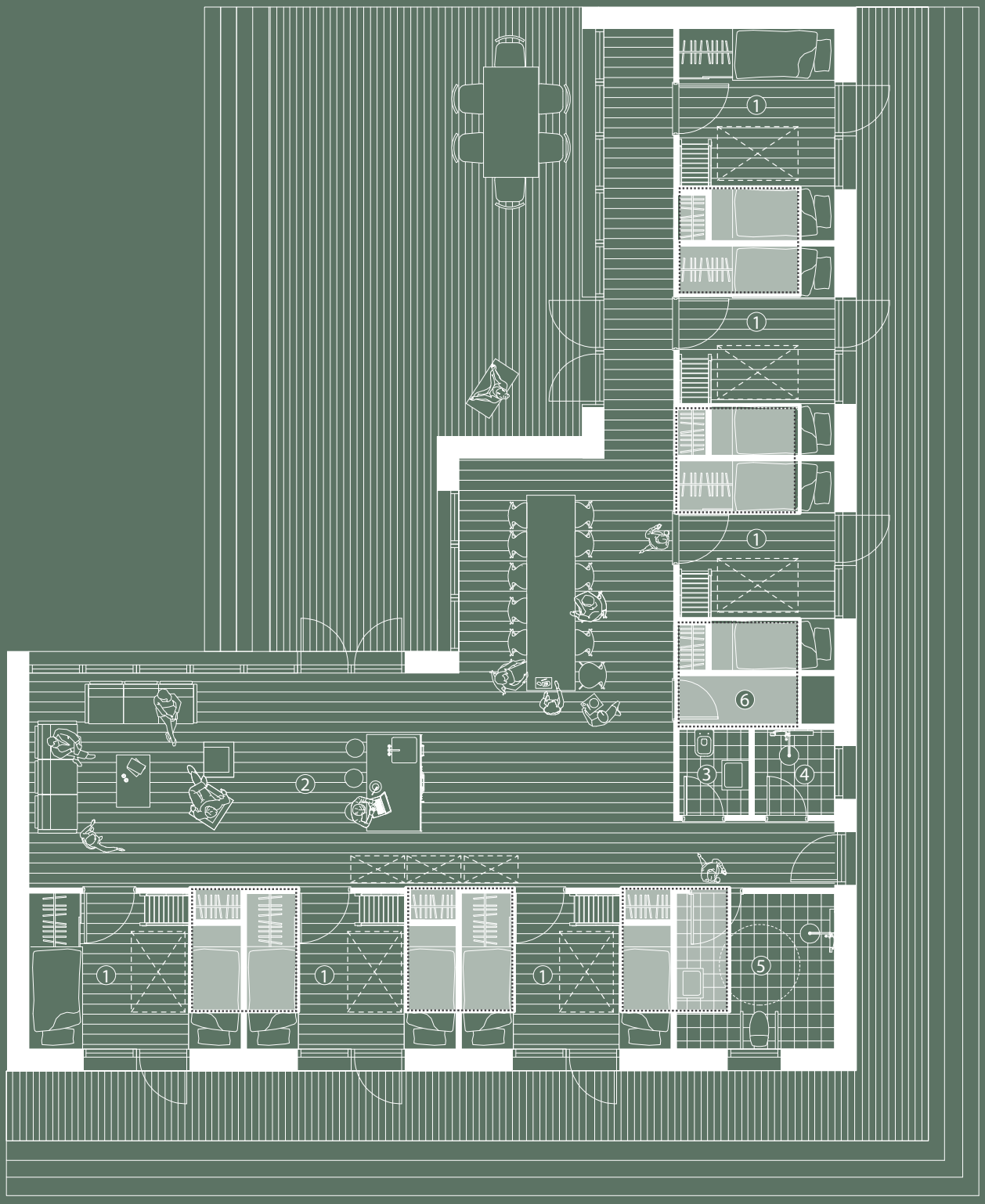
## BUILDING TOGETHER

*”One of the principles for a partnership, is the participants being active together. As some third world country experts’state: we shall not send fish to the third world countries, but instead send them a fishing rod and teach them to fish.” - (Hermansen and Nørretranders 2011 p. 21)*

*Et af principperne for et partnerskab er at deltagerne er aktive sammen. Som nogle ulandseksperter siger: Vi skal ikke sende fisk til ulandene, men sende en fiskestang og lære dem at fiske. - (Hermansen et. Al 2011 p. 21)*

Illu. 144 Self-build

# STUDENT HOUSING, PLAN 1:100



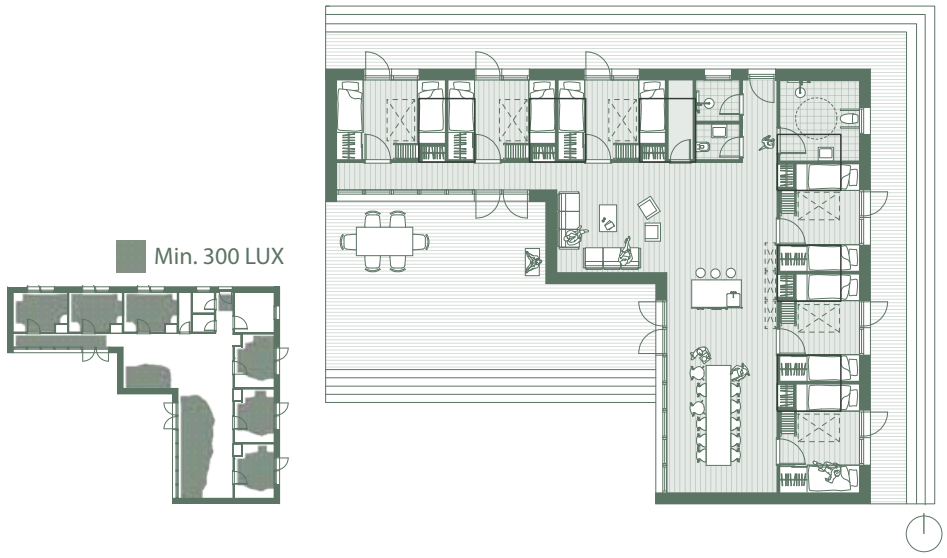

① 2 person bedroom 11 m²
② Common area 72 m²
③ Toilet 2 m²
④ Shower 2,4 m²
⑤ Handicap toilet 8,5 m²
⑥ Depot 2,6 m²

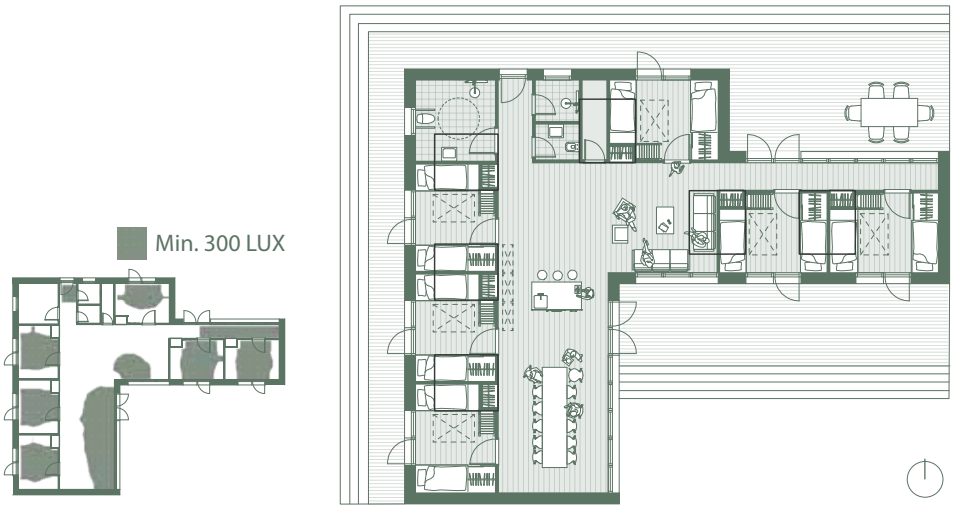
Illu. 145 Evolution of plan, 1:200

## PLAN VARIATIONS, 1:200

Subsequently, the plans are created to achieve the smallest footprint possible. The plan layout is simple, with space for students to express themselves. Different configurations of the plans are possible from the same core unit depending on the orientation and placement of the block on the site.


Illu. 146 Daylight analysis, not in scale and plan option 1:200




Illu. 147 Daylight analysis, not in scale and plan option 1:200

## THE INTIMATE COMMUNITY

*“It is about finding the balance between oneself and the community, when you need to be social, and when you need to be alone. Something is always happening, and there are also some things, that I would like to do by myself. To find the balance between it all is probably the hardest.”- (Rahbek 2019 p.88)*

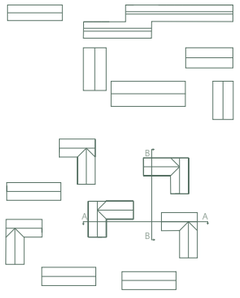
*”Det at finde balancen mellem sig selv og fællesskabet, hvornår man skal være social, og hvornår man har brug for at være alene. Der sker hele tiden så meget, og der er jo også nogle ting, jeg gerne selv vil. At finde balancen mellem alt det er nok det sværeste.” - (Rahbek 2019 p.88)*

Illu. 148 Inside the student housings

## SECTION AA & BB STUDENT HOUSING

The private zone is subdivided into different community sizes to accommodate several social settings. The smallest and most intimate community is in the bedrooms, where two students share the space. Leaving the bedrooms, you step into the bigger common area consisting of a community of ten to twelve people.

Every terrasse of the student houses faces the terrasse of the nearest neighbouring block to create a community of around 24 people. Four blocks together create a cluster community of 45 people. By dividing the school into different community sizes, students can choose between degrees of *fælledskab*.




Illu. 149 Section AA, 1:200

Illu. 150 Section BB, 1:200

# FACADE, STUDENT HOUSING

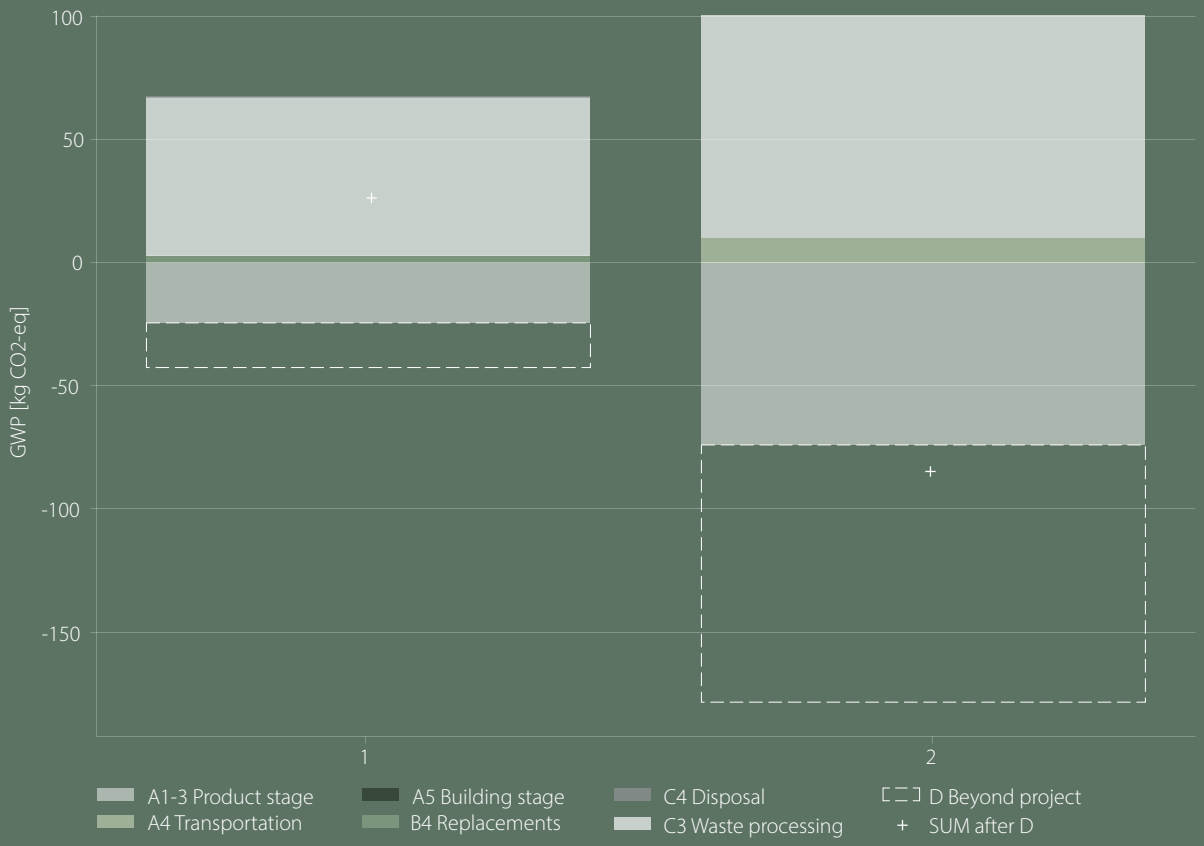
Illu. 151 North, 1:200

Illu. 152 East, 1:200

Illu. 153 West, 1:200

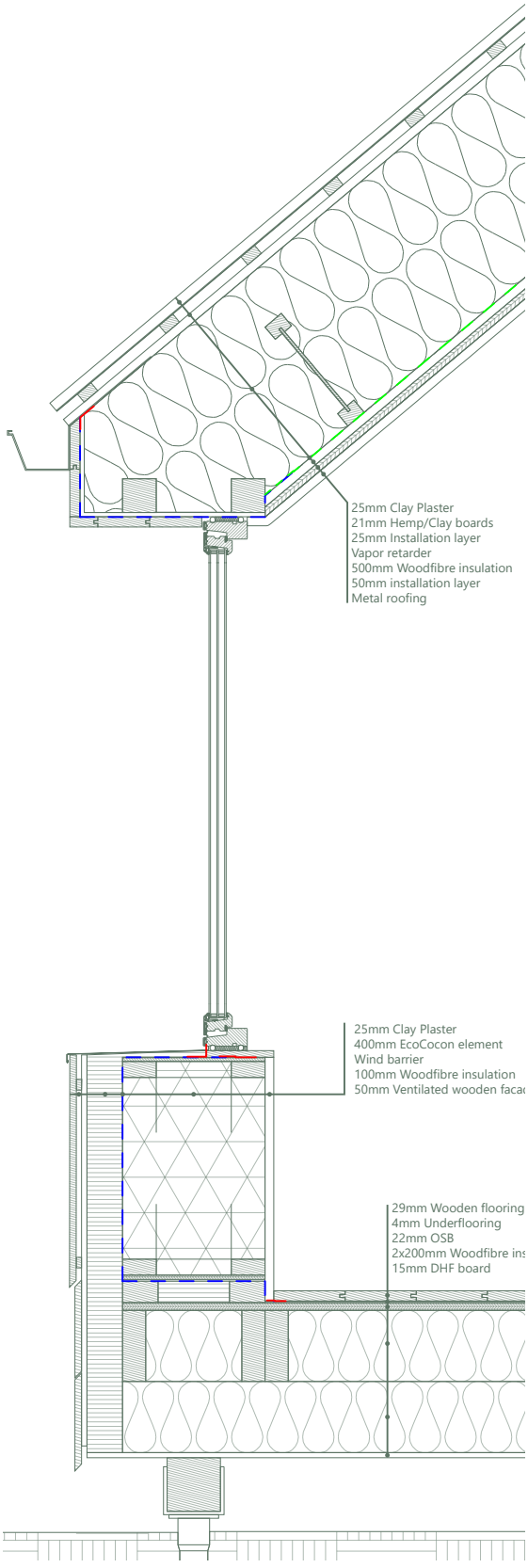
Illu. 154 South, 1:200

# LCA RESULTS

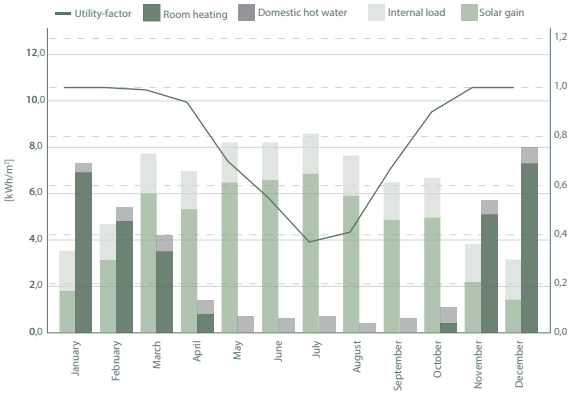



| | Element | A1-3 | A4 | A5 | B4 | C3 | C4 | D | Sum (before D) | Sum (After D) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Standard construction | -2,45E+01 | 0,00E+00 | 0,00E+00 | 2,94E+00 | 6,42E+01 | 4,35E-01 | -1,81E+01 | 4,31E+01 | 2,49E+01 |
| 2 | Ecococon construction | -7,40E+01 | 9,82E+00 | 0,00E+00 | 0,00E+00 | 9,04E+01 | 1,36E-04 | -1,04E+02 | 2,62E+01 | -7,82E+01 |

# WALL DETAIL AND INDOOR CLIMATE RESULTS




Illu. 155 Detail, 1:20




Illu. 156 Be18 result, graph

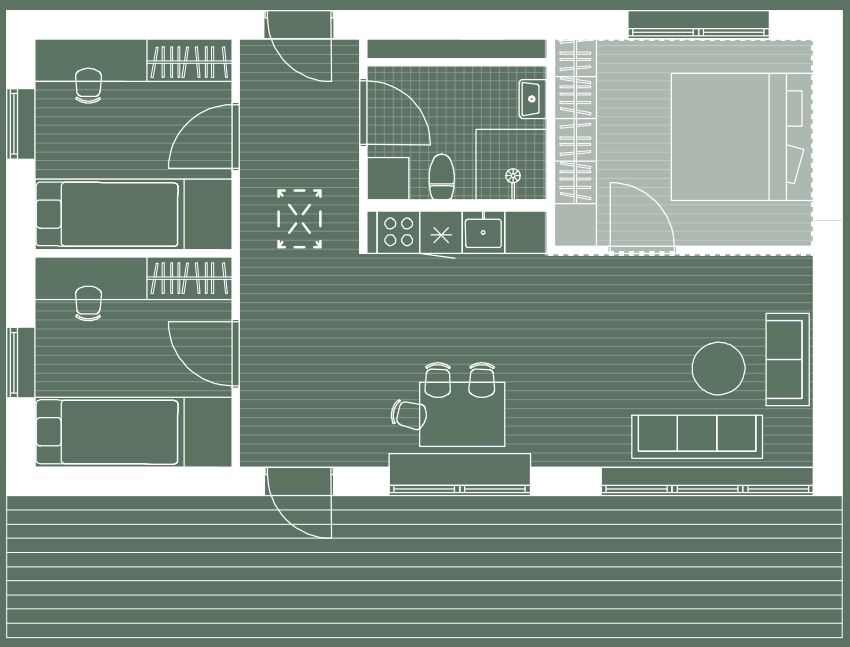
| Key numbers BE18 | |
|---|---|
| Energy performance | 1,0 kWh/m² |
| Contribution to energy need | |
| Heat | 0,0 kWh/m² |
| Electricity to the building | 0,5 kWh/m² |
| Over Temp. | 0,0 kWh/m² |

| BSim Results | |
|---|---|
| Hours above 27 °C | 49 hours |
| Hours above 28 °C | 16 hours |
| TopMean summer | 22,4 C |
| TopMean winter | 21,7 C |
| AirChange | 5,8 /h |
| **Acoustics** | |
| Reverberation time | 0,67s (125 Hz) |

# TEACHER HOUSING, PLAN

*“It was actually by chance, that I ended up as a folk high school teacher. It was not my natural choice with my educational background, where I worked more traditionally academically and analytically. But I have discovered that it matches quite well. My personal approach does not only fit the way I teach but also the folk high school as a whole. On the school I have found a place where I can experiment and where I can challenge the students in a different way because I know them, and they know me. Life enlightenment is not an analytic thing. You must put your own person into play, for it to be life enlightenment.” - (Rahbek 2019 p.145)*

*”Det var egentlig lidt et tilfælde, at jeg endte som højskolelærer. Det var ikke umiddelbart det naturlige valg med min uddannelsesmæssige baggrund, hvor jeg tidligere har arbejdet mere klassisk akademisk og analytisk. Men jeg har fundet ud af, at det matcher rimeligt godt. Min personlige tilgang passer ikke kun til min måde at undervise på, men også til højskolen som helhed. På højskolen har jeg fundet et sted, hvor jeg kan eksperimentere, og hvor jeg kan udfordre eleverne på en anden måde, fordi jeg kender dem, og de kender mig. Livsoplysning er jo ikke en analytisk ting. Man må sætte sin egen person i spil, for at det bliver livsoplysning.” - (Rahbek 2019 p.145)*

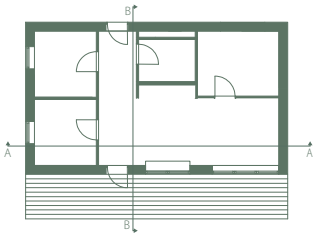


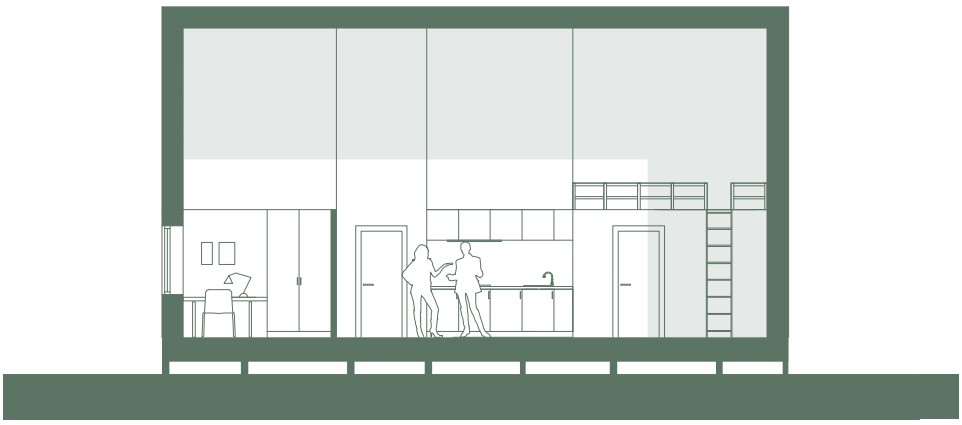
Illu. 157 Teacher housing, plan 1:100

# TEACHER HOUSING, SECTION

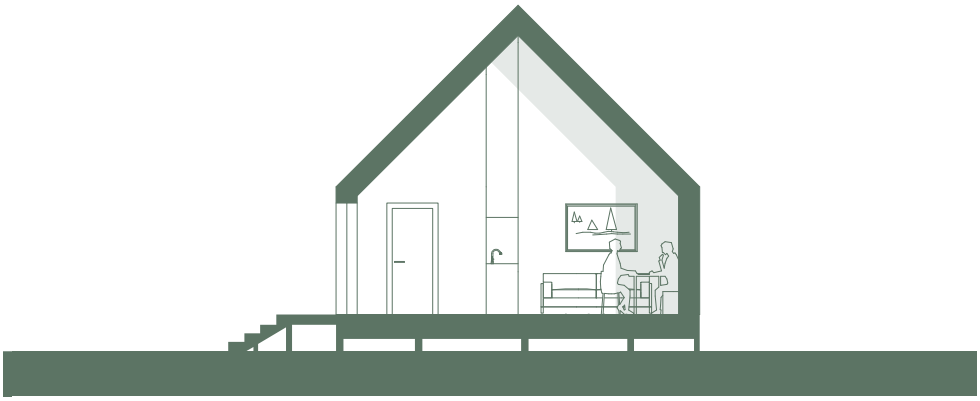
To fully include the staff of the folk high school, two homes for the family of teachers are included to the north of the site.

The tradition of housing the staff on the school itself underlines the sense of community between students inviting the staff to further take part in the *fælledskab*.



Illu. 158 Section AA, 1:100



Illu. 159 Section BB 1:100

# CONCLUSION

Earth Academy is the future. Being the Exploratorium of sustainability and a learning environment through *fælledskab* ensures a positive impact on securing a better future for the next generations. The new folk high school on Samsø will be an attractive space where people of all ages with different backgrounds can gather, share, and learn together.

Earth Academy is a living and dynamic building volume that does not conclude with a definite result. The folk high school is alive and will grow with time together with the message about a greener future and reduced consumption by humans. The school takes no extreme measures but tries to appeal to the average citizen through simplicity and rationality. The presented design of the Earth Academy is a worked-through plan for an architectural platform where a sustainable lifestyle and common responsibility for the earth are the focal points. The project operates on an approach inspired by the book *fælledskab* as a tool and solution on how architecture can promote a sustainable lifestyle. The folk high school creates an awareness of what humans can do with the environment, and the understanding of a behavioural change relies on the human beings themselves. Having an architectural approach with a basis from the primitive hut creates an architectural building that is cut down to its essentials with only required materials without any ornaments. The school consists of several individual buildings allowing a flexible setup to adapt the future changes. Self-build concept and rational design have been the entire concept of this master thesis. This approach is reflected in technical, functional and aesthetical aspects concerning experiences, expressions, construction and materials. The design of a new folk high school is a part of Samsø's identity by being energy-friendly and a frontrunner in sustainable building design for the present and future generations.

# REFLECTION

The problem statement was solved by creating an architectural platform based on fælledskab. The project and final design needed to be a new example of how to conduct and approach sustainability through the community. However, Earth Academy cannot be the sole contributor to society's needed behavioural shift. The Earth Academy has primarily focussed on specific users, mainly young people who newly graduated from high school. It can be discussed that changing the climatical issues through human behaviour requires change from all members of society and not only the limited segment of students at folk high schools. By building a folk high school, which most often is closed off to the public, the influence of the Earth Academy could be further hindered.

Exploring alternate typologies and types of institutions could broaden the demography, ultimately reaching a wider audience. More people could be reached by creating a cultural centre for a sustainable living but at a much shallower basis of influence. Though more people would be informed about their impact on the climate crisis, their willingness to change behaviour and insight into how to do so might be much more limited than the Earth Academy students. The discussion of reach versus depth is hard to determine which proves most influential in a broader societal sense.

Earth Academy will not be the key player in changing the entire world and is not meant to be so. The Earth Academy aims to make people take responsibility for their own *fælledskaber*, creating change on a smaller scale. Though fælledskab is presented as a solution for the small-scale behavioural change and is based on the views of one of the key people behind The Earth Academy, it is an untested ideological theory.

Creating a folk high school focusing on changing lifestyles to a more sustainable one has potential. Still, it cannot be guaranteed that the visitors will use their gained knowledge outside the school environment. The created architectural platform cannot force people to change but can only promote and create the framework for behavioural change.

Reducing the use of virgin materials in the building process using reused materials and upcycling is an essential factor in sustainable design. This aspect has been underutilised in the design process as the problem with sourcing the materials was deemed the greatest hurdle to overcome. Choosing to build with elements of standard sizes and elements meant for easy disassembly was seen as building according to reusability when the buildings are to be torn down themselves.

A different aspect of reuse in the built environment is transformative design based on existing buildings. Historically folk high schools have been mainly established in existing buildings housing the school facilities, with student housing added to the sites. Building the Earth Academy from scratch might compromise the sustainable goals, as transforming existing buildings could have been explored further.

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# ILLUSTRATION LIST

# APPENDIX

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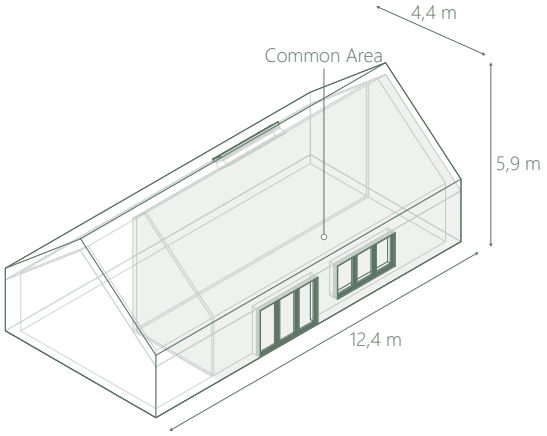
# APPENDIX 01- BSIM DATA

***General information about the models***

The BSim simulations for the dining room and common area take the basis of U-values for the floor and roof in passive houses (Komforthusene 2010). The final U-values of the roof and the floor is presented in (Master thesis, presentation p. 108). The windows are based on information from the Velfac Energy 200 Serie (Velfac 2022).

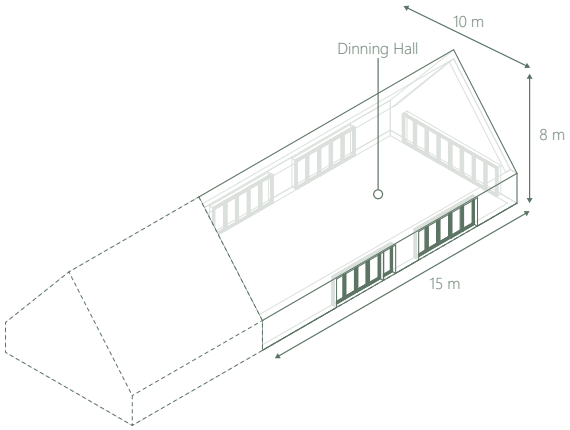
In the following, the parameters used in the BSim model will be presented for both the dining room and common area.

| BSim U-values | |
|---|---|
| Wall | 0,1 W/m² |
| Floor | 0,10 W/m² |
| Window | 0,8 W/m² |
| Roof | 0,17 W/m² |




| | |
|---|---|
| Room volume | 109 m³ |
| Floor area | 38 m² |

Illu. 160 Informations about the Common Area




| | |
|---|---|
| Room volume | 993,6 m³ |
| Floor area | 179 m² |

Illu. 161 Informations about the Dining Hall

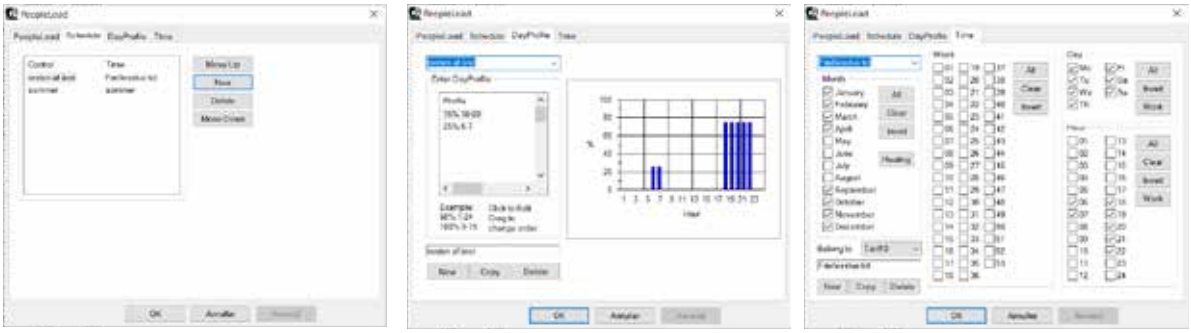
### *Peopleload*

The activity of the people is the same in the dining room and common area, estimated to be low when using the spaces. The people load is different as well as the schedules.

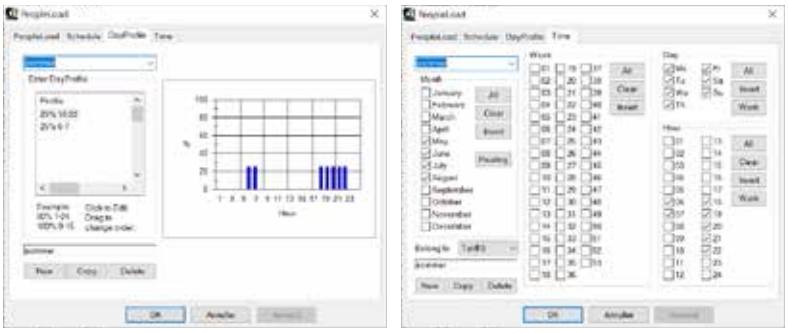
In the student housing, it is assumed that the activity in the room decreases in the summer compared to the winter period.

| People type | |
|---|---|
| Heat Gen. [kW] | 0,072 |
| Moist Gen. [kg/h] | 0,044 |

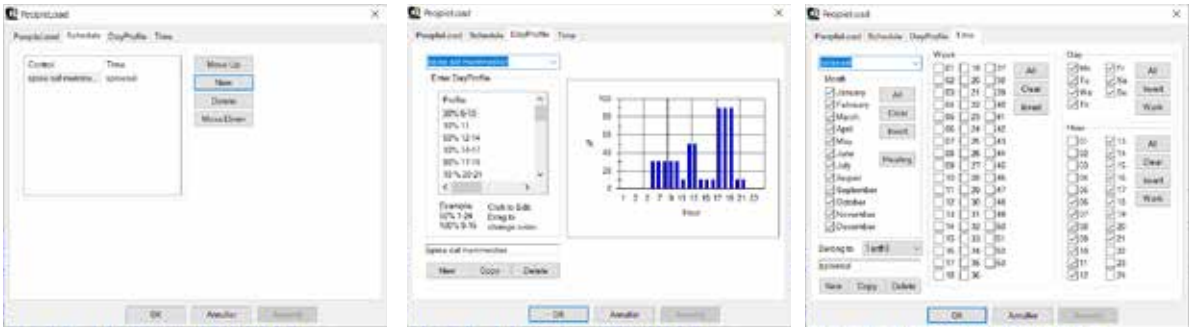
| Total peopleload | |
|---|---|
| Dining hall | 90 |
| Common area | 6 |



Illu. 162 People load schedule for common area (winter scenario)



Illu. 164 Peopl eload schedule for common area (summer scenario)

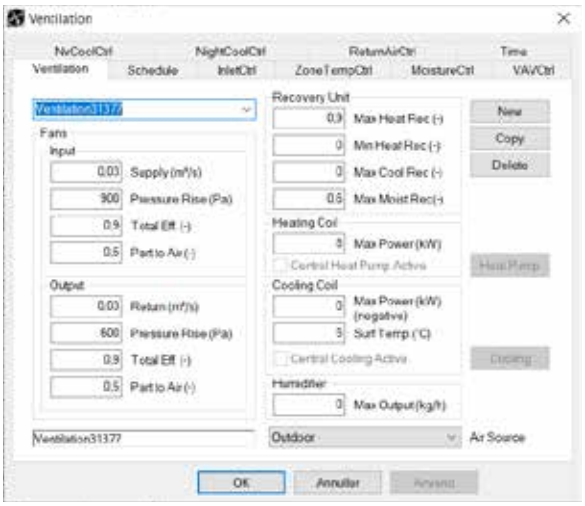


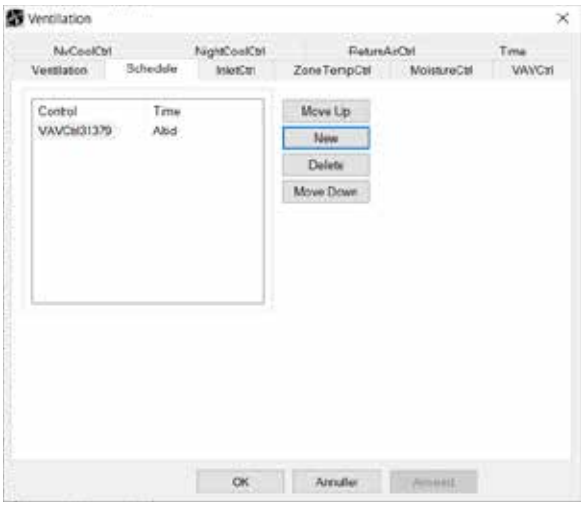
Illu. 163 People load schedule for dining hall

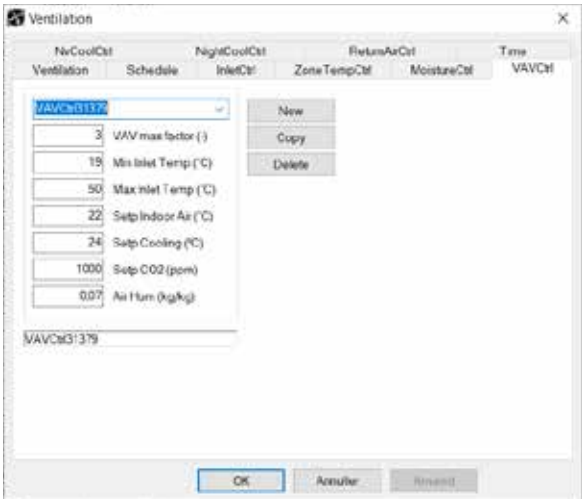
### *Ventilation*
The ventilation supply is based on information from the room program (master thesis, synthesis 54). The ventilation system has a total efficiency value of 0,9.

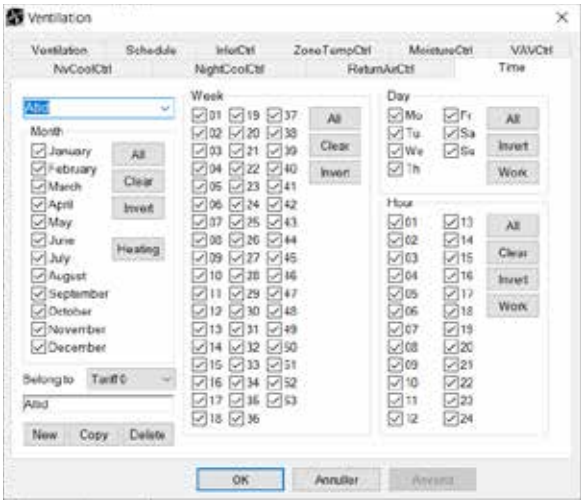
### *Ventilation Common Area*
In the common area, the ventilation is on, all year round.

### *Ventilation Dining Hall*
In the dining hall, two schedules of ventilation have been made, one for the winter period and one for summer period.



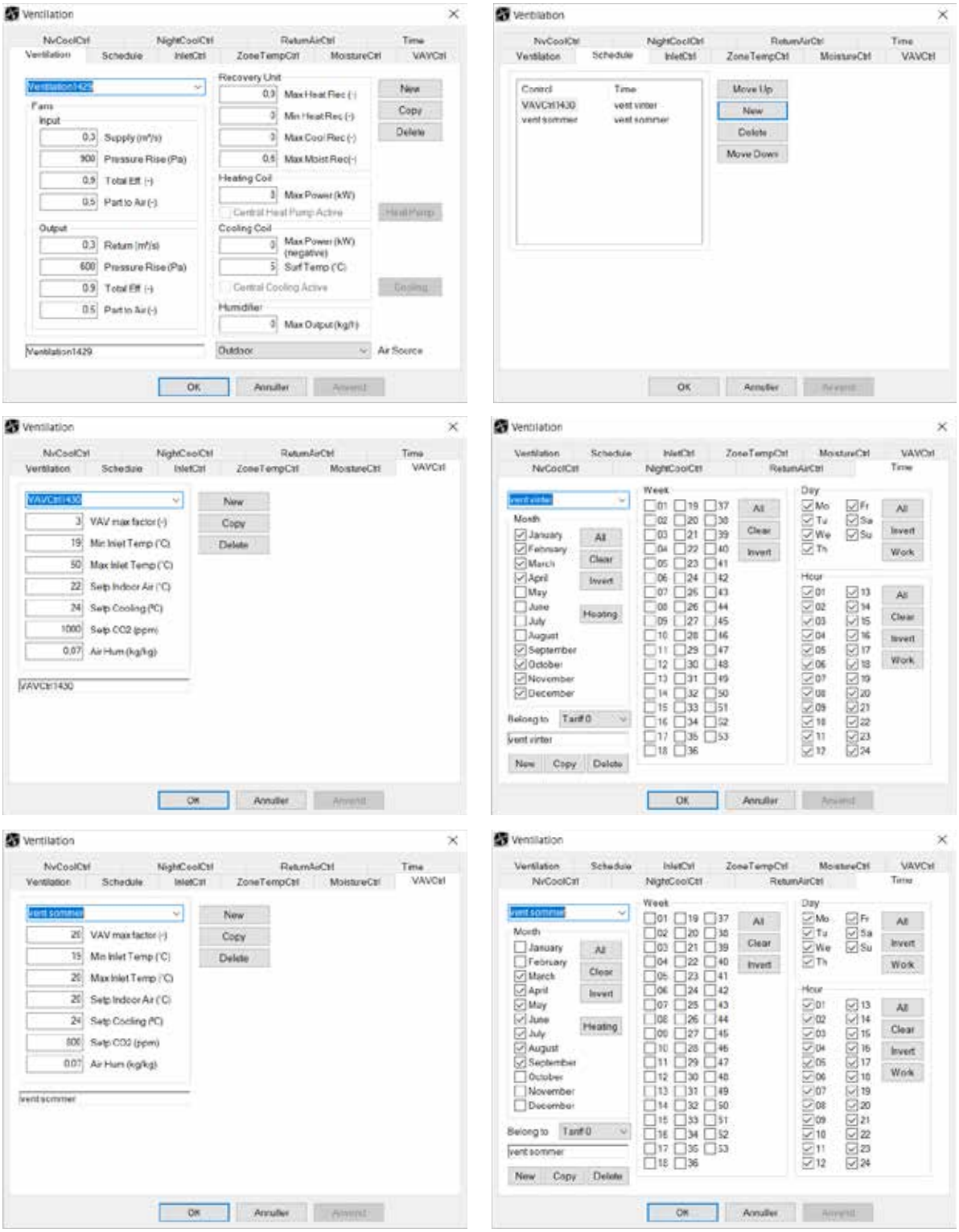






Illu. 165 Ventilation system Common Area




Illu. 166 Ventilation system Dining Hall

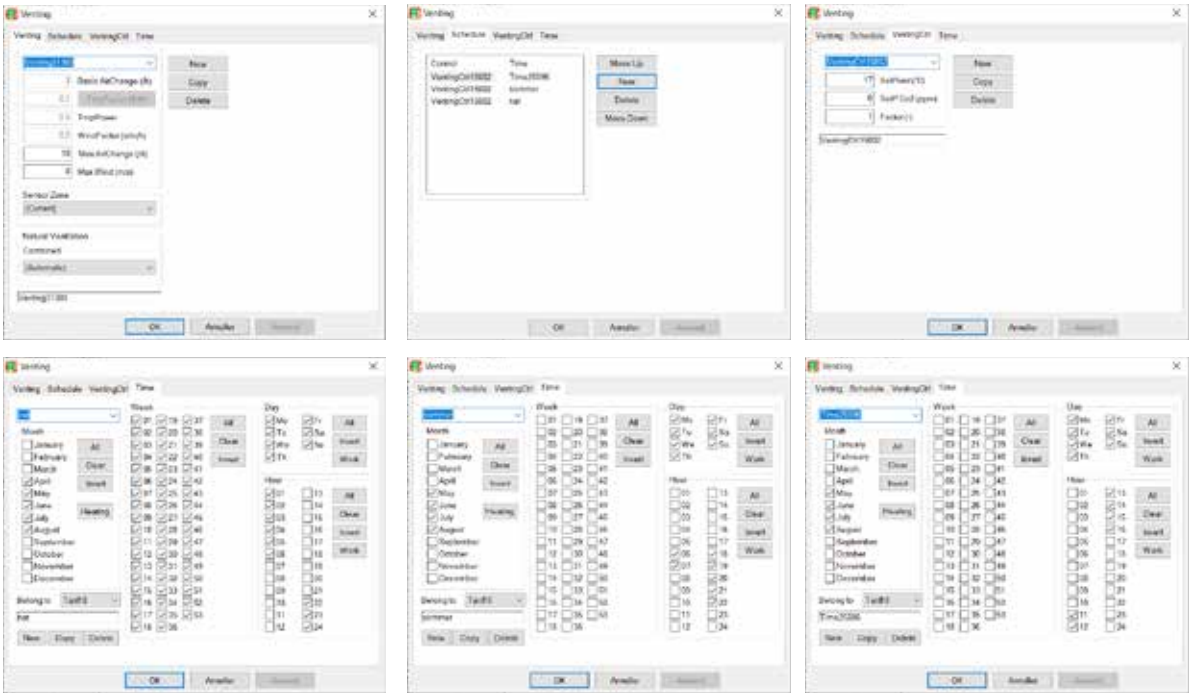
### *Venting*

Venting is only activated in the summer for the common area and the dining hall. The air change in both models is set to 10/h. It is assumed the windows are open all time during the summer period.

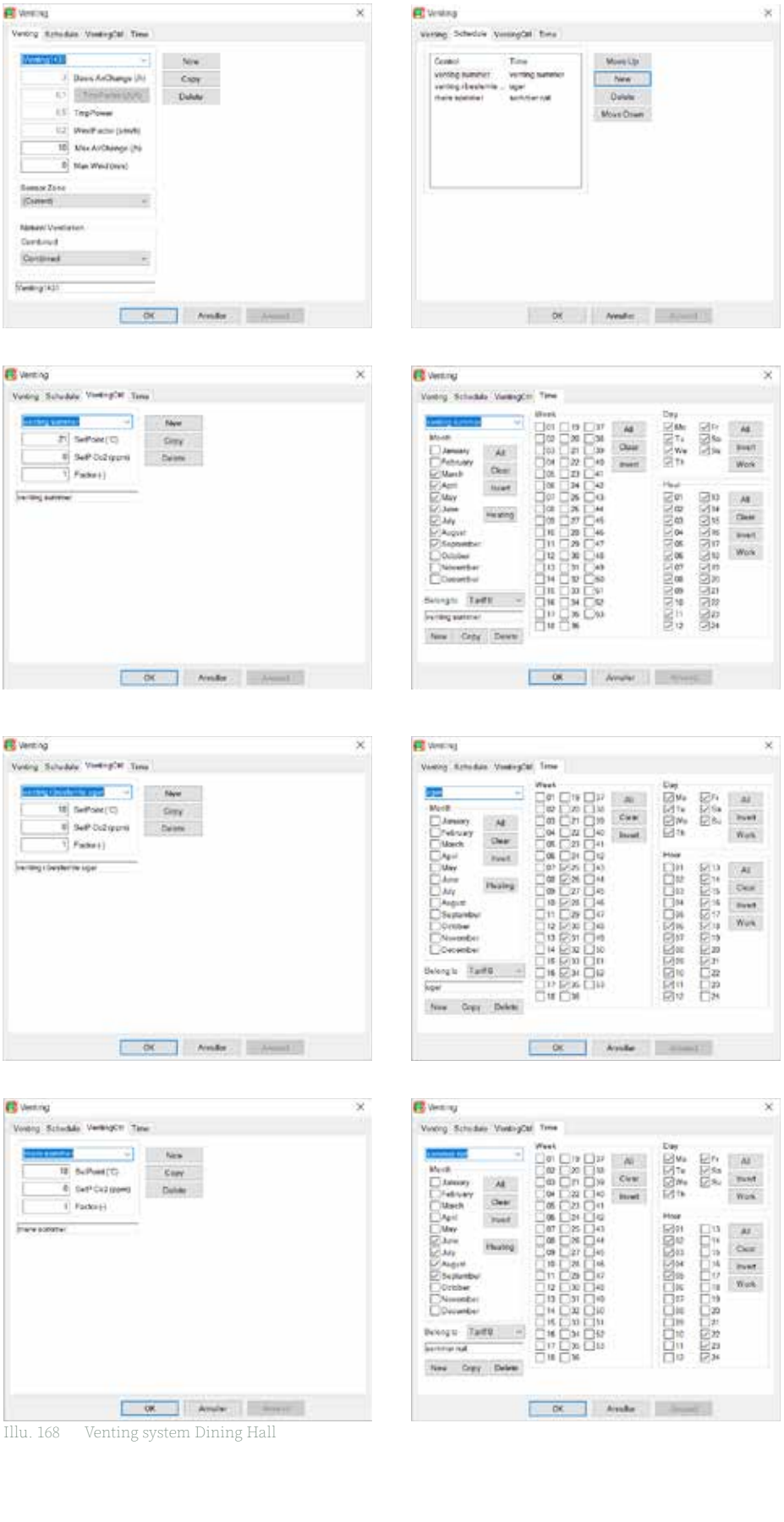
### *Venting Common Area and dining hall*

Three schedules have been worked with during the design process (Illu. 8).

First, the venting is activated to 21 °C in the summer period. In the second schedule, venting is activated at 18 °C when there is overheating in the room. In the third schedule, venting is set up on the summer nights activated at 18 °C (Illu. 9).



Illu. 167 Venting Common Area

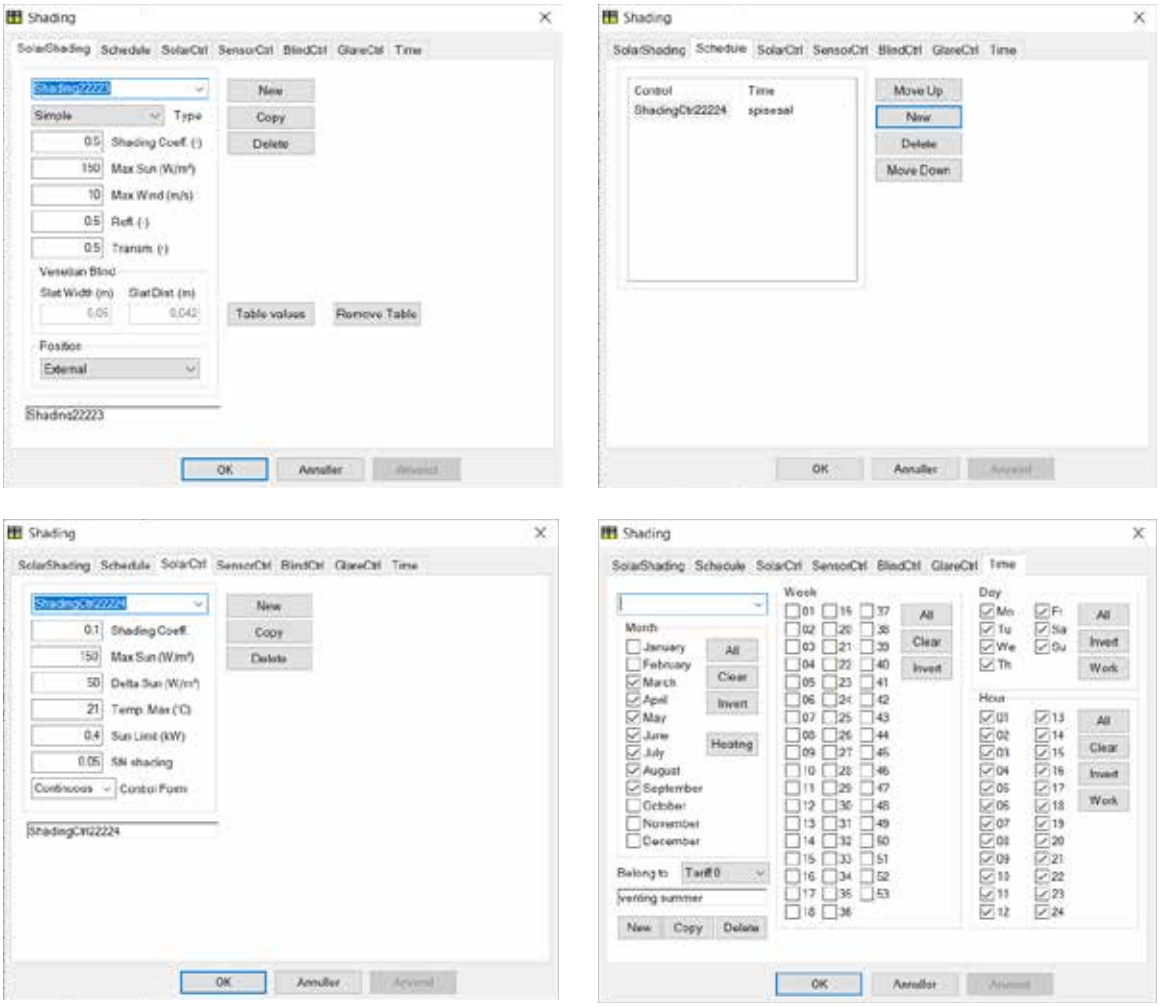


Illu. 168 Venting system Dining Hall

### *Shading*

Shading is necessary to reach the requirements (Master thesis, synthesis p. 54. The same template has been used in all models. The only change that has been made is the solar coeff. in the system. The shading coeff. can only be controlled in the solar control panel (Illu. 10).

| Shading Coeff. | |
|---|---|
| Common Area | 0,2 |
| Dining Hall | 0,1 |




Illu. 169 Solar shading, both Dining hall and Common Area

# APPENDIX 02- INTERVIEW WITH SØREN HERMANDSEN

An interview with Søren Hermandsen, the author of the book Fælledskab and the head of the Energy Academy was conducted the 1st of March 2022. The participants in the interview were Søren and Emil. In the interview, the participants will be addressed with their capital letters.

Søren: Jeg arbejder med bæredygtig udvikling på samsø og har gjort det i næsten 25 år, altså rigtig lang tid, ikke, i rigtig mange forskellige dimensioner. Var det ikke en kort introduktion?

Emil: Jo, det lyder fint. Hvordan kom du til Energi akademiet, da det startede?

S: Energiakademiet er 12 år gammelt, og før det var der noget der hed, der arbejdede jeg for noget som hed samsø energi- og miljø kontor, som var sådan en NGO som startede umiddelbart efter Samsø vandt en konkurrence om at blive Danmarks vedvarende energiø, som miljøministeriet den gang, der var ikke noget der hed klima eller energiministeriet, de gik sammen med energistyrelsen for at lave et fuldskala samfundsprojekt, hvor man skulle udvikle bæredygtige løsninger på mange ting.

...

Så noget af det som skabte forudsætningen for Energiakademiet, var jo at vi brugte de første ti år på at lave en omstilling af samsø til en 100% selvforsyning med vedvarende energi, og derefter gik vi i gang med at se på, hvad kan man sige, omstillingens vilkår, altså det der med at, det handlede om folkeligt engagement, om kapacitetsopbygning og uddannelse og viden og sådan nogle ting, det handlede ikke kun om teknik og økonomi, det handlede i høj grad også om at lave et dannelsesprojekt hvor vi fik folk med på denne her omstilling. Og det førte så til at vi blev meget opmærksomme på hele den her formidlingsdel, altså hvordan formidler man en proces.

Og det blev meget interessant, også for udlændinge, vi fik mange, mange gæster fra hele verden som kom og besøgte os og meget medier også, der kom meget presse som beskrev processerne, og var interesserede i at høre historierne om det 100% bæredygtige samfund, og om den succes det var og det var dels for vores egen skyld, men det var også lige så meget fordi vi var en del af Danmark, hvor der var en god dansk grøn politik som man nu kunne se udført i praksis i lokalsamfundet. Så det førte så til at vi byggede energiakademiet, fordi vi fik flere og flere gæster, og det var ligesom, kan man sige, energiakademiet kan man kalde et living lab, eller et forsamlingshus for bæredygtig udvikling, så da det blev oprettet, så skiftede vi lidt identitet. Energi og Miljøkontoret foreningen, som er sådan en græsrodsforening, findes stadig væk, men den har ikke ansatte folk, vi flyttede sådan set den ud som at være sådan en NGO, som vi understøtter i det daglige og er sekretariat for den i energiakademiet, ligesom vi også er sekretariat for elbilforeningen og de grønne mænd og forskellige andre ting som så bruger os som, hvad skal man sige, sådan en slags, sekretær, ja, vi holder sammen på det hele og laver bogføringen og bogholderiet, og skaffer nogle penge og sådan noget, så de har lidt at lave.

E: Perfekt, så den primære opgave for Energiakademiet er den her formidling af bæredygtig fremtid, eller hvad?

S: Ja, med alt der hører til ikke, med projekt udviklinger og ansøgninger, vi holder øje med rammeprogrammer, både i EU og i Danmark, og hvis der så er et rammeprogram der passer til samsø eller passer til andre samfund, så gør vi opmærksom på det, og sætter os ind i det og hjælper med at organisere nye processer, hvis der skal laves et nyt fjernvarmeprojekt i et lokalsamfund i Odsherred, så laver vi workshops for dem, eller hvis der skal laves sol over Brenderup, der er et meget kendt projekt nede i Middelfart, så startede det her, som en folkelig proces, og jeg var derned og holde et grundlovstalemøde om fællesskaber, og så blev de helt opildnede af det og tænkte sådan en skal vi jo lave. Og så de første spadestik til det, de bliver baseret på nogle erfaringsudvekslinger med nogen der har prøvet sådan noget før, hvor man ligesom får nogle af de første redskaber til at selv organisere og gå i gang med at se på hvordan løser man sådan en opgave her på en klog måde, og så begynder de jo selv at tage fat, for så tårner alle tingene sig op foran en med lovgivning, og ansøgninger, og alt sådan noget, og her står vi oftest af igen, fordi vi ikke er konsulenter, vi laver opstartsprojekter, men vi

finder også rammeprogrammer som ingen andre har brugt, lige nu er vi i gang med et stort projekt for Region Midtjylland hvor vi har søgt nogle penge hos DG-reform, de fleste arbejder med DG-energi altså generaldirektoratet for energi eller klima, eller andre i EU-systemet, som jo laver rammeprogrammet for at udvikle den der The New green deal, og den grønne dagsorden i det hele taget som Danmark også har committet sig til, og så fandt vi ud af, af bagveje at DG-reform, som er et generaldirektorat der ligger hen over de andre rammeprogrammer, de har nogle penge til at udvikle, hjælpe med at lave noget af det der ligger lidt uden for rammen, nemlig sådan en borgerorganisering eller, hvad skal man sige, det folkelige, som vi snakker meget om i Danmark, men som ikke er så tydeligt i andre lande hvor man ikke kalder det folkeligt, men kalder det bare borgerinddragelse, eller sådan noget, altså borgerinddragelse er sådan meget bureaukratisk, oppefra og ned ikke, men det folkelige er mere selvorganiseret, hvis i forstår hvad jeg mener, det er mere decentraliseret i sin struktur. Og det synes DG-reform, var interessant så da vi spurgte efter om de ville være med til at aktivere klimahandlingsplaner altså de der DK2020 planer som alle kommuner har lavet og få dem sat i gang, så sagde de ja til det, og så lavede vi en aftale med Region Midtjylland om, og nu er vi i gang med alle kommunerne i regionen ift. at lave det arbejde. Det er en kæmpe opgave og meget svær osv. osv. ikke, men den tager vi på os selvom vi hverken har mandskab eller kapacitet til det, men det er bare en vigtig opgave ikke, så håber vi på at vi lærer noget undervejs samme med de her kommuner ikke, vi kommer ikke med løsningerne, men kommer med en masse af de spørgsmål som vi ved de har til samfundet og til staten og regeringen om, jamen det er fint nok med at vi skal nå alle de her mål, men hvad så med det, og hvad så med det, og hvad så med det ikke, hvis vi simpelthen ikke har de her samtaler om det her inden vi går i gang, kan vi jo lave visionsarbejde herfra og til nytårsaften, og have reddet hele verden i teorien ikke, men ikke sat en eneste handling i gang.

Og det ved vi jo godt med det folkelige, det handler om at omsætte visionen til handling, så der bliver noget til den enkelte at tage fat i, altså hvad skal jeg gøre, eller hvad kan jeg få ud af det, eller hvad får jeg for det eller sådan nogle spørgsmål stiller man jo helt banalt meget ofte til forandringer.

E: Så det er at gøre det lidt mere håndgribeligt den her bæredygtige fremtid for den enkelte borger?

S: Oversæt verdensmålene, oversæt DK2020 klimaplansmål, alle de her ting alle snakker om, vi skal gøre noget for klimaet, ja det skal vi, hvad skal vi så gøre, jaa, nu skal vi lige have fundet ud af hvad vi så skal gøre ikke, og det er altså svært.

E: Er det også det som skal være baggrunden for Earth Academy, jeres højskole planer?

S: Ja, jeg sidder faktisk i Højskolesekretariatets klimaudvalg, sammen med nogen fra DPU, Connie Hedegård, Elsebeth Gerner, nu er hun så gået af som generalsekretær for højskolerne, men vi sidder der, vi skal faktisk holde møde på Brændbjerg højskole om ikke så længe, hvor vi skal snakke om kommissoriets forandring, hvad er det vi skal kigge på nu. Grunden til at jeg sidder her, er at jeg har arbejdet meget med højskoler og dannelse i det hele taget ikke, og jeg har også siddet i bestyrelsen for højskolen på samsø så jeg kender højskolen indefra, jeg har også være lærer på højskoler nogle gange, jeg underviste på højskoler rundt omkring.

Men noget af det jeg er optaget af, er det dannelsesspor som højskolen den har er jo i høj grad, udenfor skolecurriculum, altså det er ikke eksamensgivende, og derfor kan man sige et det sådan temaagtigt, og du kan jo selv vælge dit dannelsesforløb, altså hvilken højskole du er på er alt efter hvad du er interesseret i den kan handle om sport, eller musik eller kultur, eller kunst, eller what ever, altså alle mulige emner, og der findes en højskole for hvert emne man næsten kan forstille sig, og der mener jeg der mangler en klimahøjskole, men det er lidt ligesom mange siger, at klima, det er jo lidt implicit en del af vores hverdag, men det er det bare ikke, **det bliver noget bullshit ikke, hvor man planter et træ, og så spiser man lidt mindre kød nogen gange, undtaget når man går til fest, eller man flyver lidt mindre, undtaget når man skal flyve alligevel, og så køber man en billet til 200,- ekstra,**

**for så planter man nogle kompensations træer et eller andet sted, altså det bliver lidt velfærdssamfunds bullshit eller velfærdssamfundsbingo, jeg ved ikke lige hvad det hedder.**

***(English translation: "(...) It is bullshit right? We plant trees and eat less meat sometimes, except when we go to parties. Or we fly less, except when we fly anyway and buy a ticket for 200 kr. Extra. We plant more compensations trees somewhere; well it becomes a welfare society bullshit or welfare society bingo.")***

E: Sådan lidt green washing.

S: Ja, og det ved vi alle sammen godt, og derfor bliver vi også nødt til at snakke om det, fordi det er egentlig ikke noget blame der er ikke noget shame i det, **det er egentlig bare en erkendelse af at vi stadig ikke er kommet dertil hvor vi rent faktisk håndgribeligt gør noget ved de her ting.** Nogen gør, det er ikke for at skærer alle over en bred kam, men det er **som samfund er vi ikke kommet ret langt. Højskolen kunne godt være det sted hvor man eksperimentere med det,** og gør nogle sjove ting, prøver nogle tiltag, **lever bæredygtigt, i fire måneder, eller ligesom prøver det af, får det ind under huden, og har det fedt samtidig og møder nogle andre fede unge mennesker og har det sjovt ikke, det behøver jo ikke være modsatrettede.**

***(English translation: (...) It is just a realization that we still don't do something tangible to these things (sustainability) (...) we have not reached far enough in the society. The folk high school could be the place, where people can experiment with it, (...) live sustainable, in four months or try it out, get it under the skin and have a nice experience and meet other people, young people, and have fun right? It does not have to be opposite.)***

Det er det lidt i samfundet, hvis du er den første til at undvære altmuligt, bliver det virkeligt surt at være en klimarigtig person ikke. Man kan se i samfundet, at der er meget sådan aktivisme, og det er jo også en ny kultur ift. organisme, det organiske handler meget om at vi som samfund organiserer os i genkendelige størrelser i foreninger, så vælger vi en formand har en bestyrelse, vi laver en vedtægt og sådan noget ikke. Den næste generation, det gider de ikke altså, fx den grønne studenterbevægelse har ikke en bestyrelse og en formand, der er ikke ligesom ét hoved man skal se til, det er ikke en karriere at blive formand i den grønne studenterbevægelse, men der er måske en karriere i at være en del af den, og det synes jeg er interessant. Det er en bevægelse mere end det er en organisering. Også nogle af de andre lidt mere rabbiale, som mødes når der er et eller andet at mødes om, og det kunne højskolen også undersøge hvordan er nye mødeformer, hvordan aktiverer vi samfundet, på en ny klog måde, som inspirerer folk uden vi går til i organisations bureaukrati.

E: Så der er stadig den her tanke om den almene dannelse, som grundtanke, det er bare den almen dannelse i bæredygtig livsstil?

S: Jamen, så tror jeg også højskolen er blevet fanget lidt i sin egen succes, højskolen er på finansloven, der er stillet nogle krav om at den skal være lidt kompetencegivende, og man skal også opfylde de og de krav osv. hvor jeg synes højskolen i princippet burde vride sig, protestere sig, og sige i skal fandme ikke lægge jeres klamme hånd... selvfølgelig skal i betale tilskuddet til eleverne, men der skal ikke være de her rammer, hvis man ellers opfører sig ordentligt, så har man opfyldt forpligtelserne i højskoleloven, altså der er noget tvind over det, og der er nogle andre ting som har gjort at man har strammet op på den her lovgivning så man ikke bare kan lave, altså. Der er nogen der svindler en gang i mellem, og så strammer man loven. Når man så holder om med at svindle, så burde man fjerne de lovgivninger igen. Det gør man bare ikke, så dem der sidder i sekretariaterne på højskolerne skal dokumentere hele vejen, altså, det må være dødssygt at sidde på kontoret på en højskole. Det har intet med højskole at gøre, det kunne lige så godt have været et reviser kontor.

E: Hvem er den primære målgruppe til Earth Academy, er det ligesom Energiakademiet, hvor det er større aktører, både nationalt og internationalt, eller er det den klassiske højskole elev?

S: Den er klassisk i den forstand, at den klassiske højskoles grundform, det er den vi snakker om, det handler om at du har en fri tid til at studere

koncentrere dig om ét emne som du synes er interessant ikke. Så på den måde er det klassisk. Det vi gerne vil er selvfølgelig at fokusere tema-agtigt at det handler om bæredygtighed, på en lavpraktisk måde, og det vi godt kunne tænke os lige nu, vi har lige sendt en ansøgning afsted til noget der hedder Wissing fonden, som er en forsker fond oppe i Nordjylland, jeg tror den bor i Aalborg, og det er en Aalborg professor Arne Remmen som har sagt; "Prøv at høre her, nu skal i søge den her pulje fordi der er nogle penge til at lave sådan nogle ting som i går og laver." Og det der Earth Academy højskole tanke er i virkeligheden også et forsøg på at sige, byggeri er jo et af de aller værste steder for klimapåvirkning, fordi vi bygger bare helt vildt, altså sindssygt meget, og der jo spekulationsbyggeri meget af det, fordi man investerer i byggeri, der jo ikke mange der tjener bunker af penge og det koster en krig at købe en lejlighed, eller bare at leje en lejlighed i byen, ikke, det er bare én stor pengemaskine og det fører jo til at Bjarke Ingels og andre de tegner jo de mest fantastiske huse som ser pisse godt ud udvendigt, og noget skrammel indvendigt fordi de er bygget af stål, og glas og beton, og deres fodaftryk er elendigt, altså miserabelt, og de er bygget dårligt af ringe materialer, kæmpe fodaftryk CO2-mæssigt, vildt dyrt at bo i, og så er det i virkeligheden bygget super skrækkeligt og der er ikke et menneske involveret i det. Det er ikke en landsby man bygger, det er en investerings betonklump, hvis man skal være lidt grov, ikke. Hvordan får man lavet om på det? Fordi der er alt for mange interesser i det. Folk vil gerne have en lejlighed, der penge i det, folk vil gerne putte penge i det, byggefolk der gerne vil bygge det, osv. osv. Der er alt for mange "whats in it for me"-agtige tiltag i den positive retning, for de folk som er involverede i det til at man ville kunne sige "Hey, måske skal man bo og bygge helt anderledes". Det kunne vi godt tænke os at se på.

...

Byggeriet bliver et højskoleemne i sig selv, så når man prøver at tænke på at vi ikke har bygget noget herude endnu, altså vi skal ligesom. Nu kommer i lige på en lille studietur med her. Hvis i kigger ud af vinduet, har i været forbi her? Nej, det har i ikke.

E: Jo, vi har besøgt det.

S: Her ude på marken, har vi to hektar ca. over mod vejen, der har vi tilladelse til at bygge 250 sengepladser, ude på det stykke jord herude. Det ligger jo 100m fra stranden, eller 50m, det ligger mega fedt, så det er sådan et sted vi rigtigt gerne vil bygge noget på, men så i stedet for at vi bare sætter nogle byggefolk i gang med at lave noget smart herudefra, så kunne vi godt tænke os at byggeriet, blev et højskoleprojekt, så vi fra starten for tænkt det ind som et udviklingsprojekt, hvor vi aldrig rigtigt bygger det helt færdigt, men der altid sådan en ende der er ved at blive bygget på, så når man kommer, så kan man deltage i byggeriet, og se hvordan gør vi det her, skal vi selv lave murstenene, eller væggene, eller skal vi selv, altså er der noget vi selv kan gøre, sådan vi får indsigt i hvad det betyder at bygge sundhedsvenligt, klimavenligt, ressourcevenligt, og alle de her ting her, sådan vi tænker det ind som, hvad skal man sige, et innovationsprojekt. Så er der nogen, hellere vil lave mad, de går så ud og sørger for at mad-delen er i orden, og andre ting også, men der er nogen der kommer her på højskoleprojektet, eller på Earth Academy, som er intereserede i fremtidens byggeri, så kan det samtidig blive en vejledning til byggebranchen og håndværkerne, sådan man kunne lave kurser her for håndværkere, så de kunne komme på sådan et efteruddannelseskursus, og prøve at se om det kunne lade sig gøre at de kunne lære noget, i byggeri, altså om byggeri, og det er sådan nogle ting, som jeg synes er spændende, det er det der med at vi lærer mens vi gør noget, at det ikke at vi lærer en masse gamle ting som allerede på forhånd er gammeldags, men at vi lærer noget fordi vi har brug for det.

...

De kurser skulle vil gerne kunne lave, vi har inviteret teknologisk institut og noget der hedder we-build Denmark, som er to organisationer som arbejder meget med byggebranchen, så institut for byggeforskning, en der hedder Mette Meldgaard, tror jeg hun hedder, så er det en der, jeg kan fandme ikke huske hvad han hedder, som arbejder for We-Build Denmark en institution som er lavet, skabt af byggebranchen til at uddanne håndværkere eller brancheforeninger

til at vide noget mere om bæredygtighed, og byggeri i det hele taget. Kunne vi inspirere nogen til at blive håndværkere, eller gå ind i byggebranchen, ved at komme på højskole så kunne det være lidt fedt, altså, fordi filosofien er også lidt at højskolen i gamle dage, blev skabt for at bønder og arbejderbørn og andre de kunne komme på højskole for at lære nogle boglige fag, fordi de var kommet alt for tidligt ud af skolen for at lære et håndværk, ikke, så de var super dygtige når de kom på højskole kunne de bygge et hus eller passe en ko, eller reparere en bil eller bygge et hus, men de havde ikke læst poesi eller litteratur eller de store videnskaber, det havde de ikke fået indsigt i, fordi de ikke havde gået ret lang tid i skole, så når man kom på højskole, så lærte man noget om de nordiske guder og filosofi og kunst og sådan nogle ting her ikke, fordi det var en del af et helt menneske. Vi mener jo lidt at det hele menneske er forsvundet igen, for nu har vi det hele oppe i hovedet, vi har lært alt om de græske guder og filosofi, men vi kan ikke bygge et hus eller reparere en bil eller slagte en ged. Vi har mistet meget af det håndværksmæssige. Så i virkeligheden handlede det i gamle dage om fra "hånd til ånden", nu handler det om "ånd til hånd" igen vi skal sådanset tilbage igen og gå på højskole for at lære det vi mangler, og det skal vi selvfølgelig definere sammen, hvad det er vi mangler, men vi kan sige at hvis vi skal lave en bæredygtig verden, så skal vi også blive dygtige til at kunne, altså, vi skal kunne reparere det der er gået i stykker, eller det der ikke fungerer og så den håndværksmæssige side af sagen er helt vildt vigtig, sådan som vi ser på det, ikke. Lidt filosofien bag Earth Academy, det er at vi gendanner tingene. Nogen af de folk som arbejder med det Kim Hyttel, og nogen af de folk som har været oppe på, hvad er det nu det hedder, det oppe ved Ebeltoft. Der er sådan en stor fabrik der er blevet overtaget af nogen unge mennesker som laver sådan et genbrugs-byggeprojekt, hvor de laver tiny-houses, og alt muligt andet. Det kommer lige lidt, så husker jeg det. Det udspringer af Friland, og dem der laver halmhuse deroppe i sin tid. Det kommer lidt deroppe fra, de havde en drøm om at bygge en højskole, hvor man så brugte hele det der byggeelement og, hvad skal man sige, selvorganiseringen som en del af det, det er det han har flyttet herned, men det bliver for mig at se en lille smule religiøst, fordi jeg er en bonderøv fra samsø, jeg tror ikke rigtig på ismer, eller på meget, meget specifikke ønsker om at gøre noget på en særlig måde. Jeg tror på at dem der er sammen skal finde ud af gøre det på deres måde. Altså at vi har en selvorganiseringskultur, som er stærk nok til at man godt gider at lytte til andres mening end en selv. Man gider godt at arbejde lidt mere konsensusorienteret henimod at det vi er sammen om, det gør vi sammen, i stedet for at hvis man meget ideelt mener at man kun må tage højredrejede græsstrå ind i sin bygning, altså der er meget, der bliver meget specifikt. Når man snakker om regenerativt landbrug eller permakultur eller nogen af de ting her, så lyder det jo meget godt, ikke, og jeg kender også en masse til det, og har arbejdet med det, men det bliver sgu meget sekterisk i en eller anden forstand for der er ikke så mange der er i stand til at udføre det i praksis. Det er et kæmpe arbejde at lave permakultur for eksempel, det tager mange, mange år at bygge sådan en permakultur mark op, eller en skov eller hvad det nu måtte være, det er ikke noget man bare lige kan gøre, det er en livsstil det tager vildt lang tid, ikke, og er vildt svært. Men man kan godt lugte til det, man kan godt røre ved det, men det betyder ikke man behøver at synes at alle muligt andre er nogle idioter fordi de laver landbrug på en anden måde eller fødevarer på en anden måde, men vi kan måske påvirke hinanden og komme et rigtigt sted hen, det er mere den der proces som, samfunds- fællesskabs-agtige måde at arbejde på som jeg godt kan lide.

E: Så det ikke bliver preachy?

S: Altså jeg kommer fra et samfund, og det vil jeg gerne holde fast i, altså jeg kommer ikke fra en ideologi, eller noget, jeg kommer fra et samfund som hedder samsø, og her er der alle mulige tosser, der bor her ovre, ikke. Både nogle meget grønne nogen, og nogle kulsorte nogen og nogle rabiate, nogle nationalister, og der er sikkert også nogen racister, det vil jeg tro, altså, men vi bor her jo alle sammen og vi lever i et frit land, så de må gerne være her, men så længe vi kan opretholde en nogenlunde god tone og lave noget sammen, så tror jeg vi positivt kan påvirke hinanden i en bedre retning end hvis vi malede os op i et hjørne og syntes de andre var nogle idioter. Altså der er noget samfundsansvar over det som gør at vi kan tale direkte til hinanden uden at vi

bliver dødeligt uvenner eller begynder at gå i krig eller slås eller opfører os som Putin eller en anden idiot, ikke, vi bliver mere rummelige fordi vi har brug for det, altså vi har brug for at være her i morgen også, så der er grænser for hvor dum du kan være eller hvor idiotisk du kan opføre dig, og det synes jeg er en kvalitet, på en eller anden led. Det er også lidt et tab, at man ikke bare kan være fuldstændig sig selv. Men det er jo det med biodiversitet er jo i virkeligheden sådan en generel aftale om at alle skal være her, men alle er bestemt ikke lige. Altså, hvis man kigger på biodiversitet i en skov, så ved de store bøgetræer, der står inde midt i skoven, de ved jo godt at de skal sørge for at sende nogle rødder helt ud til de bittesmå hvidtjørnsbuske og brombærkrat der er helt ude foran, for det er dem der bryder vinden når det stormer rigtigt meget, så de store træer ikke vælter, altså, så de hjælper hinanden, ikke fordi de er venner, men fordi de store træer, de ved godt at de små er afgørende for deres overlevelse, og det er sådan lidt sådan det fungerer også i den her sammenhæng, at alting har en rolle i den her sammenhæng. Det synes jeg er en helt vildt vigtig erkendelse og at man er opmærksom på det og hjælper hinanden til at bibevare de roller og at man kan fastholde det man er god til og blive dygtig, ikke.

E: Hvordan regner I med at I vil kunne trække de her videns personer til Samsø? Der er selvfølgelig allerede en kæmpe viden i Energi Akademiet, i sig selv men..

S: Ja, altså både og, ikke, fordi Energi Akademiet vi står jo også overfor nogle transformationer, nu har vi arbejdet med energi i mange år, og det er blevet sådan en succes så alle de store industrier de kører bare på med vindmøller og solpaneler og alt muligt, ikke, det ruller derudad og investeringer i store kapitalfonde, de kaster sig over det her nu, de vil eje det her, for det er et kæmpe marked, vi skal alle sammen bruge energi, ikke, så det der for tyve år siden var sådan lidt noget hippie-noget hvor vi byggede nogle vindmøller og lavede noget grøn energi, ikke, det er nu blevet top industri og investeringsobjekter og aktierne de stiger når det er grønt fordi alle skal bruge noget af det.

E: Det bliver måske lidt endimensionelt fra en bæredygtig vinkel.

S: Vi har tabt, hvad skal man sige, ejerskabet men vundet udviklingen og det skal vi jo ikke græde over, men det er jo alligevel ærgerligt, for jeg synes jo den decentrale, lokale udvikling den havde nogle kvaliteter som kunne være med til at finansiere nogle af de fornuftige ting vi skulle lave her. Hvis vi selv kunne producere vores egen energi i stedet for at importere den fra Rusland som gas, ikke, så kunne vi måske godt være meget friere i vores tilgang til hvordan vi besluttede verden skulle være i stedet for at skulle gå ind i allianceer om at genvinde magten. Hvis magten ligger i energien så er det ærgerligt vi ikke bare beholder energien, altså at vi ikke bliver selvsupplerende, men selvforsynende, det er ikke kun for at være grøn, det handler simpelthen også om sikkerhed, det handler også om økonomi og en bæredygtighed som har et meget bredere aspekt end bare selvforsyning med grøn energi. Det er også et selvforsynet samfund der styrker sig selv, og dermed kan man i princippet også være med til at definere hvad skal vi bruge pengene til eller hvad har vi brug for hvis vi laver et overskud på vores energiomsætning, hvad skal vi så bruge de penge til, skal vi lave en bedre skole, skal vi bygge Earth Academy eller hvad har vi lyst til der skal ske her. Det giver sådan en selvadministration som er interessant. Nu bliver vi bare kunder i nogle store drenges butik, ikke, altså det er fucking irriterende, at vi afgiver suveræniteten, så selv om det er grønt så bliver det grønt men med sort på, ikke, så det er lidt irriterende.

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Til dit spørgsmål, så starter vi faktisk også lidt forfra når det begynder at handle om klima, fordi det der klimaarbejde er lidt en ny tilgang til bæredygtighed. Det handler stadig om energi, men det handler jo også om mange andre ting, ikke, altså jordens ressourcer i det hele taget, så derfor tror jeg faktisk vi ligesom siger, os på akademiet, vi starter egentligt også lidt forfra med at lære igen, hvad betyder det her for os, og hvilken rolle giver det os, altså hvad skal vi gøre i den her sammenhæng. Så kan vi være samlingssted for de her spørgsmål og så genopbygge en eller anden form for vidensbank, omkring hvordan vi forholder os til klimaet, og hvad vi så kan gøre,

ikke, fordi det bliver det store spørgsmål rigtigt mange vil spørge, jamen, det er fint nok, jeg går sgu også ind for et bedre klima, hvad skal jeg lige gøre.

E: Hvordan differentierer den her fremtidige højskole fra den allerede har været på Samsø? Den kunne ikke løbe rundt, den lukkede i 201 hvad har i tænkt jer at gøre anderledes, den her gang?

S: Vi har tænkt at lade være med at lukke. Nej, altså den lukkede. Jeg kender rigtigt godt historien deroppe, og det var megasørgeligt at den lukkede, det var en tid hvor der lukkede mange højskoler. Der var kommet måske lidt for mange højskoler, og så blev der også... Der kom nogle ændringer i højskoleloven, og det er også lidt det jeg mener, højskolen den blev for sårbar, fordi den var afhængig af årselevrefusionen. Årselevrefusionen var tidligere udregnet på årselever fra hele året, men så begyndte man at sige, jamen, der er rigtigt mange af sådan nogle, hvad skal man sige, specialhøjskoler som lavede livsstil, det kunne være fedme, eller det kunne være, golf eller sådan nogle ting, som primært levede af sommerkurser. Så besluttede man sig for at, fordi det var en god forretning for nogen skoler, at man så simpelthen lod årselevtallet tælle mindre for sommerskoleelever end for vinterskoleelever. Og det betød så at dem der lavede de specialkurser, lige pludseligt havde de ikke elevrefusion nok til at få økonomien til at hænge sammen. Fordi, de lange kurser om vinteren der var de udkantshøjskoler lidt, de havde svært ved at få elever. Så ville de hellere være på en højskole som var nær ved en stor by eller altså en af de større højskoler, så de der små højskoler, de havde det virkeligt hårdt i den periode, og der var mange der lukkede. Så derfor lukkede Samsø også. Så jeg kunne jo godt tænk mig at man måske endda ikke gik ind i højskoleloven og fik elevrefusion, men lavede en fri højskole hvor vi lavede kurser af kortere eller længere varighed, som var selvdefinerede, eller hvis du nu for eksempel havde et kursus, i godt kunne tænke jer, så kunne i ringe til os og sige vi har et ugekursus, eller fjorten dage, hvor vi gerne vil lave der projekt her, og vi mener vi har 30 elever. Kan vi booke kurset, hvis i kan levere nogle lærertimer, og sådan nogle ting, så kunne man lave sådan nogle højskole, internkursus-ting hvor man kunne komme med nogle højskolehold, for det taler også lidt til den der aktivisme-ting, det der med at vi skal sgu være sammen for at lave et eller andet, hvor kan vi gøre det? Jamen, det kan man gøre over på Samsø, de har sådan et sted man kan det. Det kunne man godt forestille sig det kunne være fint, ikke.

E: Så lidt mere åben højskole?

S: Ja, så skal vi ikke have kurserne godkendt af højskolesekretariatet, det er sådan noget jeg arbejder på i det udvalg, jeg sidder i. Det har jeg også sagt til Connie Hedegaard, nu må hun sgu hjælpe mig lidt med at være autonome, Connie, jeg ved godt du er gammel bureaukrat og minister og sådan noget, ikke, men hun er også meget fed, jeg kan egentlig meget godt lide hende, altså hun har vildt meget indflydelse, og sidder jo alle mulige steder. Formand for Aarhus Universitets bestyrelse, formand for KR-Foundation og concito, og jeg ved fandme ikke hvad. Sidder alle mulige steder, ikke. Så det kunne være sjovt hvis hun brugte sin indflydelse på at lave nogle reformer som var interessante, ikke. Så, jeg tror Samsø er et populært sted at komme, vi ligger midt i landet, det er nemt at komme dertil både fra Jylland og Sjælland, så jeg tor på en eller anden led godt vi kunne køre nogle ting, men det der med at være her i fire måneder om vinteren er måske ikke det fede, altså, det ved jeg ikke, det skal man jo så undersøge og se om det kunne lade sig gøre. Det er der udfordringen den ligger.

E: Nu siger du selv det her med at være her fire måneder om vinteren, det er måske ikke så super nice...

S: Det synes jeg, jeg har boet her, hele mit liv, jeg synes vinteren er det fedeste, men hvis du nu kommer fra en by og savner dine venner, kan det godt være det er langt væk, ikke, det kan godt være det virker åndssvagt ikke.

E: Jo, præcis, hvordan har I tænkt at resten af samspillet med resten af Samsø skal være? Altså, skal det her være et socialt og kulturelt samlingspunkt for hele samsø, eller for Ballen, eller skal det bare være centreret til en højskole?

S: Jeg tror de fleste højskoler har det problem, at de gerne vil være samlingspunkt for lokalsam-

fundet, men de fleste er det ikke. Det kommer til at være sådan nogle helt lukkede liv, hvor eleverne de laver en helt verden for sig selv, ikke, de lever i et samfund som de laver i de fire måneder. Det synes jeg på en eller anden led også er det det handler om. Altså det der med at interagere med lokalsamfundet, det er fake på en eller anden led, det bliver en kunstig ting, men derfor kan man jo sagtens lave nogle events eller nogle møder hvor man har fede folk der kommer og laver oplæg og sådan noget, hvor man inviterer lokalsamfundet til at komme på højskolen og høre det samme som eleverne eller eleverne kan lave noget som de gerne vil dele med lokalsamfundet, så på den måde kunne det blive fedt nok. Altså jeg tror ikke på den meget integrerede del, men jeg tror på den der aktions delen kunne være interessant nok. Jeg tror også samsingerne er pisse gode til at invitere folk til, så hvis folk de vil ud at lave noget eller ud i praktik på en kartoffelfarm, eller et eller andet, så tror jeg ikke det er svært, altså det vil folk gerne på samsø, der kommer 500 mennesker fra hele Europa og plukker jordbær hvert år, ikke, i sådan en kæmpe jordbær lejer, hvor de plukker, jeg ved ikke, 20-30 tons jordbær om dagen, det er helt vildt, ikke, som så bliver sendt afsted til København. Så der er jo sådan en imødekommenhed over for folk der bor her midlertidigt som vi har brug for at kende, ikke. Men det er selvfølgeligt noget der skal arbejdes på, der kunne også komme en helt ny måde at være sammen på, det ved jeg ikke.

E: Er der en specifik grund til at i valgt at ligge Earth Academy og Energi Akademiet, hvor det er i Ballen?

S: Energi Akademiet ligger her fordi, vi havde tre steder vi gerne ville ligge det. Det ene var ude i noget der hedder Stavns, ude midt på øen, oppe på en høj på en gård, i øvrigt Tor Nørretranders, som jeg har skrevet en bog sammen med, jeg ved ikke om i kender Tor Nørretranders, men han er sådan en forfatter-fætter som tager rundt og holder oplæg sammen med Brinkmann og Wilderslev, så laver de sådan nogle talks. For nogle år siden skrev jeg den her bog sammen med ham, som hedder Fælledskab, som er en meget interessant bog, set ud fra sådan en filosofisk betragtning om hvad er fællesskab og hvad er moderne fælleder? Altså de der fællesskaber, og en højskole er jo nærmest et moderne fælled, hvor man er fælles om noget i et stykke tid, ikke, fordi det er også det vi definerer fælledskaber og fælleder er midlertidige, det er sådan nogle som opstår fordi man har brug for dem og så er de her fælleder her så længe man accepterer fælledens vilkår, men lige så snart det ophører, man har løst opgaven, så opløses fællesskabet igen, og det skal det også helst, for ellers bliver det en institution, og så holder det op med at være et fællesskab, så bliver det et administrativt fælled. Det var en lang historie for at fortælle at, han er flyttet ud på den gård vi faktisk havde tænkt os det skulle være på, den ligger på det højeste sted, sådan en gammel vikinge landsby, derude med kig ud over Stavns fjord, det vildeste, fedeste sted på Samsø, der var en kæmpestor lade derude som kunne have være kanonfedt møde/kursuscenter, højskole-agtigt. Det lå bare for langt væk, syntes vi, for langt fra færgen ikke i gåafstand, ti kilometer dertil, ikke, det er lidt for langt på Samsø. Så var det noget oppe i Koldby, ved den eksisterende højskole hvor der allerede var et industrikøkken og værelser og sådan noget, der kunne vi have ligget deroppe. Måske kunne vi have reddet højskolen, hvis vi gjorde det, hvis vi havde lagt det lige ved siden af, men det kunne jeg ikke, jeg sad i højskolens bestyrelse, og der var mange der synes, nåh, det er fordi du vil redde højskolen, så der var ikke rigtig stor opbakning til at ligge det der, også fordi højskolen var lidt på røven allerede den gang, så tænkte man, hvad nu hvis den går helt på røven, ikke, og vi så er der og ligger ved siden af med en ruineret højskole, det er ikke fedt at starte med det. Så var der den her grund her hvor vi er nu. Det var en gammel hotel-byggegrund som lå i Samsø kommunes lokalplan som vi så kunne få lov at købe af bonden som ejede jorden her for fornuftige penge, ikke, og der var en byggetilladelse allerede stort set, og det ligger i nærheden af Ballen, alle vil være i Ballen om sommeren på Samsø, det er sådan et turiststed, der ligger en festival hernede også, og det er meget tæt på færgehavnen fra Sjælland, man kan faktisk gå hen til færgen herfra, ikke, og der er butikker og restauranter, barer og sådan noget, ikke, lige i nærheden, så på en eller anden led, så gav det meget mening at være her. Det ligger også helt vildt, urimeligt tæt på stranden, ikke, du kan bare gå ned og hoppe i vandet. Så på den måde så var det et fedt sted. At højskolen så skal ligge

her, det er jo så fordi den grund her er så stor, og der er den her byggetilladelse, det er svært at finde et sted hvor du kan få lov at lave sådan noget, medmindre du finder en gammel institution som allerede har nogle værelser eller nogle faciliteter som kan bruges. Det ville jo være lidt i Earth Academys ånd at man ikke bare byggede noget nyt, men man rent faktisk genbrugte nogle gamle bygninger, men det har vi ikke. Den gamle højskole er fuldstændigt rykket fra hinanden, stor set, den kan ikke genbygges. Det var sådan, lidt tynd forklaring, men det var sådan det var.

E: Hvor afhængige er i af turister i jeres virke, ikke rigtigt måske?

S: Nej, turister kommer her som strøggæster, der er nogen der har hørt om os fordi vi nogen gange kommer i medierne eller andre steder, så skal de lige ind og se det her Energi Akademiet som de har hørt om, og så kommer de ind og så laver vi om sommeren tirsdag og torsdag sådan nogle offentlige møder fra 11 til 15, hvor vi har nogle studentermedhjælpere fra Aalborg, eller et eller andet sted, som gider at bruge sin sommerferie på at være studentermedhjælper her i huset, ikke, som viser folk rundt, og fortæller om hvad vi laver, og det er meget populært, men det er en service vi laver. Vi satser meget mere på dem der bevidst opsøger os og gerne vil nogle bestemte ting som har et formål med at komme her som vi kan lave en workshop for. Det er det der giver mening for os. Vi er ikke et planetarium eller et showsted hvor man får lidt underholdning, så kan man tage børnene med hen og rykke i en vindmølle, eller et eller andet. Det har vi slet ingen ambitioner om.

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Men altså, man kunne jo godt snakke om grøn turisme, Earth Academy kunne godt være afhængig af turister på den måde. Hvad nu hvis man fra maj til september lavede sommerkurser, altså ugekurser, eller korte kurser som henvendte sig til de gæster som havde lyst til at lave en aktiv ferie, hvor man gjorde noget fornuftigt i stedet for bare at ligge på stranden, så ville man gerne lave noget med noget mening, ikke. Det kunne godt være et mål i sig selv at møde dem, altså, på en eller anden led. Ikke som kunder, men fordi det kunne være et interessant tilbud. Kom til Samsø og gå på sådan et kursus, hvor man lavede noget vild mad, muslinger fra havet og tangmad, og byggeri, og altså, sådan noget bæredygtighedssommerferiekursus hvor man lærte noget samtidig med at man var på ferie. Det halve af tiden gik man på kursus, og den anden halvdel af tiden var man ude at ride på heste eller cykle, eller hvad man nu ville.

E: Men det er ikke noget i har i støbeskeen som sådan?

S: Nej.

E: Hvornår har I tænkt at Earth Academy skal stå færdigt, hvor langt er I, i processen?

S: Jamen, hvert år der tænker vi, nu kommer vi i gang med det, men det er en megasvær proces, den der for der kommer alle mulige banditter ind over også, som vil os det bedst, men som ikke rigtigt kan noget når det kommer til stykket. Det er et område der kalder på en masse idealister, men det er sjældent nogen med ret mange penge eller ret meget kapacitet. Lige nu har vi sendt en ansøgning af sted til Wissingfonden som jeg nævnte før, ikke, på at lave det der forsknings/udviklingsprojekt, så vi ligesom har forudsætningen lavet sammen med nogen topprofessionelle folk som ved noget om byggeri. Det vil vi så bruge når det er færdigt, det tager det næste år. Når vi så er færdige med det, formodentligt til foråret næste år, så skulle vi gerne være allerede der være i dialog med nogen der kunne kigge på funding af byggeriet, altså, vi begynder at bygge på det. Og det behøver nødvendigvis ikke være noget stort, det kunne godt være vi bygger tiny houses eller bygger meget, meget billigt og let skurvognsagtigt. Jeg har ingen ambitioner om at det her skulle være noget meget fint sted, det må gerne være et mobilt flytbart sted, det kunne også være containere ligesom de der studenter boliger ude ved Refshaleøen, hvor der er bygget sådan nogle oven på hinanden, eller noget helt tredje som er interessant. Så hvis vi kunne få startet op med en eller anden grundidé, så ville det være fint for mig.

E: Når bare kernefaciliteterne er på, så der er styr på dem.

S: Ja, for vi har jo hele det hus her, jeg ved ikke om I kan huske det, men det er jo et ret stort hus, der er faktisk plads til rigtigt mange ting, og der kan laves møder og kurser og workshops og sådan noget i det her hus her, det skal bare råbruges noget mere, ikke. I lange perioder står det jo rimeligt tomt, ikke, der er bare os der arbejder her, og så indimellem er det megafyldt nu, den telefon der var lige før, var nogen fra Østrig der ville komme her på sådan et studenterkursus fra et universitet. Så kommer de måske i en tre-fire dage og så laver vi ballade her og så er der totalt fyldt her, men så går der måske to uger hvor der ikke sker så meget igen. Så der er mange rum her, der er meget ledig kapacitet, ikke.

E: Hvor mange er I ansatte?

S: Lige nu er vi fire årsværk, det vil sige fire der kommer her hver dag, og så har vi måske lige så mange deltidsansatte eller projektansatte som er ansat off and on i forskellige typer projekter med færre eller flere timer alt efter hvad det er for nogle projekter vi har.

E: Jeg tror vi har fået svaret på en masse af vores spørgsmål, så medmindre du har nogle afsluttende bemærkninger du synes vi ikke er kommet ind på?

S: Nej, jeg tænker sådan lidt, hvordan I tænker, hvad er det videre forløb for jer?

E: Jamen, vi har selvfølgelig et rumprogram, som I har lagt ud på nettet der, som vi regner med at tage udgangspunkt i, langt hen af vejen, men vi forbeholder os også friheden til selv at remixe det lidt, og arbejde ud af det rimeligt autonomt. Så vi har en rimelig tight deadline, så vi skal allerede være færdige med vores projekt sidst i maj. Så det kommer til at være lidt intensivt.

S: Hvordan aflevere I det?

E: Det er vores afhandling, så det er en rapport og med præsentationsmateriale osv.

S: Men I må sige til hvis der er noget vi kan hjælpe med, så vender I bare tilbage.

E: Ift. det program I har lagt ud på nettet, er der nogen ændringer til det, eller er det up to date?

S: Alt det vi lægger ud på nettet, er allerede gammelt når vi lægger det ud. Altså det er jo bare nogle postkort vi hænger op i virkeligheden, altså, der er meget der ændrer sig hele tiden, ikke, og jeg tror også at dynamikken i det, har jeg også prøvet at forklare som svar på dine spørgsmål, fordi det er ikke hjemmesider og oplysninger, det er ikke det vi gør. Det er de direkte møder hvor vi går ind, ligesom med jer nu her, ind i nogen innovationer, jeg går jo også beriget ud af det herfra med de spørgsmål er jo interessante, de giver mig mulighed for at tænke over noget, ikke.

E: Jeg tror også det mere var det her ethos for stedet, vi gerne ville have svar på, og der har du i hvert fald været mere end behjælpelig.

S: Jamen, det er cool, og hvis der kommer mere ud af det, hvis I tænker, det var sgu noget mærkeligt noget han sagde der, så kom bare tilbage, i kan også bare skrive det, så kan jeg jo svare på det, hvis det er, hvis det kan hjælpe jeres opgave. Og så regner jeg jo med at i signer up til det første kursus der kommer, ikke?

E: Selvfølgelig! Jamen, mange tak for hjælpen Søren.

S: Det er i orden, det er godt, hej hej.

# APPENDIX 03- INTERVIEW WITH KENNETH DEGNBOL

An interview with the principal Kenneth Degnbol of Kalø folk high school was conducted 21 of February. The participants in the interview were Kenneth, Inoyah, Emil, and Sara. In the interview, the participants will be addressed with their capital letters.

Inoyah: Må vi optage?

Kenneth: Yes.

Inoyah: Super, det er altid godt lige at få afklaret det. Vi vil først gerne høre lidt om dig, og hvilken rolle du har her på højskolen?

K: Jeg er forstander og forstander er jo det, at være leder ikke, det er det man kalder rektor andre steder. Forstander betyder jo egentligt, at det typisk er, hvor vi har en form for hjem, altså et sted, hvor folk de bor ikke. Institution eller sådan et eller andet... Ja... Så har jeg været højskolelærer i 14 år op på Rønde, på højskolen deroppe, og så fik jeg lyst til at prøve kræfter med ledelse, hvor jeg fik en stilling på en friskole, hvor jeg var i tre år og så her for et år siden.

Emil: Hvad er din baggrund, før du blev højskole lærer?

K: Jeg er cand. merc. i musik og historie. Ja - så hele mit universitetsliv, vidste man hvad man skulle, men så i undervisningsverdenen er så gået med højskole og haft et vikariat på en efterskole. Så jeg har været kendt med hele højskolen.

E: Og grebet af det?

K: Ja, hvordan, har I været på højskole?

I: Har aldrig været det.

E: Jeg har været på efterskole, så det er jo sådan lidt deropad.

K: Og hvad har fået jer til at lave et studie projekt om en højskole?

I: En ting er, at det er aktuelt. Vi har læst lidt om samsø og deres udviklingsstrategi, og der nævnte de højskole og der tænkte vi, at det kunne være spændende at tegne sådan en typologi.

S: Også bare hele øens problematik om, at sommeren er der meget centreret turisme. Det er det, der sker, der er flest mennesker på øen, hvor vi har tænkt lidt funktionen højskole, der kunne måske komme mere liv hele året rundt, hvis man fik den ind.

I: Skabe mere aktivitet, det håber vi.

K: I har grebet den, fordi de netop har nævnt en højskole?

I: Det var i hvert fald udgangspunktet, og vi har også designet en folkeskole før. Det synes vi også var spændende, det her med undervisning og arkitekturen og sammenkoblingen af denne.

K: I er arkitekter og I skal lave en højskole, er det så bygningen vi taler om? Er det den i designer eller hvad?

I: Det er faktisk sådan, vi er både arkitekter og ingeniører, så det er også den ingeniørfaglige med indeklima, plantegninger og hvordan holder bygningen og... Det er faktisk bare det hele.

E: Altså vores opgave lyder meget konkrete i det, hvor på arkitektskoler godt kan være mere uhåndgribelige og fænomenologiske.

S: Ja, mere konceptuelle og sådan noget. Vi er mere kendt for, at vores projekter skal kunne bygges.

K: Yes.

S: Ikke fordi, det bliver de jo aldrig. Men man får lidt erfaring inden for, hvordan tingene hænger sammen.

K: Jeg tror som aldrig, jeg har mødt en højskole, man bare har bygget fra starten af.

S: Nej, det er også noget vi har. Vi har kigget på en del højskoler, og det er som regel i ældre bygninger.

K: Ja, en herregård man har overtaget eller.

I: Ja, det er også et af spørgsmålene om, den her bygning var opført med formålet som en hø-

jskole?

K: Ja, det var det jo så egentlig, for det så var en landbrugshøjskole. Så på en måde ikke.

I: Okay, for vi har været i gang med at kigge på rigtig mange cases, og det er sjældent det har været nyt.

S: Ja, vi har fundet én, der er en i Roskilde, festivalhøjskolen. Men den er jo så bygget i en gammel lagerbygning, så der er stadig, det der med, at der er noget gammelt. Det har vi også lidt på samsø, det sted vi har valgt, er en gammel fodre station, der skal laves om.

K: Og det er jo også tit, det der gør det rigtig svært at starte højskoler op ikke, for hvor pokker skal man få pengene til at lave højskole, og det der tit sælger til eleverne, er jo at der er faciliteter til. Der er jo også højskoler, der boomer af springhaller og gymnastiksale og jeg ved ikke hvad: musikhøjskoler, kreative højskoler boomer af værksteder, og musik udstyr, og hvordan man lige får startet det op fra ny af, og det er jo fordi økonomien kommer. Man kan sige, der er to ting i det, i forhold til økonomien. Det ene er den først kommer med eleverne, så man er nødt til at være startet op og været i gang med det. Man starter jo ikke op med 80 elever til at starte med, det er jo noget man bygger op over tid, så det er svært at få den der økonomi. Det andet er faktisk også, at det er svært at låne i kreditforeningerne til højskoler, fordi man vil sige, hvad kan den bruges til, hvis nu den går konkurs. Den der sikkerhed som parcelhuse oppe i Rønde, der kan man altid sige, at det kan sælges, men der kigger man anderledes på det her og siger, hvis ikke det skal være højskole, hvad skal det så bruges til. Det kan være et godt spørgsmål.

E: Vi prøver også ar arbejde os ind i den der form at det skal være multifunktionelt og det også skal give noget tilbage til byen som en kultur og socialt sted så det også får en eller anden form for multifunktionel med indbygget.

I: Men også tænke det langtidssigtet og fleksibel, og sige okay hvis det her ikke bliver til noget den her højskole, kan den så bruges til nogle andre ting.

K: Ja det er en rigtig god ide. Både bæredygtighedsmæssigt men også finansieringsmæssigt. At man kan se en plan B med det ikke.

I: Har i så haft nogle tilbygninger i forhold til højskolens udvikling i forhold til at der er kommet flere?

K: Altså ja, det har vi, igennem tiden har vi været det. Det er lang tid siden vi har bygget til men auditoriet og hallen derover kommer jo til engang i 90erne og så de huse eleverne bor i, som vi skal ud at se lidt senere de er også blevet bygget lidt i etaper, nogle kom der i starten i eller lidt efter 49 og så er der blevet bygget nogle til i 90erne.

I: Okay

K: Det var jo også en skovridder gård helt til at begynde med, så der var ikke behov for at bygge det hele i 40, der var også den her skovridder bolig. Hvad sagde du?

E: Om det er sådan lidt knubskydning at den er sådan lidt levende?

I: Men er det ikke også lidt et fællestræk for højskoler at det kommer lidt løbende?

K: Jo, det gør det. Og det kan man jo også sige at det er et spørgsmål om markeds relevant at man hele tiden skal sikre sig at der er det eleverne gerne vil have. Så det skifter jo over tid. Og så kommer der jo nye forstander til også.

I: Har der været stabilitet i jeres højskole, med antal af elever eller har det været faldende?

K: Det har gået meget op og ned.

I: Det har gået meget op og ned, okay.

K: Og det er ikke fordi jeg kan det store historiske, men det vil sige det gælder for alle højskoler. Der er mange højskoler der har været luknings truet i mange omgange igennem tiden. Det er en del af det. Det ændrer sig i hele tiden.

**I 80erne kunne man komme på højskole, fordi der var stor arbejdsløshed og man kunne fi-**

**nanserne hele højskole opholde med de der dagpenge der. Det var faktisk billigere end at have en lejlighed der inde i byen og forsørge sig selv. Og det lukkede man så for, så derfor følger det jo lidt nogle lovgivnings mæssige ting, det følger arbejdsløskurven, det følger den generelle økonomi i samfundet og så følger det selvfølgelig trends ikke.**

***English translation: "In the 80s, a folk high school stay was possible, because of the huge unemployment rate and financing the stay with the given unemployment benefit. It was cheaper than having an apartment in the city and providing for oneself. This was closed afterwards. Everything follows the legislations, which follows the unemployment curve, which follows the general economy in the society and then there are trends, right?"***

Er det moderne at holde sabbatår er det ikke moderne. Der har været rigtig mange på højskole her de sidste to år, fordi man ikke har kunne rejse til udlandet og man har savnet fællesskabet. Og så er der selvfølgelig også de små højskoler, hvor man er heldig at ramme et eller andet spot on, der er inde i tiden og man får masser af elever og så kommer der jo tiden hvor man køre lidt ved siden af.

I: Nu kan jeg jo også forstå at i har internationale studerende, er det lige så mange som de andre studerende?

K: Det er cirka 1/3 del, altså det der er vores historie her det er at vi bliver et projekt efter krigen der handler om at hvis man skal undgå at folk de slås med hinanden, så skal vi have folk til at tale sammen i stedet for og så, det handler meget konkret om sprog ikke, så det var danske unge der kom her på Kalø i 50erne 60erne 70erne og lærte spansk og fransk og tysk og forskellige europæiske sprog ikke, det var et lille fredsprojekt ikke. Men så kan man sige op igennem 80erne 90erne, så begynder vi at backpackere i stedet for os danske unge, hvis vi er interesseret i sproget, så vil vi hellere England og være au-pairs eller andre steder hen ikke. Så det falder fra hinanden, så har det faktisk været her på stedet et godt spørgsmål om hvad så egentlig skulle og vi har stået meget stærkt på det her sprog. Og så er det egentligt blevet til dansk sprog for udlændige man har lavet. Men det kan man ikke lave alene fordi den danske lovgivning siger at der minimum skal være 50 % danske elever på danske højskoler. Så det har været et problem at skulle trække de danske elever til. Og så op igennem 00erne har det næsten været en flygtningehøjskole, som brugte det danske sprog til flygtninge og det var det frem til 2017 var det og så var det at Inger Støjberg lukkede ned for det. Apropos det der med det politiske. Og så siden da har vi så skulle finde ud af hvad vi så skulle. Og så laver vi en fri lufts linje i 2018 som skulle og har en vis succes. Men det har knebet med elever stadigvæk. Men nu har vi simpelthen fulde huse her ovre og det er første år. Så nu er vi 72 elever, men det kan i ikke se her til morgen, men det er simpelthen fordi folk de lægger med Corona.

Og det er sådan 1/3 af internationale elever, det vi er superglade for det er også derfor kører sådan rimeligt engelsk. XX plejer at være oversætter holdet normalt så kører vi på dansk derovre. XX er ham der fortalte om fastelavn.

I: Okay

K: Og så har vi så et oversætterhold af elever, der bare sidder og oversættere bare som et Messenger opkald så sidder de og kalder og så sidder vi med deres headphones og lytter på det.

I: Ok smart.

K: Fordi han ikke kunne gøre begge dele i dag, så tog han den på engelsk. Men ellers har de danskundervisning, dansk sprog og kultur hedder deres linje, masser af danskundervisning og så også nogle kulturtimer. Og de.... Altså deres. De fleste der, er nogle der kommer. Nogen kommer og det er egentlig dem vi rigtig gerne vil have, kan man sige. Det er de elever, hvor måske far er dansk og mor og spansk og man har man har boet i Spanien hele sit liv og så bliver man 20 år og vil gerne flytte til Danmark igen når man kan tale lidt dansk, men... men ikke sådan lige rigtigt hvad man har måske en bedstemor i landet. Det er supersjovt for dem, der har en god forbindelse til Danmark. Ikke jeg godt ville gøre det ekstra ud af, at sproget måske skal de til at læse eller sådan noget. Og så har vi også nogle. Vi har rigtig mange japanere, der kommer. Og vi begynder

lidt at tale om dem som en form for... flygtninge egentlig, altså de kommer jo mange af dem, de kommer med den hensigt, at de skal finde et andet sted at bo i deres liv end Japan. Og det er jo ikke sådan traditionelle flygtninge, som vi kender det, der er truet af krig og fattigdom. Men det er jo simpelthen truet på... på samfundet. Det er det, de siger ikke, hvor de synes, det er svært at være i. Det kan være man er homoseksuel, det ikke være, man er... Bare drømmer om et liv, hvor man både kan familie og arbejde. Det er nogle af de der ting, de sådan er truet af.

E: Kulturelt truet nærmest.

K: Ja på en eller anden måde ikke? Så har de hørt om det der lykkelige land, hvor der opstår højskole bare lige mulighed for at komme væk. Ikke altså sådan forholdsvis rammen sat og forholdsvist en billig måde egentlig at komme til udlandet på ikke. Men, der er mange veje til det der.

I: Hvilket kursus og linjefag er mest velbesøgt både fra internationalt og.

K: Jamen de internationale, de er... ja, hvad har vi nu? Hvad vi har 24-25 elever på den. Og så har vi 27 elever på den der outdoor ranger, friluftslinjen, så viser dem at blive lige store ikke og så den sidste tredjedel der så fyldt op, hvor dannelsesrejsen og gro tilsammen ikke. Gro en lille smule større end dannelsesrejsen.

I: Okay. Hvornår blev gro etableret?

K: Det var her i efteråret. Ja ja.

I: Okay, så det er noget helt nyt?

K: Ja, altså da jeg kommer til der... der står vi virkelig med nøglen i hånden og får at vide der er et penge til 3 måneder frem til at kunne betale lønninger. Ikke... Altså så. Vi får de der små 3 måneder til at til at redde stedet. Så der skal jo ske noget, så de bliver udviklet lidt. Med afsæt i... Man kan sige gro, det er jo helt oplagt i... Den her landbrugsskole, det måtte man jo kunne bruge til et eller andet og dannelsesrejsen er noget med de læreres færdigheder vi allerede havde i forvejen ikke? Altså hvis det ikke skulle være afskediget for mange, så det må jeg sige. Hvordan kan de der havde vi mange gode akademikere der underviser på dansk sprog kultur, hvor vi så nødt til at sige okay. Kan vi også bruge deres faglighed til noget andet?

I: Altså det næste spørgsmål, hvordan kurserne har ændret sig gennem tiden. Men, det kan jeg godt forstå. Det har også været afhængig af selve økonomien og alle de her aspekter. Men stadigvæk, hvis vi ser på bæredygtighed. Hvordan? Hvordan fortolker i bæredygtighed i forhold til ud over økonomien er der også nogle andre aspekter i tænker det her, det er bæredygtigt, og er meget vigtigt for de her unge eller?

K: Ja, jamen det er det altså du siger det fortolker vi jo egentlig meget, vil jeg sige, det er noget, vi er på vej med, ligesom alle andre. Så det er jo en proces og det er jo noget, der er supersvært ikke. Bare lige at gøre fra den ene dag til den anden. Så fik vi jo omstilling med, og det forsøger vi egentlig også være meget dialog med eleverne med ikke der er nogle også kommer med mange store forventninger til det og det er jo som at tage det er gradvist de ting, vi synes der er relevante. Men du kan sige de ting vi gør. Det er jo, vi har jo bøvlet meget med det sidste år på at få vores køkken til at til at spille. Vi ansætter en køkkenleder den 1. januar og han går meget ind for kødløs mad... Kan man sige altså... Meget Mellemøstens mad faktisk og meget vegetabilet meget. Så er der den del af det og sætte fokus på madspild, selvfølgelig og så er det jo... så er det affaldssorteringen, som vi lige har sat i gang, så det var ting, vi jo vi jo går med hele tiden kan man sige ikke finde ud af, og det er jo det er jo LED pærer og de der ting. Jeg arbejder med løbende at få udskiftet forskellige steder, så vi har jo fast strategi for nogle ting, vi gør.

I: Okay.

K: Og så skal vi have skrevet ind i vedtægterne, at det er en del af vores værdigrundlag at vi er bæredygtige, og det skal vi også gøre blandt andet for at kunne være en del af højskolernes, altså vores fælles forenings bæredygtigheds indsats. Ja og så er det også det pædagogiske arbejde gennem gro, altså på det... altså ja ved at for elever til altså... det er meget havebrug... altså det er sådan helt etablere køkkenhave og arbejde

med forskellige måder at være selvforsynende på ikke? Så det er vi i gang med at opbygge, så vi er i gang med at søge tilladelse til en stor polytunnel, ikke det, til de her drivhuse ikke, sådan nogle runde lange, ligesom vi vil lave mere traditionel køkkenhave, ikke? Og så har vi lige ansat en ny fyr på vores outdoor ranger linje, som kan altså friluftsliv, men derudover så privat som bor herude på friland som vi kender eller ikke kender? Lidt? Altså det der bæredygtige hvad hedder det jo en landsby?

S: Jeg kender det ikke. Jeg ved ikke, om du gør Emil?

E: Har hørt lidt om det? Ja, som bæredygtig landsby.

K: Det skulle i næsten se så. Simpelthen en landsby der blev etableret for 20 år siden, tror jeg, hvor de får en jordlod af kommunen og så handler om. At de skal gøre det hele selv. Der er blevet bestemt nogle principper derude ikke. Det skal være, det skal være affaldsfrit og det er både i forhold til det, man bygger med, det skal være på sådan en måde eller huset. Det skal skilles ad, så skal de egentlig bare kunne gå ind med naturen, ikke? Det kan man, det kan også... det kan både være af naturmaterialer, isolere med muslingeskaller for eksempel sådan noget. Men det kan også være man overtager genbrugsting, at man overtager et gammelt industridrivhus, så det er rent genbrug ikke og så bygger man noget op inde i det her, så bor man i det eller sådan noget, så alle mulige måder hvor man arbejder med at genbruge byggematerialer ikke... eller og hvis det er nye ting man skal spille, så skal det være naturlige materialer det er det princip, hvor det andet princip det er gældfrihed.

I: Okay.

K: Folk må ikke stifte gæld for at bo derude. Fordi man vil gerne ud af den der eller den der mølle ligesom ved kreditforeningen altså hænger man på de 30 år, og så skal man knokle i 37 timer hen over stress og... og depressioner og jeg ved ikke hvad. Så det er sådan deres princip, samtidigt så også er et fællesskab, hvor man bor derude, ikke? Og det skal gerne være siger de, det det tredje trin. At hvis man er en familie derude, så skal den ene af de voksne, skal arbejde derude fra, altså bo derude. Eller hvad hedder det ikke pendle? Være er derude og have deres egen lille virksomhed, eller måske ikke arbejde eller sådan noget, fordi vi vil gerne væk fra det der med alle pendler til Aarhus hverdag og så er byen fuldstændig død med indtil klokken 16. Men for at man skal kunne det, så er man også nødt til at leve på lidt mindre levestandard. Måske ikke... altså ja... fordi et par for eksempel ikke skal arbejde. Ja, nå men det var jo lang historie... det kunne være det var interessant for jeg i forhold til den at etablere sig på og måder at tænke bæredygtighed på og så videre. Men friluftsmanden kommer derude fra bor derude, ikke? Det er en af grundene til, at vi ansat ham sådan, fordi vi godt vil være mere knyttet det der derude, og vise vores elever det er en måde og leve på men er.

I: Men er det så sådan at de kommer her over og underviser eller hvordan er jeres forbindelse?

K: Det sådan, at de kommer herover og vi har jo Thomas ansat på vores outdoor ranger linje, som bor derude og så har vi den anden fyr derude fra til at komme og undervise nogle andre ting, sådan noget tiny houses og den slags.

I: Og eleverne kommer også derhen?

K: Ja, også kommer vi derud og kigger. Noget af det vi nogle gange tager ud og kigger, det er en kæmpestor permakultur have derude ikke altså... hvor... det er en familie derude der arbejder med det her. Og forsøger at drive... altså egentlig at være bønder ikke, men bare permakultur her.

I: I forhold til bare det her med bæredygtighed, og nu har vi etableret det i efteråret, hvis man ser det fra elevernes perspektiv, er der... synes i selv, der er meget interesse fra deres side af end i forventede eller ja.

K: Altså i forhold til komme på linjen?

I: Ja, bare sådan... generelt på linjen og det her med interesse for bæredygtighed er. I har vel haft sådan en lille vurdering i starten om der ville være nogen der er interesserede eller er det mere end det i forventede?

K: Det... altså det synes jeg... Vi er enormt glade for, at vi lykkedes med det at komme afsted med den. Altså nu har vi 10 på linjen nu og det det er svært nogle gange i højskoleverdenen at sætte nye linjer i søen der rigtig virker. Det er noget der skal køre nogle år før det rigtigt virker, så vi er glade for at. Der er 10 elever nu her allerede på andet hold. Så det oplever vi da en interesse for. Vi kan også se, at analyser viser at omkring 90% af alle højskoler har bæredygtighed som fag forskellige afskygninger så det er jo ikke noget vi alene om overhovedet, så derfor kan man sige, det er måske federe at vi havde udbudt skak eller et eller andet mærkeligt for ligesom og hvis man skulle være alene på markedet, ikke med noget. Ja til gengæld kan vi jo bare se der er interesse ikke? Og vi tænker bare med landbrugsskolen. Det må simpelthen være muligt at klemme os ind. At være ret spiller dér ikke?

I: Trække på noget af det omkringliggende og prøver at få det med I undervisningen. Det gør også, at altså eleverne kommer lidt ud på eller anden måde.

K: Og så har vi lige en skoven herhenne, der ligger i Danmarks jægerforbund, så det er vores anden nabo, så det er jo simpelthen forening med danske jægere med masser af super dygtige konsulenter. Så der kan man også. Der har vi også fast i vores skema 2 moduler hver uge om at gå derover bliver undervist af deres specialister.

I: Okay.

K: Og det er ikke jagttegn. Det kan man tage ved siden af, for der er allerede nogle elever, der kommer her. Der har jagttegn, så det er egentlig mere end alt mulig i forhold til naturbevarelse. Jagt kultur, jagthistorier, jagt etik. Naturen mennesket i forhold til landene, alle mulige ting og sager, vi får undervisning derovre, så det er superspændende. Kommer ud, ud til alle mulige naturbeskyttelses projekter, hvor jægerne spiller eller anden form for rolle i forhold til rekrutteret. Vildtbestande og ting og sager så... så.... Det er rigtig spændende og der er en del af vores outdoor elever der kommer her den jagt interesse? Så der får vi også lidt spændende diskussion op. Ikke fordi så får vi jo så gro eleverne der kommer og er veganere, vegetarer alle sammen. Så får vi så dem der er interesserede i at nedlægge en hjort, der sidder og ser nak og æd hver søndag i biblioteket. Og så får vi de diskussioner der og. Det er jo superfedt. Fordi det er vi jo fælles om. Det er jo ikke sådanne naturfolk over for anti naturfolk det. Det er jo, det er jo bare forskellige perspektiver på naturen, ikke og får det i spil?

I: Ja man møder på eller anden måde end diversitet

K: Ja det gør man ja... fordi derovre taler man også om bæredygtighed... på jagt skolen, ikke? Men, men det er jo sådan en anden forståelse af det, det er jo ikke sådant kød eller ikke kød. Det vil sige jamen altså kan vi bruge det der er mellem markerne, kan vi bruge det, som altså det med de gamle dage ville kalde for hegnet til det vilde område kan vi ikke, kan vi udbygge det, fordi så får vi mere vild natur. Det er godt for alting. Det er faktisk også godt for marken ved siden af i forhold til insekter og så videre. Og så finder man faktisk ud af, hvis man kan bruge det der vilde natur imellem markerne til jagt, så kan man faktisk have et lige så stort udbytte af den natur, som man kan have af marken. Og så bliver det jo interessant og så sige, kan vi så tage det store landbrugsområder lægge mere af det ud til vild natur imellem markerne, fordi det gavner markerne, og fordi vi faktisk også kunne udnytte det til jagt. Så det er jo så mange perspektiver på det, og det ikke bare bliver kød, ikke kød der ligesom bliver. Det vi taler.

I: Og det er jo også en måde at få læring på.

K: Ja ja og så ligger vi jo tæt på vandet, hvor alt hvad det har med. Og altså det er jo også jagt, når vi tager ud og fisker ikke. Ja, så har vi sankning som et fag.

I: Hvad er det for noget?

K: Så det er jo. Altså vi har skove lige omkring, vi har masser af muslinger i vandet og så er det jo bare at tage ud i verden og lærer naturen at kende og forsøge at leve af dem,

I: Er undervisningen afhængig af årstiderne, fordi det har vi snakket rigtig meget om, hvordan vi lige får sådan undervisningen til at fungere med

tiden, og det kan jeg også forstå det er for jer. Hvordan er det?

K: Jamen det er det klart der er gro der. Det er selvfølgelig sjovere, når vi kommer til april og tingene begynder at vokse gro og så videre, ikke. Men det er jo også en... det er jo... det er jo også sådan... der er også noget fedt ved den udfordring ikke? Altså at man egentlig fordi det er jo ikke fordi det det det eleverne siger det er øv, kan vi ikke lavet noget andet det er jo januar det ved vi jo godt. Altså det er jo det er jo vilkårene, men det er jo også på en måde kunsten og så sige kan vi kan vi arbejde med naturen hele året rundt, ikke? Altså hvad kan vi egentlig arbejde med i januar? Så spirer vi, eller så bygger vi. Her om 2 uger skal vi til at bygge hvad hedder det nu... de her små drivhuse, ikke. Så man kan være klar til foråret.

I: Vi har brug for lidt hårde facts, hvor mange ansatte og hvor mange kursister har i? Bare sådan i tal. Bi er stadig ved at finde ud af hvor stor vores højskole skal være og sådan men umiddelbart ser det ud til jeres størrelse højskole kan være passende for det, vi gerne vil designe.

K: Ja... det er et rigtig godt spørgsmål hvad? Altså jeg ville jo egentlig sige i skal. Jeg vil sige i skal have en højskole på minimum 80, så laver vi er 70-72 elever. Det er fordi man kigger lidt på økonomien. Hvornår er det man kan lave et billigt nok køkken, billigt nok administration og kommunikationsafdeling og så videre. Så er det jo at en højskole skal være på minimum 80 elever.

I: Okay.

K: Så vi kan simpelthen se, at det er svært i længden, så det er inden vi bliver større, og vi ikke flere senge det er vores udfordring når vi ikke rigtig har økonomi til at bygge det, så vi står som er strandet et eller andet sted, hvor vi sådan skal lige præcis klare os godt nok lige i en periode til at vi kan få lov til at bygge til, at vi forhåbentlig kan vækste med en 10-20 pladser.

I: Okay nu, sagde du afdelinger. Hvad er det?

K: Det også for meget sagt, så det har vi jo ikke ligefrem vi. Jeg tror vi er 16 ansatte, ikke. Vi har en kommunikations fyr, der også underviser lidt og har nogle vagter og så har vi en forretningsfører og en fleksjobber som sekretær.

I: Okay.

K: Så det er administrationen, og så har vi en pedel, men vi har budgettet, at vi skal kunne ansætte en halvtidspedel mere i det her år fordi der virkelig er nedslidte bygninger. Og så har vi vel 6-7 lærer ikke ja... ja... Og så mig, og så køkkenet vi er 3,5 ja, det bliver endnu mere, hvis antallet stiger til den 1. april. Så 4,5 og så 3 i rengøring. Fik i det? Hvor mange blev det?

I: Mon ikke den har optaget det her. Men ændre antallet af elever, i forhold til vinter og sommer eller lange og korte kurser?

K: Altså vi har 2 lange kurser her i efteråret og i foråret. Og så har vi sommeren, hvor vi så laver korte kurser. Det gør vi i 3 uger.

I: Okay.

K: Og så er vi ned lukket I.... 3 uger.

Og de korte kurser der kan der godt være økonomi i, der også er meget arbejde i det. Der er jo nogle højskoler der virkelig store altså Brandbjerg højskole der er der har rigtig mange pladser de har sådan de køre med kort kurser hele tiden ved siden af. Eller kort gruppe, så det er jo sådan lidt typisk en uges varighed. Typisk er det lidt voksne, lidt mere voksne mennesker, der kommer, og så er det på en uges hækle kursus eller en uges sang kursus eller et eller andet historie kursus. Økonomien er sådan, at der altid er mest økonomi i lange kurser, så vi ikke skal lave... der skal vi lave et kursus. Der i skal lave jeres højskole efter de unge elever der er her I deres sabbatår i mere end 12 ugers varighed og det er fordi 12 uger derovre der får man den høje statsstøtte. Og den er noget højere end den man får ved korte kurser. Men det betyder noget når man skal til at designe en højskole...

... Fordi at de korte kurser der. Der vil man godt. Der vil de gerne have eget bad og toilet. Det er ret vigtigt på værelserne. Så der ligger jo der ligger jo en vurdering... skal vi lave det? Det er på en eller anden måde... det lækkert at have det. Der

er også fremtidssikret i det, så kan man bruge det til flere ting måske bagefter apropos det med finansieringen ikke på den anden side, så er det klart, så er det virkelig, virkelig for dyrene, når man skal lave højskole, hvis man laver eget bad på værelserne.

I: Men hvad for nogle korte kurser har i?

K: Ja vi kører... det smarte ved vores beliggenhed, og det er, at om sommeren, der er landbrugsskolen ude. Det kører ligesom erhvervsskole, så de almindelige sommerferielukket ikke. Så der har vi sådan set flere senge værelser at råde over, og det betyder vi laver flere titler over hinanden. Så vi har jo vi har jo 27 der kører vi med sådan et fællessangskursus simpelthen bare højskolesang, ikke mig ved klaveret og så fællessangen hele ugen og foredrag sådan noget. Og så kører vi oveni det vandrer kursus ud i mols bjerge ikke, og så kører vi et... så ligger jeg sådan et lidt kloge kursus ind der hedder naturdannelse, ikke så det er sådan et foredrag ikke, rewilding projekter og klima og ting og sager. Og det er sådan, at vi forventede det måske 15, hvis vi er heldige, der på dette kursus ikke, men så kan de andre til gengæld stor volumen ikke altså vandre kurser allerede nu. 50 tilmeldte. Og sang der kan vi lavede det i sommer ikke, der var vi der var vi 80-70 tilmeldte, men det den ene uge og 50 den anden.

I: Hvem er det så, altså aldersgruppe?

K: Der taler vi. Ja på sang, der taler vi 70 + og andre kurser måske 50 plus. 50 – 70. Og så kører vi... så kører vi... I uge 28 har vi egentlig solgt til en til en familie, men de er ikke i familie med hinanden. Men som tradition tager de rundt på højskoler og i år er de kommet til Kalø og så kommer de måske 115 menneske lige nu er de 90 tilmeldt.

I: Er der mange tilbagevendende kursister?

K: Det ved vi ikke. Fordi vi startede med det i sommer. Og selvfølgelig havde der været sådan en lille bitte smule sommerkursus virksomhed, men det var meget, meget lidt det var sådan 15-20 henover... ja...

E: Fordi det ikke kan betale sig, eller?

K: Det var det... jamen... det var læreren før det kunne betale sig

E: Men det kan det måske heller ikke?

K: Det kan det godt. Vi lavede 300.000 i sommer ekstra altså udover faste udgifter og må vi sige det faste udgifter. Har du alligevel? Lærerne skal også løn om sommeren, og pedellen skal have løn om sommeren og det hele ikke. Så i skal lave en højskole hvor man fylder sengen hver eneste nat. Det er der økonomien ligger altså... ja.

I: Hvordan er jeres? Nu kommer vi jo til at se dem. Deler man dem?

K: De fleste er dobbeltværelser. Nogle af køje værelser. Nogle er enkelt sengs værelser. Det er nemmere at sælge enkelt senge end køjesenge. Og jeg vil sige, skulle jeg bygge noget, så skulle det være enkelt senge. Fordi man sparer ret meget plads ved en køjeseng alligevel. Der skal alligevel være noget gulvplads og så videre?

I: Har i også lærer boliger?

K: Ja, og det skal man have man skal minimum. Ja det hedder man skal have minimum 2 lærere der bor på skolen, så kan man dispensere. Det er klart at man kan jo ikke tvinge folk til at bo der. Og det hedder sig også hvis man skal, skal der forefindes 2 boliger. Vi har 2 boliger. Lige nu har vi et 2 elev værelser der er slået sammen med en halv bolig, som der er en pedel der bor i. Det er lidt tilbage til den tid, hvor der ikke var så mange elever, så kunne man lige så godt få penge for det.

I: Nu snakker vi om korte kurser til de længere lange kurser. Hvordan er elevfordelingen i forhold til køn og alder? Er der nogen forskel?

K: Altså på de... på de lange, eller?

I: Ja... ja de lange. Det mest alderen som vi kan forholde os til, for det er vel mest efter gymnasiet. Eller hvordan er det?

K: Ja, det er det. Jamen det kommer an på hvad det er for en type højskole vi vil lave. Kan man sige altså. Der hvor jeg tidligere arbejdede der får de

supermeget sådan lige 4gere, så de alle sammen 20-21 år. Så det er det... de har et studieforberedende profil ikke, kom her og find ud af om du skal være mediciner eller sygeplejersker eller journalist eller bum bum derudad. Og her der får vi der er lidt mere bredde, altså det vi får dog. Primært i tyverne. Stadigvæk med de lidt spredte. **Vi får mange der kommer, med en bachelor eller en fuld uddannelse. Og siger, jamen de skal lige lave noget inden de skal ud at arbejde eller tager en pause eller en anden grund.**

***English translation:***
***"We get a lot that have a bachelor's degree or have completed an education, that states that they have a need to do something else before they enter the job market and the adult responsibilities or just a break for another reason."***

Midt i studiet eller midt i et arbejdsliv, og så har vi en 5 stykker der er 50 år.

I: Okay

K: 1 hjemmeboende bor på Djursland kommer ind og er med på gro linjen, kommer hver dag om morgenen. Så har vi... jamen så har vi... Jamen så har du andre sådan lidt oppe i årene.

I: Men flertallet det er altså 20-21 år.

K: Ja altså, vi har selvfølgelig også mange dage med 20-21, der er i gang med det der sabbatår, ikke, men det spreder sig egentligt hen over tyverne her. Jamen så er der jo dem der laver livsstils mod skoler altså, ja teater eller ændre din... din livs omstændigheder, på eller anden måde får du nogle gode vaner eller et eller andet, ikke? Altså det er det. Det er der jo nogle højskoler der har stor succes ved. Ikke hvor man også har mulighed for at komme med sine børn.

E: Det er ikke så vigtig her? Familie højskole?

K: Nej, det er det ikke rigtigt. Men det er måske på de livsstilshøjskoler, hvor man skal have mulighed for det. Ja, det kan godt være det er fedt. Hvor der er et værelse, hvor der kan være et barn. Man lige på skilt ikke, og faderen er ude af billedet, ikke? Og man trænger på en eller anden måde at der skal ske noget i ens liv, ikke? Ja opkvalificeres eller få sig nogle gode vaner, så... så det nu nogle højskoler der excellerer i og så er det jo typisk i 30erne eller 40erne. Så det er jo meget at sige, at det er noget med hvilke linjer i laver på skolen.

I: Men primært jeres højskole. Det er mere for at man skal prøve noget nyt og finde sig selv eller? Er det ikke de tematikker i arbejder med?

K: Jo, det kan man sige. Det og så var der naturen ikke, men ja. Så vi har rigtig mange der netop kommer på grund af naturen, ikke måske vores outdoor linje. Det er ikke sådan. Altså på en eller anden måde drømmer om at få et liv, hvor naturen fylder mere. Altså, men de mangler måske nogen at gøre det med de er vant til, når man tager ud og overnatter i shelter og så tager kammeraterne poser med øller i. Man ville godt noget andet, men det skal man tit have et fællesskab for, for at det er sjovt. De søger egentlig det der fællesskab til at få flere naturoplevelser ind i deres liv og nogle af os i gang med den der finder ud af, hvad de kan. skal jeg være naturvejleder eller? Der er rigtig mange mennesker, der ønsker, at ligesom at. Arbejde med naturen, lever lige og det er supersvært. Der er ikke ret mange stillinger. Så så det er en del af det der hvor de er ikke.

I: Jaer, hvordan er det sociale fællesskab har jeres højskole er det er det noget i prioriterer mere i undervisningen, eller hvordan er det?

K: Ja altså man kan sige hvordan det er det. Det er meget forskelligt i forhold til hold, altså på hvert hold får ligesom sin identitet på anden måde. Lige nu har vi et enormt fællesskab søgende holdning, så det er jo lige fra dag et. De var meget sådan på den med det samme, ikke. Men jeg vil prioritere det. Altså man siger i runde tal siger man i højskoleverdenen at lærer skal undervise 1/3, skal forberede 1/3, hvilket også er møder og så videre, ikke og skal have samlings tid 1/3, og det er faktisk interessant samlings tid. Det er jo weekend vager, det er aften vagter. Det er måske måltidsvagt, og det er sådan forskelligt, hvordan man gør det som skoler ikke. Men det er alt den tid, der ikke er direkte undervisning.

I: okay.

K: Og det er jo lidt interessant ikke? Altså det er jo det der gør denne skoleform helt unik. Det at jeg kan sige, at lærerne skal have lige så meget tid. Hvor der ikke er en dagsorden, som de skal til have til undervisning. Hvor der er en dagsordenen. Så det er jo... prøve at tænke på hvordan folkeskolen vil se ud, hvis man brugte lige så meget tid bare på at være sammen med eleverne, uden at der hele tiden var den der med, nu skal jeg... nu er det altså nu... jeg frem til næste dansk-prøve. Så det er jo noget af det der gør den her skole for meget unik

I: Hvad er det for nogle sociale arrangementer i har? Er der nogen sådan ekstraordinær hedder det arrangementer i kører med her på jeres skole?

K: Altså i alt ved siden af, eller? Ja, der skal jeg lige tænke mig om, der kan jo..

E: Det er måske mere eleverne der står for det?

K: Jamen altså når det bedste så er det jo en god blanding ikke, du laver den her fastelavnsfest her i dag. Og det er jo super, ikke, så er vi jo festival og hvor de står for nogle fester i weekenden ikke. Og så byder lærerne jo til med nogle aktiviteter, så i denne weekend der tog lærerne, med ind og se basketball i Århus den ene dag og så de været i gang med at male den ene væg på biblioteket om. Altså så det er jo sådan nogle aktiviteter der er ikke, men så har eleverne jo masser af klubber selv, så der er en strikkeklub, der er morgenmad klub og der er brygge Lauge og der er løbeklub, der er rigtig mange klubber.

I: Det måske hverdags sociale aktiviteter.

K: Ja det er det jo det

I: Er det sådan, at vi også får gæster udefra, godt kan komme og være en del af det eller er det mest for højskolen?

K: Altså vi laver nogle enkle ting, altså det kan godt være et foredrag i ny og næ og invitere folk udefra til at komme og vi har sådan et, konceptet der er syng, spis og snak for lokalområdet ikke, hvor man kommer og snakker og spiser og laver højskole fællessange.

I: Okay.

K: Og det er sådan en del af det der, måske i kender det fra efterskolen ikke? Du havde gået på efterskole ikke?

E: Jo.

K: Det er det med at man synger fra eller anden sangbog.

E: Ja, det gjorde vi også hver morgen.

K: Det kan måske virke lidt mærkeligt for alle andre. Især den første dag, der er man sådan helt wow og det ender med at man godt kan lide det. Det er jo en del af opholdet og så bliver det noget helt særligt. Det der med at synge sammen. Så der laver vi sådan noget syng spis og snak for lokalområdet. Det kan også være den rytmiske højskole, der er fusioneret, kommer forbi og kirkekoncert ikke... fester sammen med vores elever i den forbindelse. Øhm... det kan være mange ting, altså forrige weekend var der en lærer, der havde dem med på fossil tur, så var de ude at kigge på fossiler, ude ved klinten der ude ikke og det kan være mange ting. Ja.

I: Og de her sociale aktiviteter sker det oftest der hvor vi havde morgensamling?

K: Nej. Det er meget forskelligt altså.

I: Okay.

K: Nej, det kan også være i hallen. Det kan også være i spisestuen. Det kan også være ude omkring ikke og det er mange... altså det det... **fællesskabet fylder jo meget**

***(English translation: "... Community takes up and fills a lot (...))***

Ikke altså... og man kan sige, det er jo de aktiviteter, men dér hvor, hvor lærerne egentlig måske nogle gange spiller den væsentligste rolle. Det er jo der hvor der hvor der ikke er en aktivitet eller hvor der er masser af aktiviteter som nogle elever styrer og så læreren egentlig bare være til stede i dagligstuen og snakke med eleverne ikke.

Altså igen der hvor der ikke er en eller anden dagsorden eller sådan noget. Men det kan også være noget omkring at spille sammen med, altså man mødes en aften med elevrådet og planlægger eller giver dem gode råd eller sparring ikke... eller med festudvalget, så har vi hus møder engang om ugen ikke, hvor man, hvor man mødes i husene og så er der lækker mad ikke, så taler man jo om... de skal selv stå for husene, rengøring og så videre, men det kan også være ved at tale om huset, altså... ja skal der ske nogle flere arrangementer, der sker for meget eller skal vi... ja alle de der ting og så er det meget sådan et praktisk fællesskab. **Altså vi tænker, det er jo meget som en familie egentlig.**

***(English translation: It is a lot like a family (...))***

Altså vi gør rent 2 gange om ugen ikke. Så har vi sat en hel time af til rengøringen, hjemme i huset og på værelserne eller også nogle fællesområder. Vi har tjanser hver dag, hvor man enten gør rent hver dag eller tager opvasken. **Så det vil sige det der med højskole altså, det er jo først og fremmest et spørgsmål om at man bor sammen. Det er simpelthen helt almindelige daglige levefællesskab,**

***(English translation: So a folk high school is first and foremost a question of living together. It is basically a total normal everyday community...")***

Så når i bygger et køkken, så skal der være et stort nok køkken til at eleverne kan være med derude. Det kan være, vi har lavet påskefrokost der ude blandt andet ikke. Hvor vi bruger hele formiddagen på at forberedende sammen ikke? Og så hyrer vi en danselærer ind udefra, og så skal vi over at øve noget dans ikke. Så vi får nogle moves vi kan bruge fredag til festen og så slutter det med alle personale og elever de spiser påskefrokost sammen der, jamen og så går på påskeferie der ikke. Så det er sådan helt nede i det meget konkrete med at få bagt nogle fastelavnsboller eller lavet nogle... noget karrysild ikke? Til at der kan være et foredrag, eller andet sådan en koncert, eller noget ekstraordinært.

I: Der er ikke et sted her på højskolen der kan kaldes hjertet af bygningen, eller?

K: Ej, det er meget svært på den måde, den her er bygget på.

I: Ja, den er lidt svær her. Vi har siddet og analyseret forskellige højskoler, og der har vi prøvet sådan at finde der hvor er det hjertet det ligger? Altså hvor er det her samlingspunkt det er, men jeg kan forstå på dig at det er mange steder.

K: Ja, men det kan vi godt savne. Det er en god ide at bygge det, noget i ligesom tænker det er fællesområdet og det er svært at sige, hvad det skal være. Der er meget arkitektur i det der, altså naboskolen Rønde heroppe. Altså der er en stor dejlig skøn dagligstue, der ligger i kælderplan, men det kan nogle gange være svært at bruge, hvis de ikke der er så mange elever i perioder fordi det sådan lidt er en dead end, det vil sige, hvis man kommer ned og skal se om der er nogen der nede og så sidder der med Birger derovre som man ikke lige er bedste kammerater med, så kan der godt være lidt lang vej tilbage. Det er bedre med nogle områder hvor man bare tilfældigvis kan komme forbi og så kan man lige finde ud af om der sker noget ikke. Så åbne områder man lige kan passere. Aalborg sports højskole havde bygget en hal ind, hvor det sådan ligger på gaden, gangen der, den lange transport gang og det er supersmart det der med at man alligevel bare lige kommer forbi og så kan man se hov der er nogen der spiller volley ikke og så er der lavet noget hvor man, så kan man sætte sig og kigge på det. Det er noget naturligt liv, der er det her ikke eller man kan bare gå videre, i stedet for alting, ligesom foregår i lukkede bygninger, hvor man ikke rigtig kan se, hvad der foregår. Og spisesalen i centrum og så vis noget på hjertet, så er det jeg vil sige ja.

I: Det er også godt, at maden med som det centrale. Hvor meget tid bruger eleverne på deres værelser? Hvad sker der efter undervisningen er slut?

K: Jamen altså. Det er meget. Det er jo selvfølgelig meget individuelt. Det er klart altså. Der sker rigtig mange ting hele tiden. Vi kan godt synes, at der sker mange ting. Det gør der også. Men det er klart, at hvis der sker en eller anden ting, der samler 15. Elever, så kan vi jo godt synes det er mega fedt, men så er der jo stadigvæk 55 elever

der så ikke lige er med der. Så det er faktisk svært lige helt at sige.

I: Okay.

K: Og det er klart de er meget mere på værelserne nu, end da der var sommer. Nu er man ikke ude på græsset hele tiden?

I: Måske også på grund af Corona.

K: Ja det kan man sige, ja. Men de har jo daglig stuer i alle boligerne. Og det er en rigtig rigtig god ting. Det der med at man godt kan gå ned i sit hus og lige få ro og fred, uden at gå ind på værelset. Det er godt at have de der små dagligstuer.

E: Forskellige størrelser af fællesskab.

K: Ja lige præcis.

I: Ja, det skulle jeg faktisk også til at spørge om hvad? Men det har i.

K: I skal huske på, at det altså, det er jo det der med når man bor her. Det er anderledes end gymnasium, ikke hvor man godt kan klare 8 til 16 og gå ind og være super og social aktiv ikke? Altså det er dagligdag vi ikke kan blive supersociale de første 14 dage og så går gassen simpelthen helt naturligt af ballonen, man kan ikke holde til det og så skal man finde et eller andet leje på en god måde derefter. Men det er også noget af det fede ved højskolen altså man kan ikke have en maske her, det er simpelthen umuligt. Det er virkeligt noget der revolutionerer for nogen elever, de er kørt igennem hele skolesystemet, med en eller anden maske på og så er de gået hjem fuldstændigt blæst. Og så kommer de her og så går der 14 dage og så kan man ikke længere være skjult og så sker der pludselig noget og man finder ud af at der er andre der har det ligesom mig.

I: Jeg tror du er kommet ind på det, men spørg alligevel bare lige for at være sikker, om der er bestemte funktioner i vægter mest på jeres højskole?... Ja den er lidt svær.

K: Nu har vi jo ikke bygget noget i lang tid, fordi der har været så stille. Men hvis vi skulle bygge noget, så ville jeg rigtig gerne have noget mere kreativt. Og vi kan se, det er jo det der efterspørgsel på altså keramik, hitter helt vildt, musik hitter rigtig meget. Altså nu taler vi landsplan, altså hvad de efterspørger altså friluftsliv, musik og keramik. Det er sådan de kodeord. Det er det de fleste søger på. Og så kan man selvfølgelig sige, skal man så gøre det, så risikere man jo at gøre det alle andre højskoler også gør.

Men altså i skal også prøve at undersøge, hvad lokalområdet kan på samsø, om i skal bygge det hele eller hvad der er, hvad i kan gøre sammen med lokalområdet. Vi er faktisk på grund af at keramik er så populært begyndt at samarbejde med en lokal keramiker, hvor vi tager der ud og laver et samarbejde.

I: Vi har lige her til sidst, et mere diskuterende spørgsmål. Ser du at i har nogle udfordringer her, på jeres højskole? Som vi måske kan forholde os til, når vi designer?

K: Altså jeg tror det med fleksibilitet når man skal til at bygge er væsentligt. Netop fordi når man skal bygge skal det være levedygtigt i rigtig mange år. Altså fordi man kan se med tiden hvordan de forskellige typer af højskoler hitter. Så der skal være en form for fleksibilitet ind i det. Hvordan man så end gør det.

I: Er det også fint det her med, at det er flere bygninger? Eller vil det være bedre at have det hele samlet?

K: Ja det her det er jo spredt, og jeg kan egentlig godt lide det. Det ligger også naturligt, vi er en fri lufts højskole, det gør jo at man skal ud. Men det er klart, det er ikke altid så nemt en regnvejrsaften og det er helt mørkt og man kan ikke komme ud og se hvor der er noget der sker. Jeg ville bygge mere samlet end det her, men jeg vil bygge bo husene mere adskilte, det giver dem deres egen idenentitet. Men så skal jeg jo også tænke bæredygtigt og der vil man formentligt sige at det at bygge det sammen er mest bæredygtigt. Altså i forhold til varmetab men også materialer. Det er jo klart man har mange ydervægge når det hele er delt op. Der er ligesom måder man bygger gymnasium på i dag og måder man ligesom bygger skoler på og der er det okay at højskoler ser lidt anderledes ud tænker jeg. Det kan også hur-

tigt blive sådan en institution følelse eller look, hvor det er okay, det er anderledes.

S: Ja, men skal vel fokusere meget mere på hjemligheden, at man, når du siger sådan et område så som spisesalen er et møde område, at det er ligesom et hjem, det er der man mødes omkring spisebordet.

K: Ja, lige præcis ja.

I: Vi har ikke flere spørgsmål nu

K: Det er super, skal vi så ikke gå rundt og kigge lidt nu så?

# APPENDIX - 04 NOTES FROM AN INFORMAL CONVERSATION WITH STUDENTS AT KALØ HØJSKOLE

En samtale med 4 elever fra Højskolen på Kalø:

Person 1: 21 år (Begyndt universitetsuddannelse, men droppet ud)

Person 2: 22 år (4. Sabbatår)

Person 3: 24 år (Færdiggjort bachelor)

Person 4: 61 år (Elev)

Info: Alle har valgt at være på højskole i et halvt år.

Hvorfor højskole?

Person 1 var i tvivl om valg af studie og ønskede at prøve noget nyt.

Person 2 havde en stor interesse for selvforsyning og bæredygtighed og lære om permakultur. Hun ønskede også at prøve noget nyt og nye fællesskaber.

Person 2 var frustreret over voksenlivet og manglede afbræk

Prøve højskole af og få en anden hverdag. Man lever dag til dag og man bliver tætte med alle.

Gro linjen kan tage en med videre. **Man skal ikke bekymre sig for meget ift. At blive voksen. Man kan bare koncentrere sig om at være sig selv.**

***(English translation: "You don't have to worry too much about growing up. You can just focus on being yourself.")***

Den ældre mand på 61 år (person 4), valgte højskole fordi han holder af naturen. Han bor hjemme, men kommer her til dagligt. Han ønsker at bruge den viden, han får fra højskolen til sig selv. Eventuelt, lave kursuser til andre som er interesseret.

Har i valgt højskole grundet undervisningen eller det sociale?

Valget har ligget i at få et afbræk og mere pga. Det sociale.

Sociale arrangementer:

Mange elever arrangerer sociale arrangementer selv.

Først var det lærernes initiativ ift. Det sociale.

Hver aften sker der noget.

Man har muligheden for at lave masser af ting. Nogle lærer af andre. Eksempelvis at strikke.

Outdoor Ranger-linjen er der, hvor de fleste er med. Man får lov til at prøve noget af som man overhovedet ikke er vant til.

De synes det er hyggeligt på deres egne "huse". Både store og små fællesskaber. En gang om ugen mødes alle. Der er rigtig mange små fællesskaber.

Der er også små klubber man kan være en del af.

Holdene som de er tilknyttet til, er en mix af de forskellige fag.

Dem man deler "hus" med, er dem man er knyttet til. Det er vigtigt at ens roomie er på samme alder.

De internationale er både værelseskammerater og er kommet for at lære dansk.

Outdoor-linjen tiltrækker mange ældre og mænd.

Godt med en diversitet til fællesskab så man kan dele om livserfaringer.

Person 2 har været på flere højskoler. Hun har været på Nordjyllands idrætshøjskole Brønderslev og en rejse højskole. Hun synes Kalø fungerer bedre, fordi der er færre elever. Man når hurtigt at kende hinanden modsat til idrætshøjskolen hvor det hele var i en bygning og man savnede de mindre fællesskaber.

Fordel at der er natur.

Lærerne er en del af det sociale arrangement. De betragter lærerne som deres venner. De er tit med til boldspil.

Lærerne har aftenvagt ind til kl. 21.

Ophold på værelserne sker oftest omkring 22-23 og derefter snakker man videre med sin roomie.

**Man bruger ikke særligt meget tid ind i værelserne, men mere i de mindre fællesskaber. Det kommer selvfølgelig an på, hvem man er.**

***(English translation: "You don't use that much time in the rooms, but time is spend in the smaller communities. But that all depends on who you are as a person")***

Der er både dobbeltværelser og eneværelser, hvor begge dele foretrækker alt efter man er. Person 2 foretrækker eneværelser, hvor hun har mulighed for alenetid.

Det helt lille fællesskab er med sin roomie.

Det er også rart at man er tvunget til at komme ud.

Hvor samler i mest?

Akustik er meget vigtigt i samlingsrummet

Lukket fællesskab er godt

Det er i elevhusene hvor fællesskabet er størst.

I biblioteket sker der aften-arrangementer.

Godt at man har muligheden for at lukke døren for fællesskaber.

Der er frie tøjler her på Kalø, så længe folk mødes til undervisningen.
**Hvordan opleves undervisningen?**

Der er mere praktisk arbejde end almen undervisning.

De ser film når det regner, når man ikke kan komme ud.

Man får lidt teori, og derefter kører man praktisk i gang.

I starten føltes det, at det var svært at gå rigtigt i gang, fordi der ikke var et skel mellem undervisning og hygge. Efter en ny vikar, er der blevet mere handlekraft. Det er fedt at man kan lære mere.

Gro-linjen er stadig noget nyt og det er stadig en proces. Derfor får lov til at lave noget fra bunden, hvilket de tænker er meget fedt.

Kreative rum er mere nødvendigt for dem som har lyst til at male osv. Lige nu sker det i de enkelte værelser. Her vil en workshop være en fordel.

Keramik kunne være meget hyggeligt og et rum at male. Et lukket rum til kreativitet kunne være fint.

Ift. Gro linjen, er det godt med et drivhus, plads til vækst lamper, Permahave og forskellige træer.

De skal være med til fair festival, hvor de kan være med til at dele deres viden om permakultur.

De hiver også folk udefra til at undervise engang i mellem.

Temadage kunne være fedt, hvor man kan få lavet keramik fra lokale mennesker.

Aftenskoler kunne også være godt at implementere.

# APPENDIX 05 - ACOUSTICAL CALCULATIONS

$$T = \frac{0,16 \cdot V}{(Sa \cdot s) + (Sn \cdot A) + (4 \cdot m \cdot V)}$$

T = Reverberation time [s]

α = Absorptions coefficient

S = Surface area [$m^2$]

n = number of persons or furnitures

A = The rooms equivalent absorption area [$m^2$]

m = Attenuation coefficient for sounds absorption in air [$m^{-1}$]

V = Room volume [$m^3$]

The reverberation time for the dining room and one of the student housings is calculated. Several analyses have been made with Sabine's formula with different absorptions coefficients (Larsen 2019). The final calculations are presented underneath.

## Dinning room - Wood floor and timber slat claded ceiling

| Absorptions area | Materials | Areal | 125 Hz | | 250 Hz | | 500Hz | | 1000Hz | | 2000Hz | | 4000 Hz | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | [m²] | a | Sa | a | Sa | a | Sa | a | Sa | a | Sa | a | Sa |
| Floor | Wood | 180,00 | 0,15 | 27 | 0,11 | 19,8 | 0,1 | 18 | 0,07 | 12,6 | 0,06 | 10,8 | 0,07 | 12,6 |
| Ceiling | Timber slath | 180,00 | 0,47 | 84,6 | 0,9 | 162 | 1,1 | 198 | 1,03 | 185,4 | 1,05 | 189 | 1,03 | 185,4 |
| Window and doors | Glass (large pane) | 51,00 | 0,18 | 9,18 | 0,06 | 3,06 | 0,04 | 2,04 | 0,03 | 1,53 | 0,02 | 1,02 | 0,02 | 1,02 |
| Walls | Clay plaster | 177,00 | 0,14 | 24,78 | 0,1 | 17,7 | 0,06 | 10,62 | 0,05 | 8,85 | 0,04 | 7,08 | 0,04 | 7,08 |

| Absorption from persons & furnitures | | Quantity | a | Sn | a | Sn | a | Sn | a | Sn | a | Sn | a | Sn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Persons | Adult students | 80,00 | 0,22 | 17,6 | 0,3 | 24 | 0,38 | 30,4 | 0,42 | 33,6 | 0,45 | 36 | 0,45 | 36 |
| Chairs | Wood chairs | 80,00 | 0,01 | 0,8 | 0,01 | 0,8 | 0,01 | 0,8 | 0,02 | 1,6 | 0,04 | 3,2 | 0,05 | 4 |
| Tables | Benches | 16,00 | 0,5 | 8 | 0,56 | 8,96 | 0,66 | 10,56 | 0,76 | 12,16 | 0,78 | 12,48 | 0,76 | 12,16 |

| Absorption in air | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| v/ 50% RF | Relative air humidity 50% | Volume | 125 Hz | | 250 Hz | | 500Hz | | 1000Hz | | 2000Hz | | 4000 Hz | |
| | | [m³] | m | mV | m | mV | 4mV per 1000m3 | 4mV | 4mV per 1000m3 | 4mV | 4mV per 1000m3 | 4mV | 4mV per 1000m3 | 4mV |
| | | 900,00 | | | | | 1,6 | 1,44 | 4 | 3,6 | 9,6 | 8,64 | 24,4000 | 21,96 |
| Total absorption | | | | 154,36 | | 212,32 | | 241,46 | | 225,74 | | 232,22 | | 244,22 |
| Reveberation time | T=(0,16*V)/((Sa*s)+(Sn*A)+(4*m*V)) | | | 0,93 | | 0,68 | | 0,60 | | 0,64 | | 0,62 | | 0,59 |

## Student housing - Wood floor

| Absorptions area | Materials | Area | 125 Hz | | 250 Hz | | 500Hz | | 1000Hz | | 2000Hz | | 4000 Hz | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | S [m²] | a | Sa | a | Sa | a | Sa | a | Sa | a | Sa | a | Sa |
| Floor | Wood | 39,59 | 0,15 | 5,9385 | 0,11 | 4,3549 | 0,1 | 3,959 | 0,07 | 2,7713 | 0,06 | 2,3754 | 0,07 | 2,7713 |
| Ceiling | Clay plaster | 39,59 | 0,14 | 5,5426 | 0,1 | 3,959 | 0,06 | 2,3754 | 0,05 | 1,9795 | 0,04 | 1,5836 | 1,03 | 40,7777 |
| Window and doors | Glass (large pane) | 21,00 | 0,18 | 3,78 | 0,06 | 1,26 | 0,04 | 0,84 | 0,03 | 0,63 | 0,02 | 0,42 | 0,02 | 0,42 |
| Walls | Clay plaster | 86,40 | 0,14 | 12,096 | 0,1 | 8,64 | 0,06 | 5,184 | 0,05 | 4,32 | 0,04 | 3,456 | 0,04 | 3,456 |

| Absorption from persons & furnitures | | Quantity | a | Sn | a | Sn | a | Sn | a | Sn | a | Sn | a | Sn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Persons | Adult students | 12,00 | 0,22 | 2,64 | 0,3 | 3,6 | 0,38 | 4,56 | 0,42 | 5,04 | 0,45 | 5,4 | 0,45 | 5,4 |
| Chairs | Wood chair | 12,00 | 0,01 | 0,12 | 0,01 | 0,12 | 0,01 | 0,12 | 0,02 | 0,24 | 0,04 | 0,48 | 0,05 | 0,6 |
| Tables | Benches | 12,00 | 0,5 | 6 | 0,56 | 6,72 | 0,66 | 7,92 | 0,76 | 9,12 | 0,78 | 9,36 | 0,76 | 9,12 |

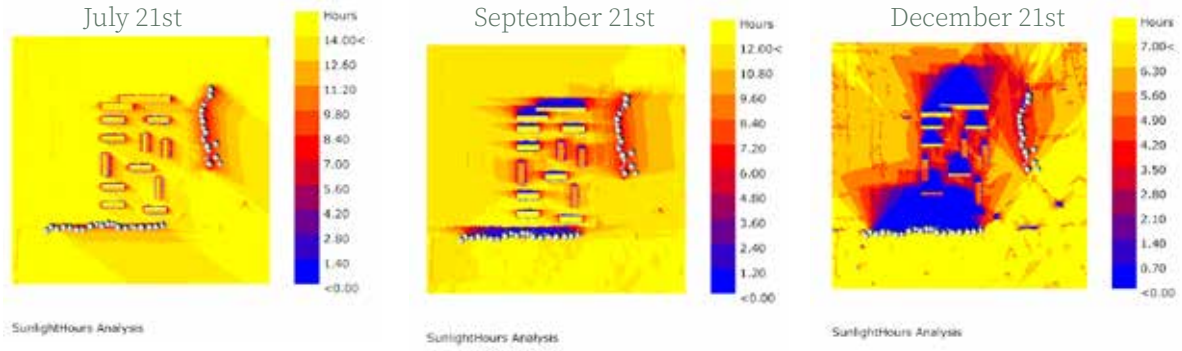
| Absorption in air | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| v/ 50% RF | Relative air humidity 50% | Volume | 125 Hz | | 250 Hz | | 500Hz | | 1000Hz | | 2000Hz | | 4000 Hz | |
| | | [m³] | m | mV | m | mV | 4mV per 1000m³ | 4mV | 4mV per 1000m³ | 4mV | 4mV per 1000m³ | 4mV | 4mV per 1000m³ | 4mV |
| | | 118,77 | | | | | 1,6 | 0,19003 | 4 | 0,4751 | 9,6 | 1,14019 | 24,4000 | 2,89799 |
| Total absorption | | | | 33,48 | | 25,05 | | 20,59 | | 19,54 | | 18,82 | | 60,04 |
| Reverberation time | T=(0,16*V)/((Sa*s)+(Sn*A)+(4*m*V)) | | | 0,57 | | 0,76 | | 0,92 | | 0,97 | | 1,01 | | 0,32 |

# APPENDIX 06 - SUN LIGHT HOURS CALCULATION

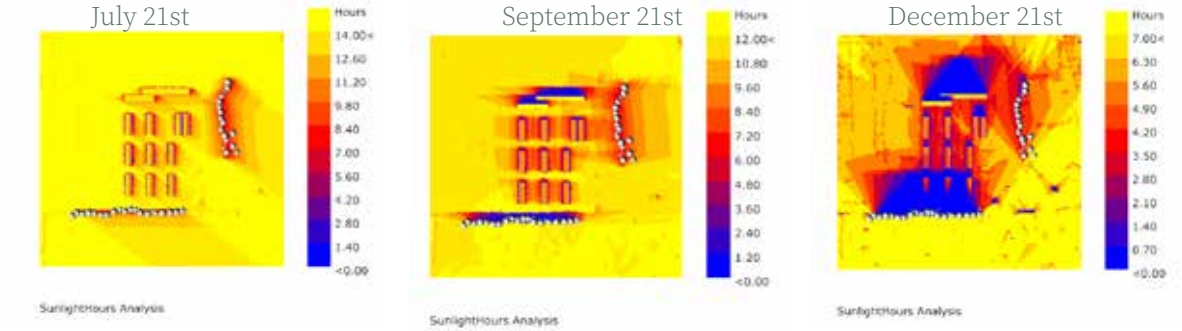
***General information about the models***

The calculations are made using Honeybee for Grasshopper to understand the degree of solar impact on and between the buildings in the master plan. Across different iterations, the configuration of the buildings and the relationship between them has been investigated.

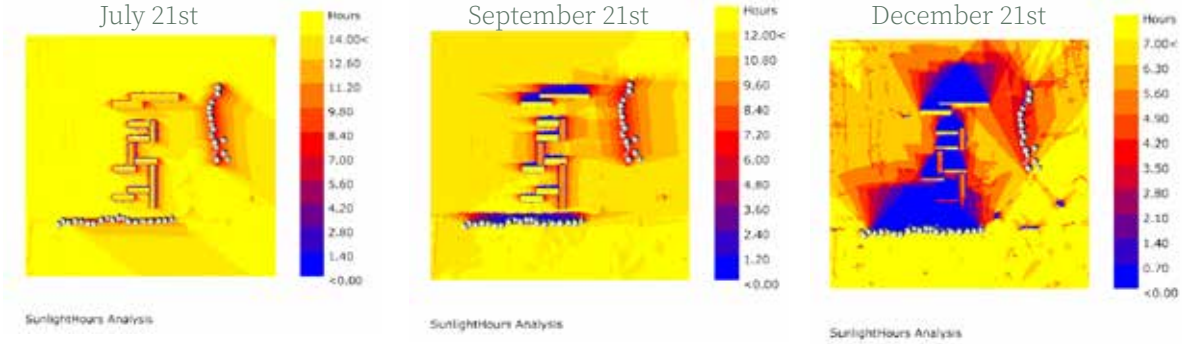
Iteration 1




Iteration 2



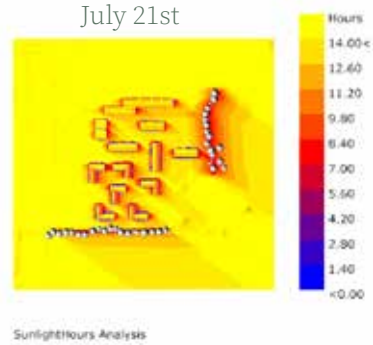

Iteration 3



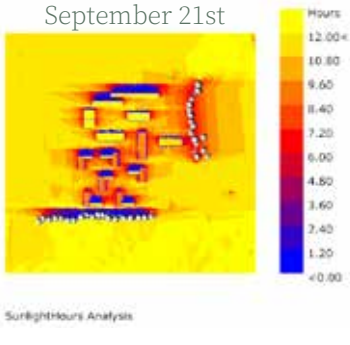

Illu. 170 Sun light hours

Iteration 4

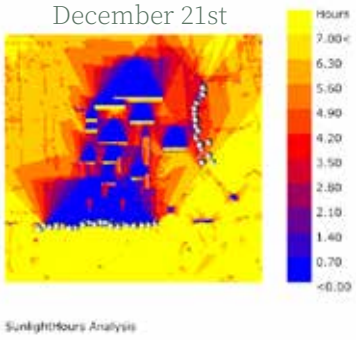
July 21st




September 21st

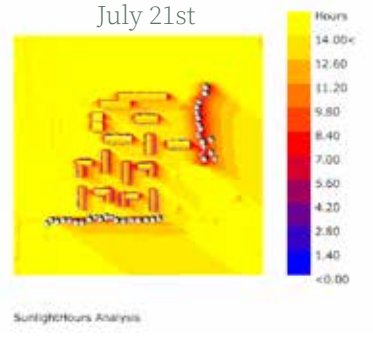



December 21st

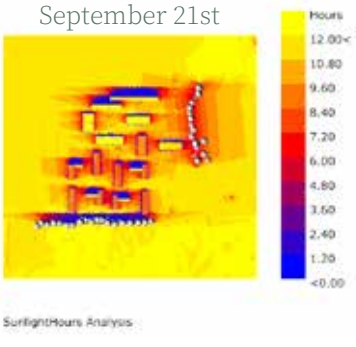



Iteration 5

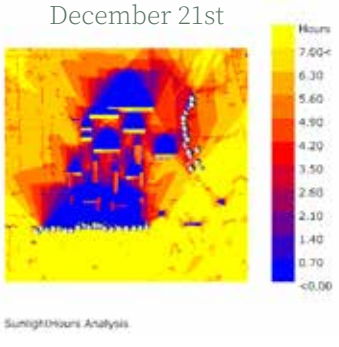
July 21st




September 21st

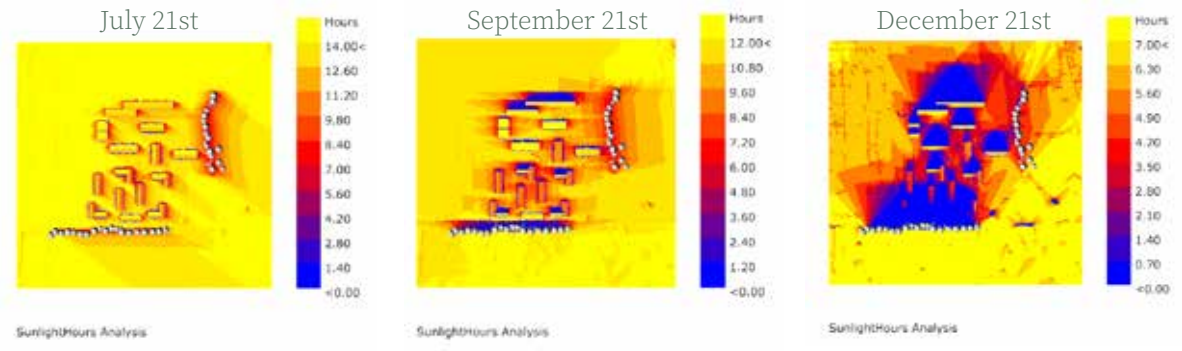



December 21st

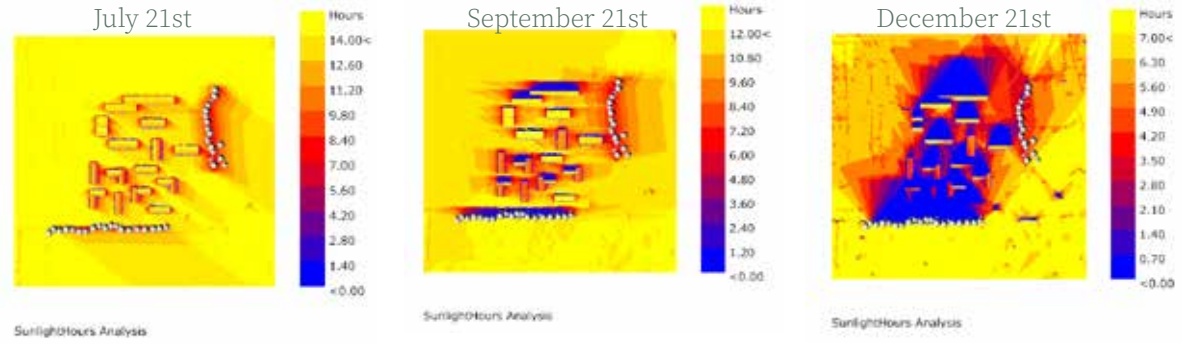



Illu. 171 Sun light hours

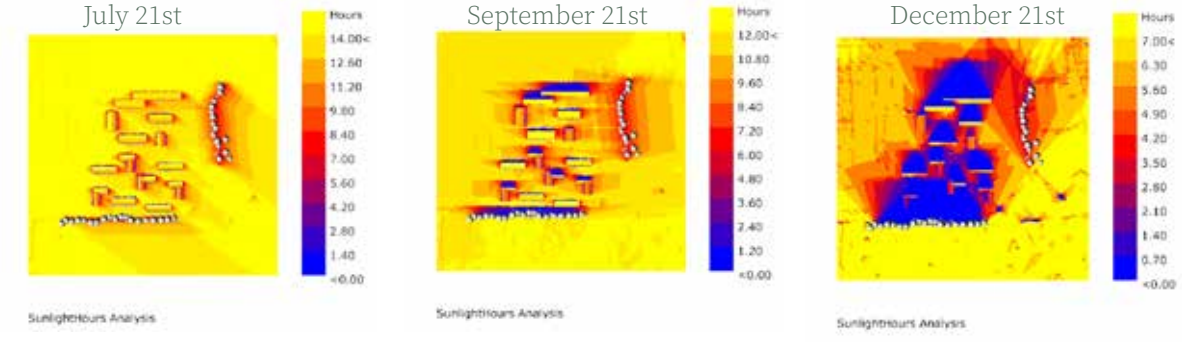
Iteration 6




Iteration 7

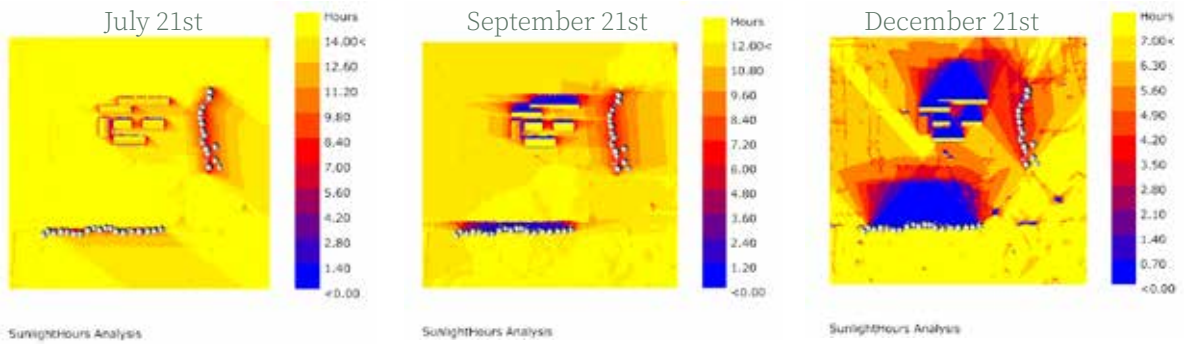



Iteration 8

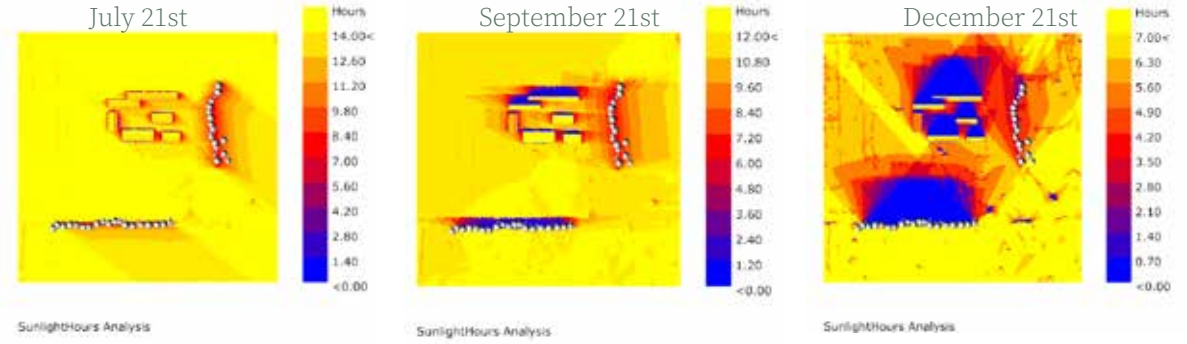



Illu. 172 Sun light hours

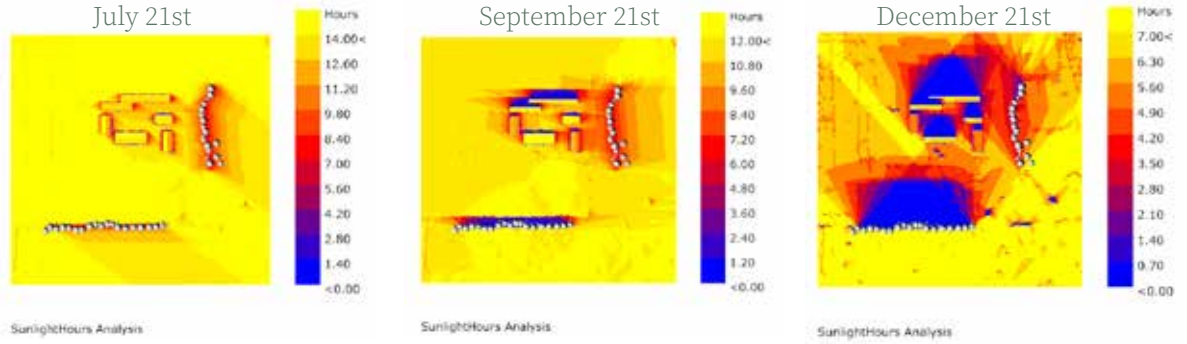
Iteration 9



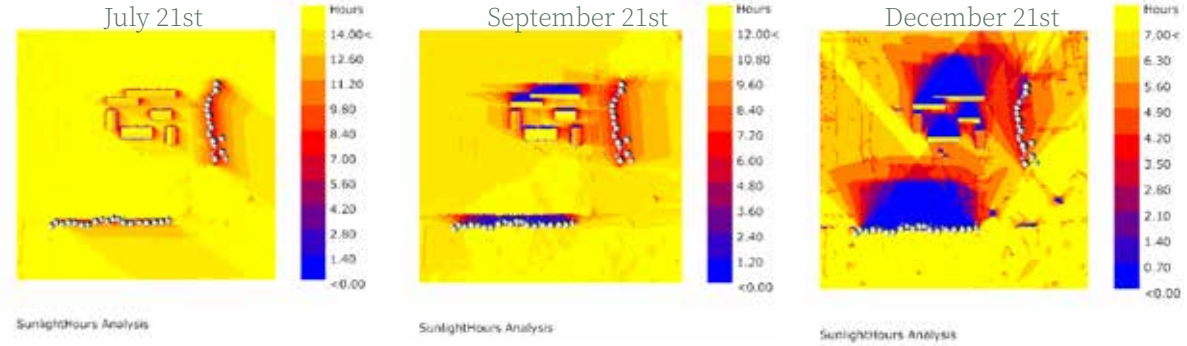

Iteration 10




Iteration 11




Iteration 12




Illu. 173 Sun light hours

# APPENDIX 07 - CALCULATION OF BASIC AIR CHANGE

Based on the primary data of the room program (Master thesis, synthesis p. 54), the basic air change for the different rooms of the school has been calculated. These results represent the lowest permittable air change, and the actual air change can deviate. Cooling with additional mechanical ventilation is needed.

| Room | Category | Quantity | Ceiling height | Area | Area total |
|---|---|---|---|---|---|
| | Level of expectation | | | | |
| | | | [m] | [m²] | [m²] |
| 1 School facilities | | | | | 616 |
| Auditorium | High | 1 | 4 | 148 | 148 |
| Classroom | High | 1 | 4,5 | 35 | 35 |
| Sprout room | Medium | 1 | 4 | 40 | 40 |
| Library | High | 1 | 4 | 70 | 70 |
| Dining hall | Medium | 1 | 5 | 250 | 250 |
| Industriual kitchen | Medium | 1 | 4 | 13 | 13 |
| Scullery | Medium | 1 | 4 | 20 | 20 |
| Niches | | | 4 | 12 | 0 |
| Depot | | | 4 | 12 | 0 |
| Technical room | | 1 | 4 | 60 | 60 |
| 2 Administration | | | | | 96 |
| Office | High | 1 | 2,5 | 40 | 40 |
| Meetingroom | High | 1 | 2,5 | 14 | 14 |
| Staffroom | Medium | 1 | 4 | 30 | 30 |
| Depot | | 1 | 4 | 12 | 12 |
| 3 Workshops | | | | | 180 |
| Wood | Medium | 1 | 4 | 40 | 40 |
| Metal | Medium | 1 | 4 | 40 | 40 |
| Creative | Medium | 1 | 4 | 40 | 40 |
| Technical room | | 1 | 4 | 60 | 60 |
| 4 Other | | | | | 120 |
| Assembly room (fest lokale) | Medium | 1 | 4 | 120 | 120 |
| 5 Student facilities | | | | | 1234,7 |
| Student room | Medium | 40 | 2,3 | 9,4 | 376 |
| Toilets | | 1 | 2,3 | 3,4 | 6,7 |
| Bath | | 6 | 4 | 5 | 30 |
| Kitchenette | Medium | 8 | 4 | 3 | 24 |
| Living room | High | 1 | 2,3 | 46 | 46 |
| Technical room | | 8 | 4 | 20 | 160 |
| Laundry, dry room | | 8 | 4 | 50 | 400 |
| Cleaning equipment room | | 8 | 4 | 12 | 96 |
| Depot | | 8 | 4 | 12 | 96 |
| 6 Teacher facilites | | | | | 200 |
| Familiy House | Medium | 1 | 4 | 90 | 90 |
| Familiy House | Medium | 1 | 4 | 110 | 110 |

Illu. 174 Ventilation calculation

| $CO^2$ | Activity seated | Activity standing | $CO^2$ l/h per person seated | $CO^2$ l/h per person standing | $CO^2$ l/h for room | Air quality in rooms with 20% dissatisfaction | Outside air quality | Air flow | Airflow | Air change | Max airchange |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | (met) | (met) | (l/h) | (l/h) | (l/h) | (ppm) | (ppm) | ($m^3/h$) | (l/s) | ($h^{-1}$) | ($h^{-1}$) |
| Auditorium | 1,2 | 1,6 | 10,8 | 27,2 | 972 | 1010 | 350 | 962,38 | 267,33 | 1,63 | 4,90 |
| Classroom | 1,2 | 1,6 | 10,8 | 27,2 | 129,6 | 1010 | 350 | 128,32 | 35,64 | 0,81 | 2,73 |
| Sprout room | 1,2 | 1,6 | 10,8 | 27,2 | 324 | 1010 | 350 | 320,79 | 89,11 | 2,00 | 5,88 |
| Library | 1,2 | 1,6 | 10,8 | 27,2 | 324 | 1010 | 350 | 320,79 | 89,11 | 1,15 | 3,66 |
| Dining hall | 1,2 | 1,6 | 10,8 | 27,2 | 1080 | 1010 | 350 | 1069,31 | 297,03 | 1,11 | 3,81 |
| Industriual kitchen | 1,2 | 1,6 | 10,8 | 27,2 | 162 | 1010 | 350 | 160,40 | 44,55 | 3,08 | 8,68 |
| Scullery | 1,2 | 1,6 | 10,8 | 27,2 | 0 | 1010 | 350 | 0,00 | 0,00 | 0,00 | 0,69 |
| Niches | 1,2 | 1,6 | 10,8 | 27,2 | 21,6 | 1010 | 350 | 21,39 | 5,94 | 0,45 | 1,85 |
| Depot | 1,2 | 1,6 | 10,8 | 27,2 | 0 | 1010 | 350 | 0,00 | 0,00 | 0,00 | 0,69 |
| Technical room | 1,2 | 1,6 | 10,8 | 27,2 | 0 | 1010 | 350 | 0,00 | 0,00 | 0,00 | 0,69 |
| | | | | | | | | | | | |
| Office | 1,2 | 1,6 | 10,8 | 27,2 | 43,2 | 1010 | 350 | 42,77 | 11,88 | 0,43 | 2,22 |
| Meetingroom | 1,2 | 1,6 | 10,8 | 27,2 | 86,4 | 1010 | 350 | 85,54 | 23,76 | 2,44 | 7,44 |
| Staffroom | 1,2 | 1,6 | 10,8 | 27,2 | 86,4 | 1010 | 350 | 85,54 | 23,76 | 0,71 | 2,54 |
| Depot | 1,2 | 1,6 | 10,8 | 27,2 | 0 | 1010 | 350 | 0,00 | 0,00 | 0,00 | 0,69 |
| | | | | | | | | | | | |
| Wood | 1,2 | 1,6 | 10,8 | 27,2 | 216 | 1010 | 350 | 213,86 | 59,41 | 1,34 | 4,15 |
| Metal | 1,2 | 1,6 | 10,8 | 27,2 | 216 | 1010 | 350 | 213,86 | 59,41 | 1,34 | 4,15 |
| Creative | 1,2 | 1,6 | 10,8 | 27,2 | 216 | 1010 | 350 | 213,86 | 59,41 | 1,34 | 4,15 |
| Technical room | 1,2 | 1,6 | 10,8 | 27,2 | 0 | 1010 | 350 | 0,00 | 0,00 | 0,00 | 0,69 |
| | | | | | | | | | | | |
| Assembly room (fest lokale) | 1,2 | 1,6 | 10,8 | 27,2 | 540 | 1010 | 350 | 534,65 | 148,51 | 1,11 | 3,58 |
| | | | | | | | | | | | |
| Student room | 1,2 | 1,6 | 10,8 | 27,2 | 21,6 | 1010 | 350 | 21,39 | 5,94 | 0,99 | 3,77 |
| Toilets | 1,2 | 1,6 | 10,8 | 27,2 | 10,8 | 1010 | 350 | 10,69 | 2,97 | 1,37 | 4,75 |
| Bath | 1,2 | 1,6 | 10,8 | 27,2 | 10,8 | 1010 | 350 | 10,69 | 2,97 | 0,53 | 2,08 |
| Kitchenette | 1,2 | 1,6 | 10,8 | 27,2 | 0 | 1010 | 350 | 0,00 | 0,00 | 0,00 | 0,69 |
| Living room | 1,2 | 1,6 | 10,8 | 27,2 | 64,8 | 1010 | 350 | 64,16 | 17,82 | 0,61 | 2,77 |
| Technical room | 1,2 | 1,6 | 10,8 | 27,2 | 0 | 1010 | 350 | 0,00 | 0,00 | 0,00 | 0,69 |
| Laundry, dry room | 1,2 | 1,6 | 10,8 | 27,2 | 0 | 1010 | 350 | 0,00 | 0,00 | 0,00 | 0,69 |
| Cleaning equipment room | 1,2 | 1,6 | 10,8 | 27,2 | 0 | 1010 | 350 | 0,00 | 0,00 | 0,00 | 0,69 |
| Depot | 1,2 | 1,6 | 10,8 | 27,2 | 0 | 1010 | 350 | 0,00 | 0,00 | 0,00 | 0,69 |
| | | | | | | | | | | | |
| Familiy House | 1,2 | 1,6 | 10,8 | 27,2 | 43,2 | 1010 | 350 | 42,77 | 11,88 | 0,12 | 1,00 |
| Familiy House | 1,2 | 1,6 | 10,8 | 27,2 | 43,2 | 1010 | 350 | 42,77 | 11,88 | 0,10 | 0,94 |

Illu. 175 Ventilation calculation

# APPENDIX 08- SHORT-CUT CALCULATION OF CONSTRUCTION ELEMENTS

The constructions of the folk high school are defined by standard elements with standard dimensions (Hjallerup træ og spærfabrik A/S 2022, Annebergs Limtræ A/S 2022).

Roof beams // Dining hall

| | | |
|---|---|---|
| Spændvidde (A): | 8 | m |
| Bjælkeafs. (C): | 2 | m |
| Total længde: | 8 | m |
| Taghældning: | 50 | grader |

90 x 533 | 8 | 191,88

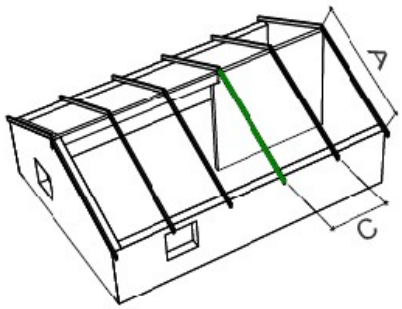
115 x 500 | 8 | 230

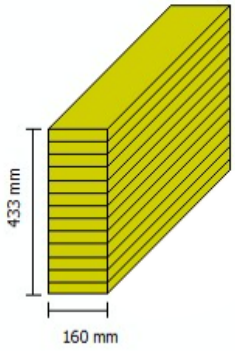
140 x 466 | 8 | 260,96

160 x 433 | 8 | 277,12

185 x 433 | 8 | 320,42

5: Tagbjælkespær




Floor konstruction // Student Housing

| | | |
|---|---|---|
| Spændvidde (A): | 3,7 | m |
| Lastbredde (B): | 1 | m |
| Total længde: | 7,4 | m |

65 x 200 | 6 | 39

90 x 166 | 6 | 44,82

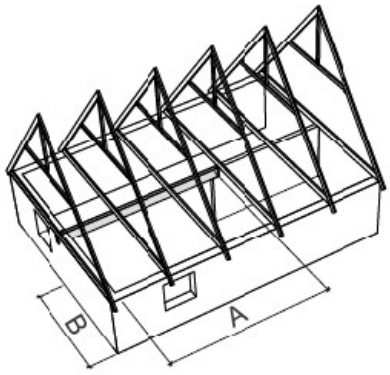
115 x 166 | 6 | 57,27

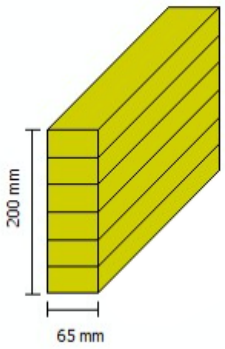
140 x 166 | 6 | 69,72

160 x 133 | 6 | 63,84

185 x 133 | 6 | 73,81

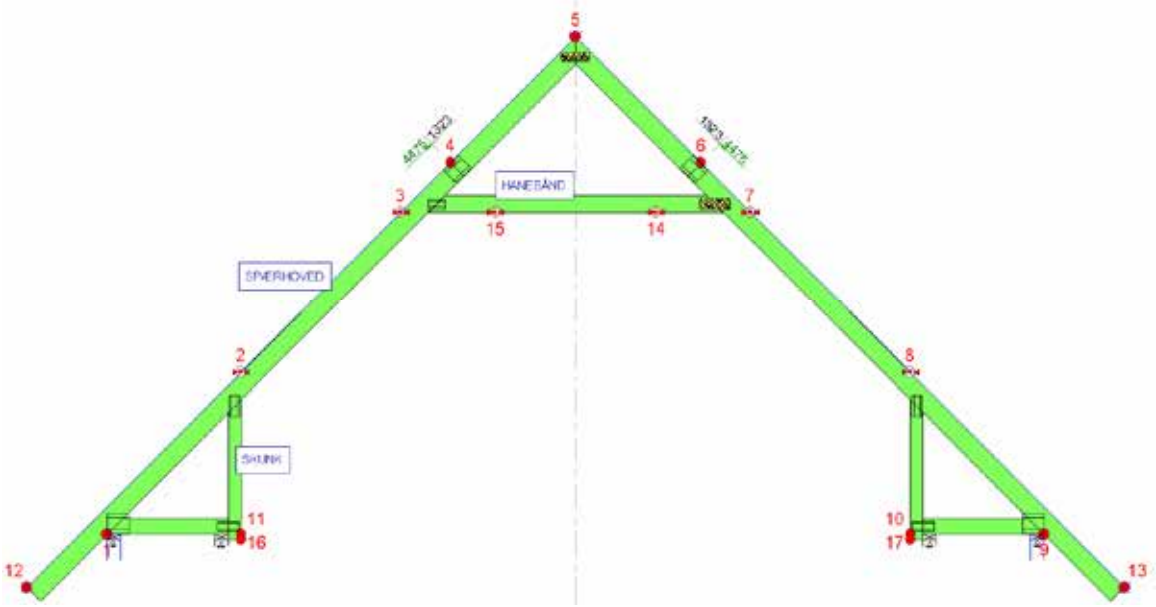
7: Gulvbjælke til etagedæk




Illu. 176 Gluelam dimensions

Roof rafters // Student housings



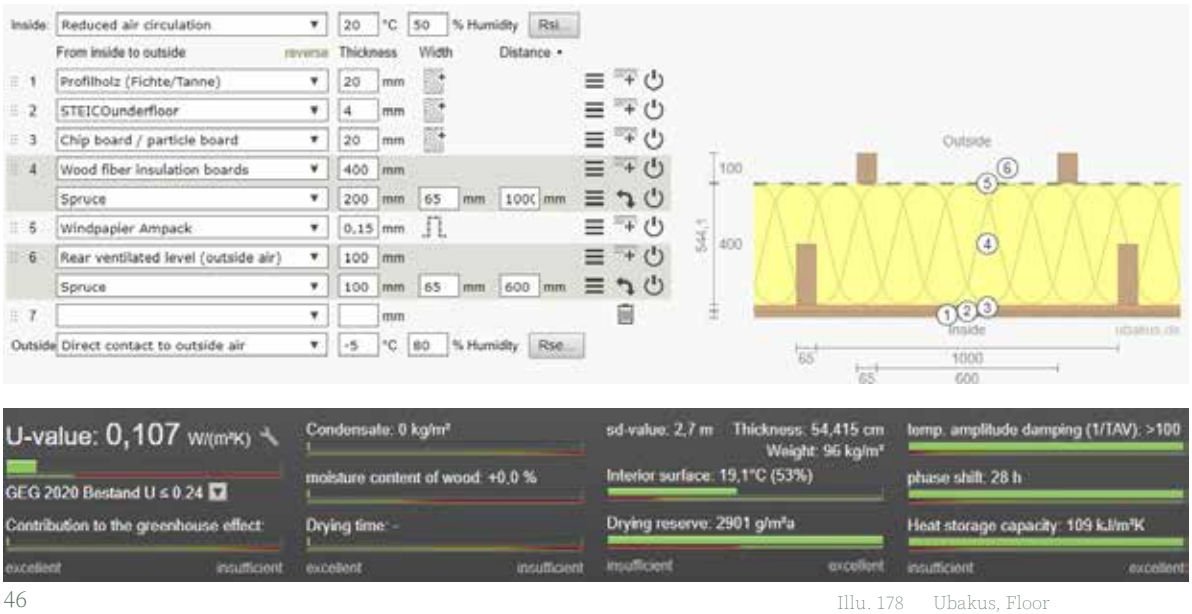

Dimentions: 95mm x 140mm

Illu. 177 Construction principle

# APPENDIX 09 - UBAKUS

To determine the characteristics of the building elements, including the most important U-value, the elements have been modelled in Ubakus. Combined with the generic data of the Ecococon elements and the LCA analyses, the following configurations of building elements have been established.

Floor construction

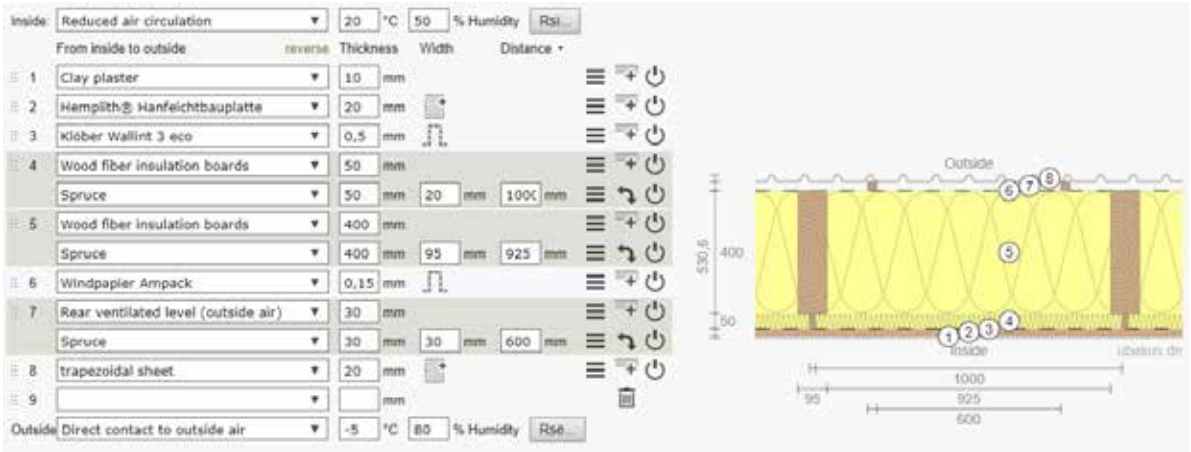



Illu. 178 Ubakus, Floor

## Wall construction


Illu. 179 Ubakus, Wall

## Roof construction



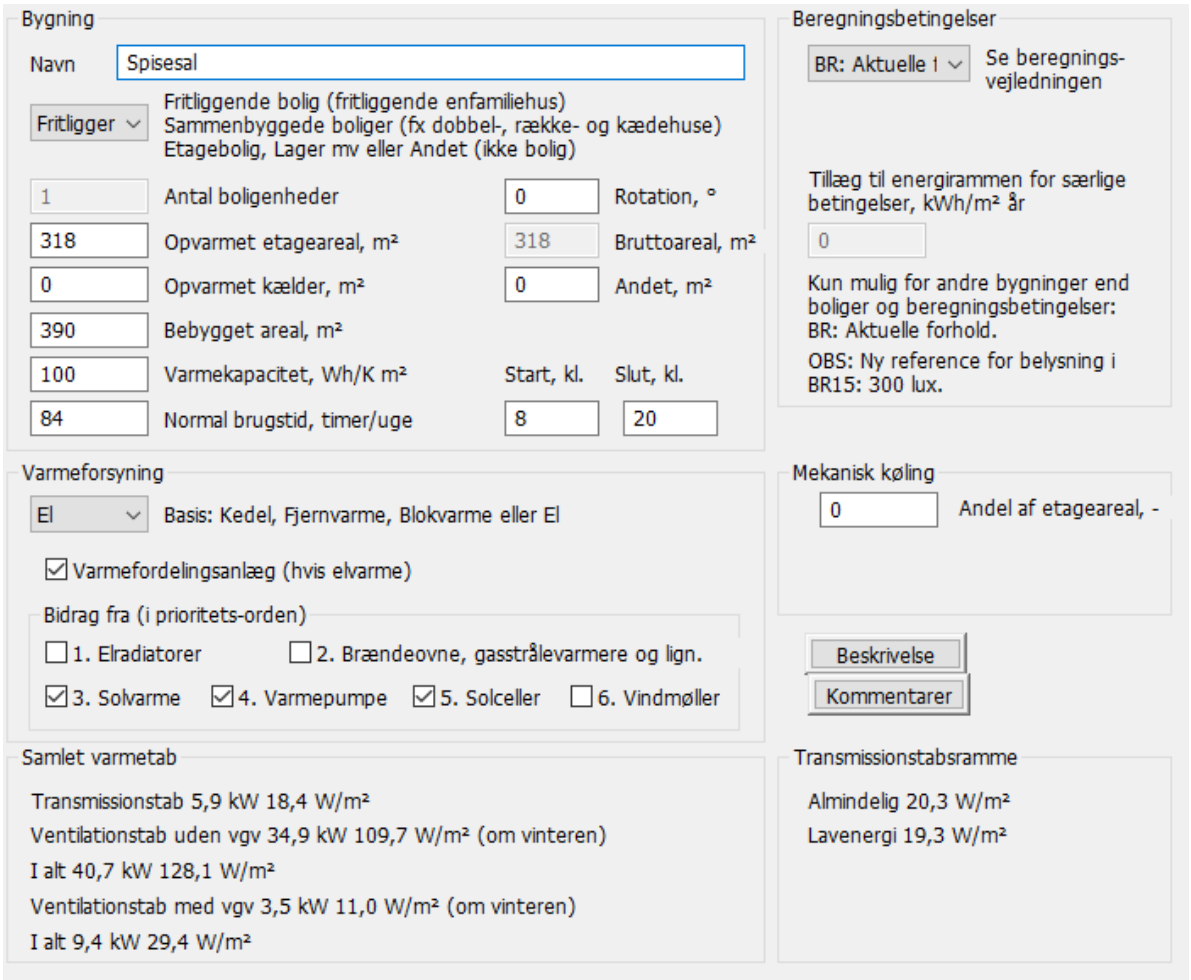

Illu. 180 Ubakus, Roof

# APPENDIX 10 - BE18 CALCULATIONS - DINING HALL

To calculate the energy frame and attempt to reach zero-energy, the folk high school has been modelled in BE18. As the school is divided into many different buildings, the energy frame calculation is made of individual buildings. To simplify, two buildings of different characteristics have been investigated. The first example of the dining hall will be described in detail, and the student housing in lesser detail, following the same logic and approach.

The building

The floor area of the building is 318 $m^2$; though the construction is mainly wooden, the heat capacity is high because of the compact straw wall elements. The supply of heating, DHW, and electrical power are dependent on local renewable sources, utilising the large roof faces.




Illu. 181 BE18 The building

The building envelope
The u-values of the elements of the building envelope have been developed using Ubakus (Appendix 09).

| | Ydervægge, tage og gulve | Areal (m²) | U (W/m²K) | b | Ht (W/K) | Dim.Inde (C | Dim.Ude (C | Tab (W) |
|---|---|---|---|---|---|---|---|---|
| | | 980,5 | | CtrlClick | 98,05 | | | 3137,6 |
| 1 | Gavl mod vest | 43,8 | 0,1 | 1,00 | 4,38 | 20 | -12 | 140,16 |
| 2 | Gavl mod øst | 33,3 | 0,1 | 1,00 | 3,33 | 20 | -12 | 106,56 |
| 3 | Syd facade | 48,9 | 0,1 | 1,00 | 4,89 | 20 | -12 | 156,48 |
| 4 | Nord facade | 40,5 | 0,1 | 1,00 | 4,05 | 20 | -12 | 129,6 |
| 5 | Gulv | 322 | 0,1 | 1,00 | 32,2 | 20 | -12 | 1030,4 |
| 6 | Tagflade | 492 | 0,1 | 1,00 | 49,2 | 20 | -12 | 1574,4 |

Illu. 182 BE18 The building envelope

Line loss at joints
Line loss has been calculated according to standards defined in the BE18 programme.

| | Fundamenter og samlinger ved vinduer | l (m) | Tab (W/mK) | b | Ht (W/K) | Dim.Inde | Dim.Ude | Tab (W) |
|---|---|---|---|---|---|---|---|---|
| | | 300,8 | | CtrlClick | 2,7072 | | | 86,6304 |
| +1 | Fundament | 83,8 | 0,009 | 1,00 | 0,7542 | 20 | -12 | 24,1344 |
| 2 | Omkring vinduer og dører | 217 | 0,009 | 1,00 | 1,953 | 20 | -12 | 62,496 |

Illu. 183 BE18 Lineloss

Window definitions
Velfac 200 Energy wood/aluminium windows are used for the window values (Velfac 2022). The Window has a U-value of 0,53 W/m²K and a g-value of 0,53. For solar shading, the windows are equipped with curtains with a shading coefficient of 0,1.

| | Vinduer og yderdøre | Anta | Orient | Hældr | Areal (m² | U (W/m²K | b | Ht (W/K) | Ff (-) | g (-) | Skygg | Fc (-) | Dim.Ir | Dim.U | Tab (W) | Ot |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 36 | | | 81,5 | | CtrlCli | 43,195 | | | CtrlCli | | | | 1382,24 | 0/1 |
| +1 | Vinduer mod nord | 15 | N | 90 | 2,1 | 0,53 | 1,00 | 16,695 | 0,9 | 0,53 | | 1 | 20 | -12 | 534,24 | 0 |
| 2 | Vinduer mod vest | 2 | V | 90 | 2,1 | 0,53 | 1,00 | 2,226 | 0,9 | 0,53 | | -0,3 | 20 | -12 | 71,232 | 0 |
| 3 | Vinduer mod syd | 11 | S | 90 | 2,1 | 0,53 | 1,00 | 12,243 | 0,9 | 0,53 | | -0,3 | 20 | -12 | 391,776 | 0 |
| 4 | Vinduer mod øst | 7 | ø | 90 | 2,1 | 0,53 | 1,00 | 7,791 | 0,9 | 0,53 | | -0,3 | 20 | -12 | 249,312 | 0 |
| 5 | ovenlys | 1 | N | 45 | 8 | 0,53 | 1,00 | 4,24 | 0,9 | 0,53 | | -0,3 | 20 | -12 | 135,68 | 0 |

Illu. 184 BE18 Windows

## Ventilation definitions

The mechanical ventilation system is based on a VAV system, where the system ventilates fully in the winter to reap the benefits of heat recovery. In the summertime, the mechanical ventilation takes care of the basic air change of 0,3 l/s m$^2$, supported by manual venting to minimise temperature and supply the remaining basic ventilation needs. The details of the ventilation aggregate are based on standard values according to the maximum SEL value for VAV systems for dwellings of 1,0 kj/m$^3$ (bygningsreglementet 2022).

| | Ventilation | Areal (m² | Fo, - | qm (l/s m | n vgv (-) | ti (°C) | El-V | qn (l/s m² | qi,n (l/s n | SEL (kJ/r | qm,s (l/s | qn,s (l/s r | qm,n (l/s | qn,n (l/s n |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Zone | 257,7 | | Vinter | | | 0/1 | Vinter | Vinter | | Sommer | Sommer | Nat | Nat |
| 1 | Spisesal + køkken | 250 | 1 | 3,5 | 0,9 | 18 | 1 | 0 | 0 | 1 | 0,3 | 6 | 0 | 0 |
| 2 | Toilet S | 3,2 | 1 | 3,33 | 0,9 | 18 | 1 | 0 | 0 | 1 | 3,33 | 0 | 0 | 0 |
| 3 | Toilet N | 4,5 | 1 | 3,33 | 0,9 | 18 | 1 | 0 | 0 | 1 | 3,33 | 0 | 0 | 0 |

Illu. 185 BE18 Ventilation

## Internal heat load

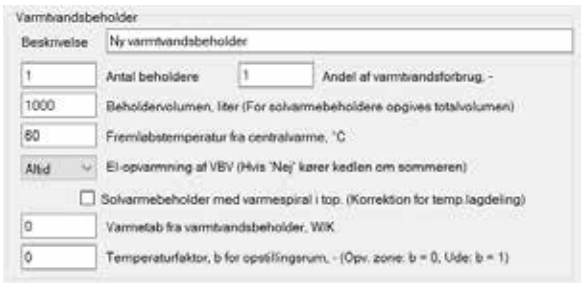
The figures of internal heat load for both people and equipment are based on the standard definitions of BE18.

| | Internt varmetilskud | Areal (m²) | Personer (W/m²) | App. (W/m²) | App,nat (W/m²) |
|---|---|---|---|---|---|
| | Zone | 318,0 | 477,0 W | 1113,0 W | 636,0 W |
| 1 | Spisesal + køkkener | 318 | 1,5 | 3,5 | 2 |

Illu. 186 BE18 Internal heat load

## Domestic hot water

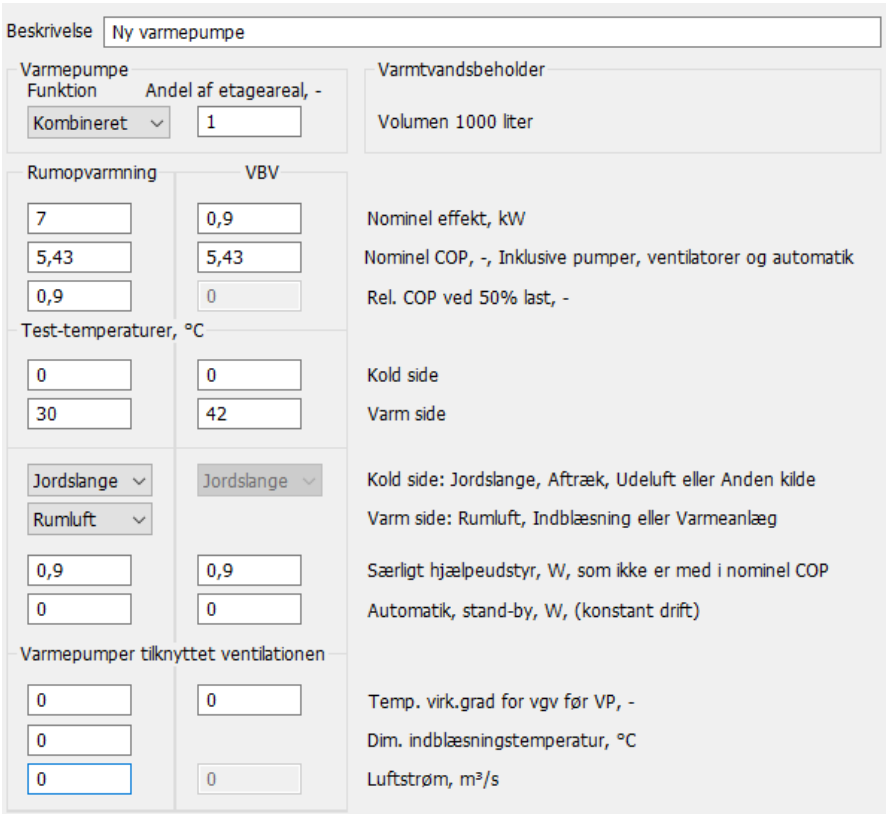
The standards of BE18 define the details of domestic hot water.


Illu. 187 BE18 Domestic hot water

Heat pump

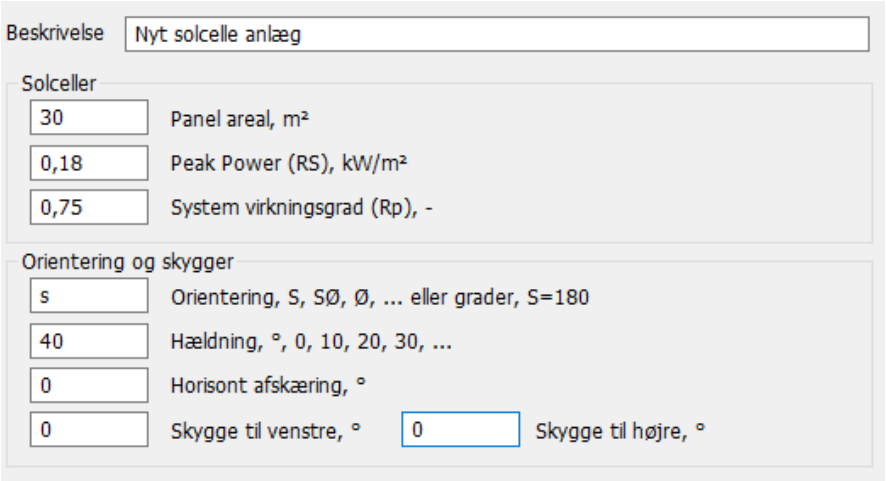
A brine to water heat pump is utilised for heating and DHW in the wintertime. The heat pump is defined based on the datasheet for the CTC GSi 600 (Jordvarmepumper 2022).




Illu. 188 BE18 Heat pump

Photo Voltaics

Solar cells will be used to supply the domestic power usage and the power for the ventilation system and heat pump. The details are based on standard values for thin-film panels (Encyclopedia Britannica 2022).




Illu. 189 BE18 Photo voltaics

Results
The building nearly lives up to the zero-energy class definition with active strategies.

Nøgletal, kWh/m² år

Renoveringsklasse 2

| Uden tillæg | Tillæg for særlige betingelser | Samlet energiramme |
|---|---|---|
| 76,9 | 0,0 | 76,9 |
| Samlet energibehov | | 0,3 |

Renoveringsklasse 1

| Uden tillæg | Tillæg for særlige betingelser | Samlet energiramme |
|---|---|---|
| 57,7 | 0,0 | 57,7 |
| Samlet energibehov | | 0,3 |

Energiramme BR 2018

| Uden tillæg | Tillæg for særlige betingelser | Samlet energiramme |
|---|---|---|
| 33,1 | 0,0 | 33,1 |
| Samlet energibehov | | 0,3 |

Energiramme lavenergi

| Uden tillæg | Tillæg for særlige betingelser | Samlet energiramme |
|---|---|---|
| 27,0 | 0,0 | 27,0 |
| Samlet energibehov | | 0,3 |

Bidrag til energibehovet

| | |
|---|---|
| Varme | 0,0 |
| El til bygningsdrift | 0,2 |
| Overtemp. i rum | 0,0 |

Netto behov

| | |
|---|---|
| Rumopvarmning | 23,5 |
| Varmt brugsvand | 5,3 |
| Køling | 0,0 |

Udvalgte elbehov

| | |
|---|---|
| Belysning | 1,2 |
| Opvarmning af rum | 0,1 |
| Opvarmning af vbv | 0,0 |
| Varmepumpe | 3,9 |
| Ventilatorer | 8,8 |
| Pumper | 0,3 |
| Køling | 0,0 |
| Totalt elforbrug | 37,4 |

Varmetab fra installationer

| | |
|---|---|
| Rumopvarmning | 0,0 |
| Varmt brugsvand | 0,0 |

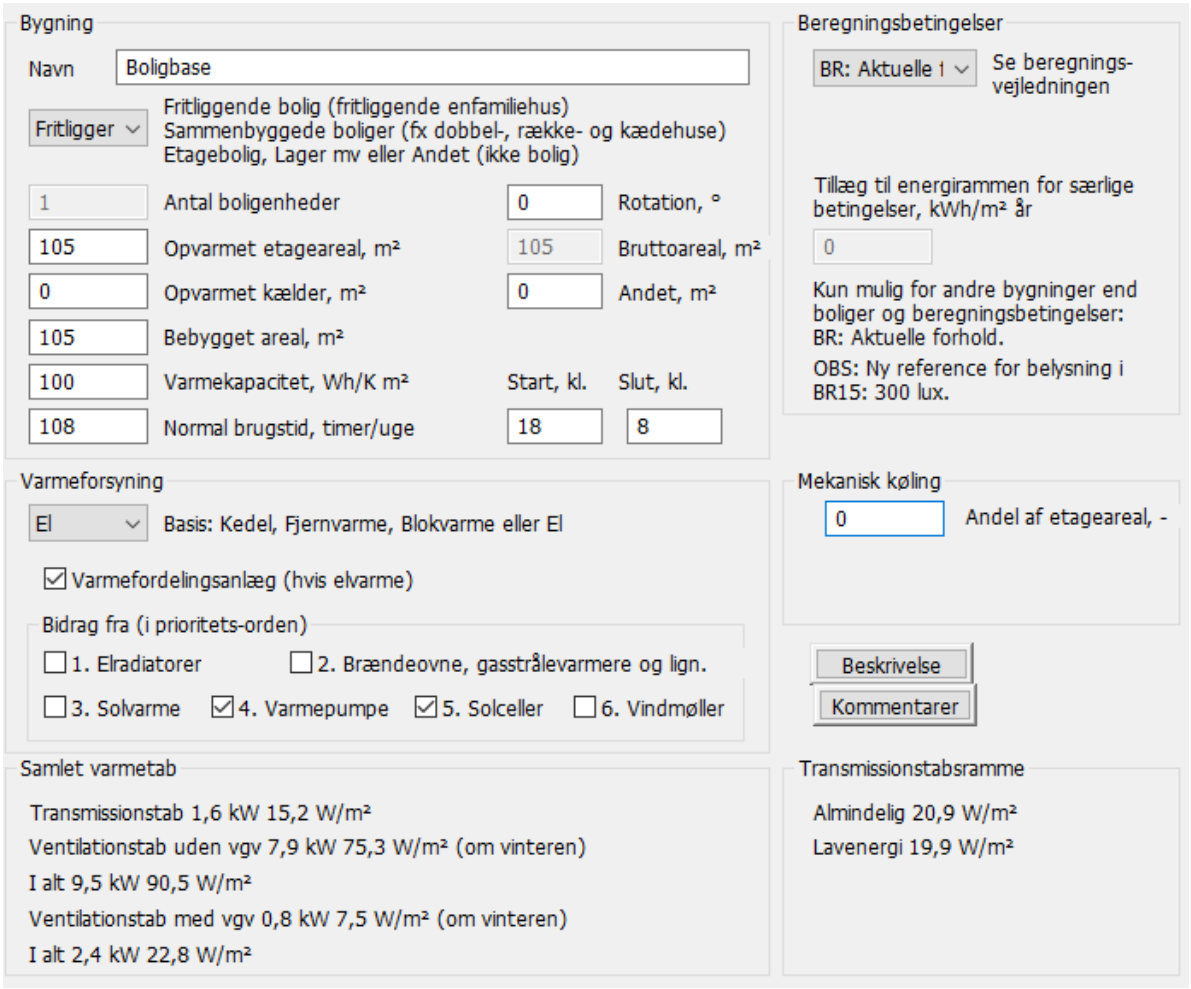
Ydelse fra særlige kilder

| | |
|---|---|
| Solvarme | 5,3 |
| Varmepumpe | 23,5 |
| Solceller | 16,0 |
| Vindmøller | 0,0 |

Illu. 190 BE18 results

# APPENDIX 11 - BE18 CALCULATIONS - STUDENT HOUSING

## The building




Illu. 191 BE18 The building

## The building envelope

| | Ydervægge, tage og gulve | Areal (m²) | U (W/m²K) | b | Ht (W/K) | Dim.Inde (C | Dim.Ude (C | Tab (W) |
|---|---|---|---|---|---|---|---|---|
| | | 344,92 | | CtrlClick | 34,492 | | | 1103,74 |
| 1 | Gavl mod vest | 26,9 | 0,1 | 1,00 | 2,69 | 20 | -12 | 86,08 |
| 2 | Gavl mod øst | 30 | 0,1 | 1,00 | 3 | 20 | -12 | 96 |
| 3 | Syd facade | 23,06 | 0,1 | 1,00 | 2,306 | 20 | -12 | 73,792 |
| 4 | Nord facade | 23,96 | 0,1 | 1,00 | 2,396 | 20 | -12 | 76,672 |
| 5 | Gulv | 105 | 0,1 | 1,00 | 10,5 | 20 | -12 | 336 |
| 6 | Tagflade | 136 | 0,1 | 1,00 | 13,6 | 20 | -12 | 435,2 |

Illu. 192 BE18 The building envelope

## Line loss at joints

| | Fundamenter og samlinger ved vinduer | l (m) | Tab (W/mK) | b | Ht (W/K) | Dim.Inde | Dim.Ude | Tab (W) |
|---|---|---|---|---|---|---|---|---|
| | | 124 | | CtrlClick | 1,116 | | | 35,712 |
| 1 | Fundament | 44 | 0,009 | 1,00 | 0,396 | 20 | -12 | 12,672 |
| 2 | Omkring vinduer og dører | 80 | 0,009 | 1,00 | 0,72 | 20 | -12 | 23,04 |

Illu. 193 BE18 Lineloss

## Window definitions

| | Vinduer og yderdøre | Anta | Orient | Hældr | Areal (m² | U (W/m²K | b | Ht (W/K) | Ff (-) | g (-) | Skygg | Fc (-) | Dim.Ir | Dim.U | Tab (W) | Ot |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 16 | | | 27,1 | | CtrlCli | 14,363 | | | CtrlCli | | | | 459,616 | 0/1 |
| 1 | Glasdøre mod nord | 3 | N | 90 | 2,1 | 0,53 | 1,00 | 3,339 | 0,9 | 0,53 | | 1 | 20 | -12 | 106,848 | 0 |
| 2 | Glasdør mod vest | 1 | V | 90 | 2,1 | 0,53 | 1,00 | 1,113 | 0,9 | 0,53 | | -0,2 | 20 | -12 | 35,616 | 0 |
| 3 | Glasdør mod syd | 2 | S | 90 | 2,1 | 0,53 | 1,00 | 2,226 | 0,9 | 0,53 | | -0,2 | 20 | -12 | 71,232 | 0 |
| 4 | vinduer mod syd | 5 | S | 90 | 1,5 | 0,53 | 1,00 | 3,975 | 0,9 | 0,53 | | -0,2 | 20 | -12 | 127,2 | 0 |
| 5 | ovenlys | 1 | N | 40 | 1,5 | 0,53 | 1,00 | 0,795 | 0,9 | 0,53 | | 1 | 20 | -12 | 25,44 | 0 |
| 6 | Vinduer mod N | 3 | N | 90 | 1,5 | 0,53 | 1,00 | 2,385 | 0,9 | 0,53 | | 1 | 20 | -12 | 76,32 | 0 |
| 7 | Vinduer mod øst | 1 | V | 90 | 1 | 0,53 | 1,00 | 0,53 | 0,9 | 0,53 | | -0,2 | 20 | -12 | 16,96 | 0 |

Illu. 194 BE18 Windows

## Ventilation definitions

| | Ventilation | Areal (m² | Fo, - | qm (l/s m | n vgv (-) | ti (°C) | El-V | qn (l/s m² | qi,n (l/s n | SEL (kJ/r | qm,s (l/s | qn,s (l/s r | qm,n (l/s | qn,n (l/s n |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Zone | 96,65 | | Vinter | | | 0/1 | Vinter | Vinter | | Sommer | Sommer | Nat | Nat |
| 1 | Soveværelse | 11,45 | 1 | 2,41 | 0,9 | 18 | 1 | 0 | 0 | 0 | 0 | 5 | 0 | 0 |
| 2 | Soveværelse | 11,45 | 1 | 2,41 | 0,9 | 18 | 1 | 0 | 0 | 1 | 0 | 5 | 0 | 0 |
| 3 | Soveværelse | 11,45 | 1 | 2,41 | 0,9 | 18 | 1 | 0 | 0 | 1 | 0 | 5 | 0 | 0 |
| 4 | Fællesrum | 47 | 1 | 1,77 | 0,9 | 18 | 1 | 0 | 0 | 1 | 0 | 5 | 0 | 0 |
| 5 | Depot | 2,7 | 1 | 0 | 0,9 | 18 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | Toilet | 4,6 | 1 | 3,03 | 0,9 | 18 | 1 | 0 | 0 | 1 | 0,3 | 5 | 0 | 0 |
| 7 | Toilet | 8 | 1 | 3,03 | 0,9 | 18 | 1 | 0 | 0 | 1 | 0,3 | 5 | 0 | 0 |

Illu. 195 BE18 Ventilation

## Internal heat load

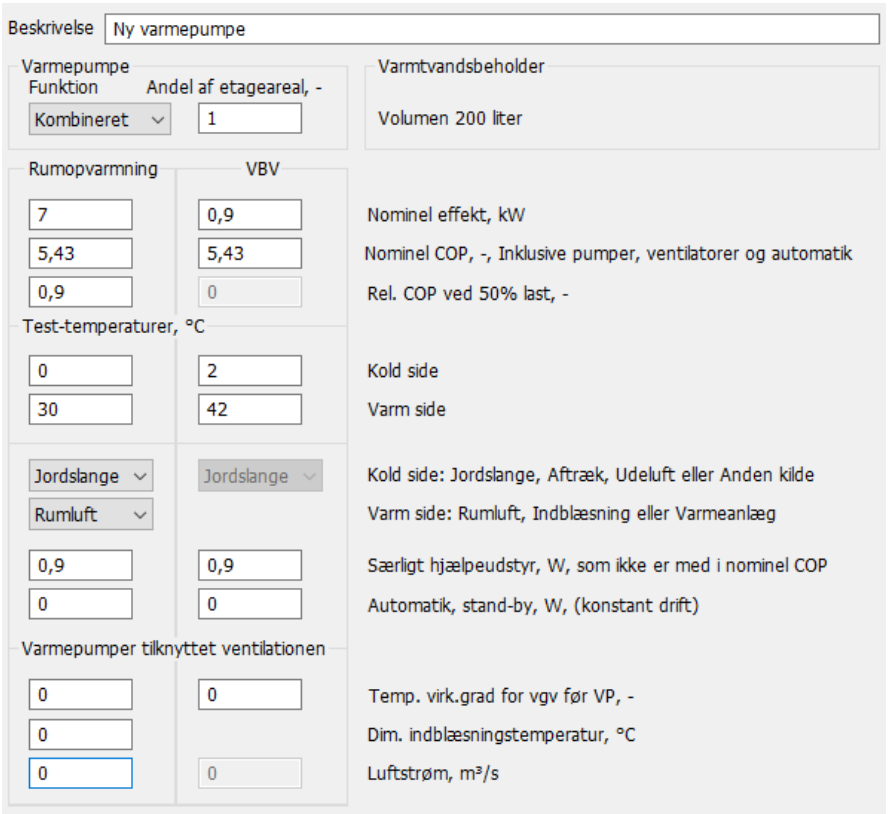
| | Internt varmetilskud | Areal (m²) | Personer (W/m²) | App. (W/m²) | App,nat (W/m²) |
|---|---|---|---|---|---|
| | Zone | 84,3 | 111,3 W | 259,7 W | 0,0 W |
| 1 | Soveværelse | 9,4 | 1,5 | 3,5 | 0 |
| 2 | Soveværelse | 9,4 | 1,5 | 3,5 | 0 |
| 3 | Soveværelse | 9,4 | 1,5 | 3,5 | 0 |
| 4 | Fællesrum | 46 | 1,5 | 3,5 | 0 |
| 5 | depot | 0 | 0 | 0 | 0 |
| 6 | TOILET | 3,4 | 0 | 0 | 0 |
| 7 | toiletter | 6,7 | 0 | 0 | 0 |

Illu. 196 BE18 Internal heat load

## Domestic hot water

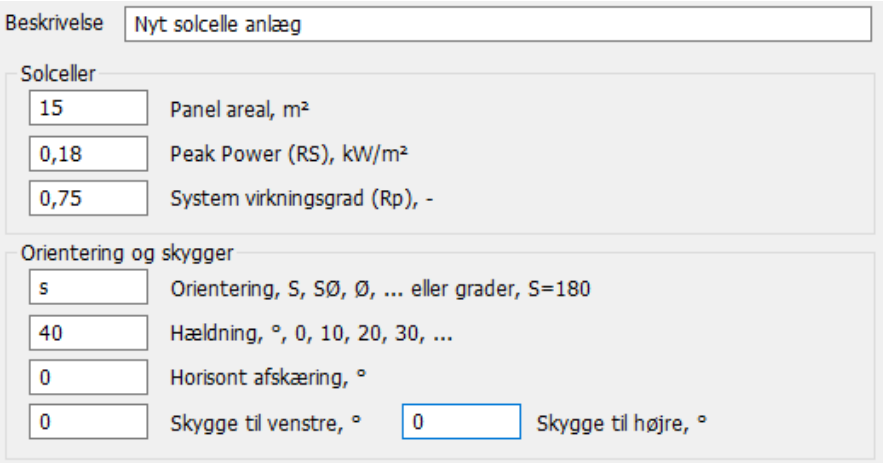

Illu. 197 BE18 Domestic hot water

## Heat pump



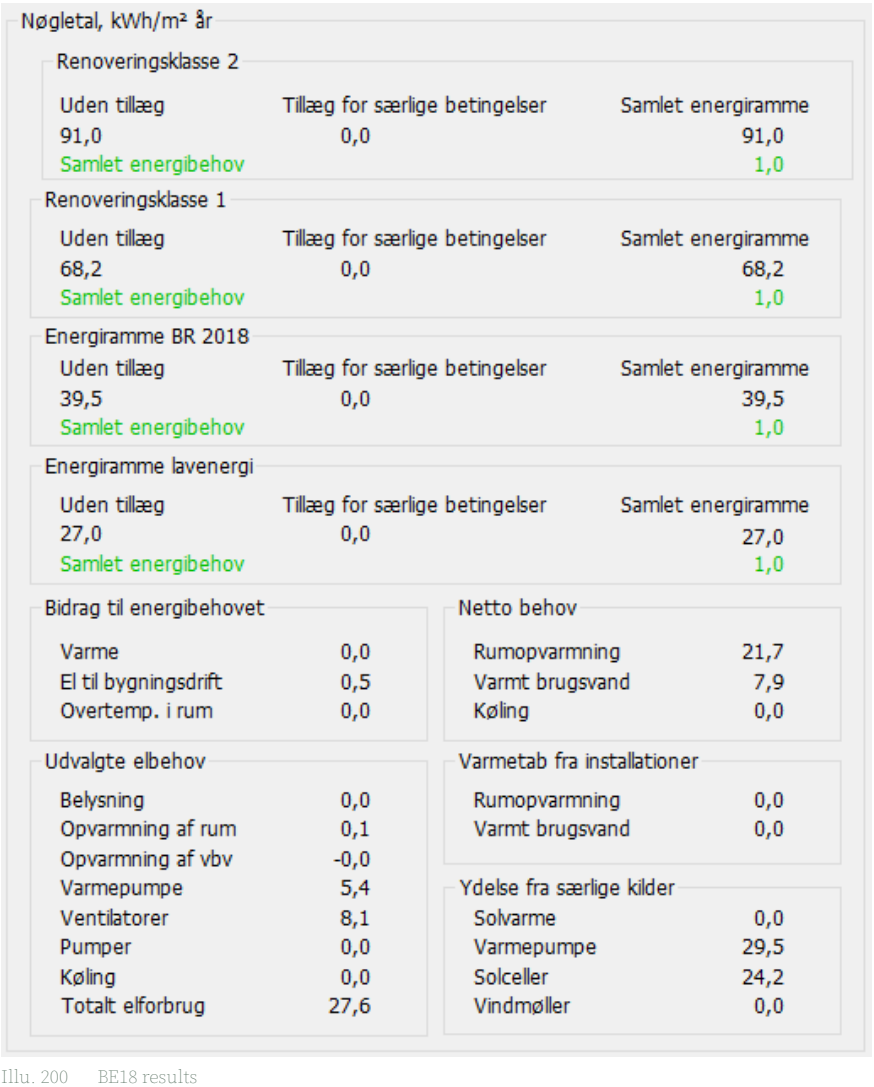

Illu. 198 BE18 Heat pump

## Photo voltaics




Illu. 199 BE18 Photo voltaics

## Results




Illu. 200 BE18 results

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# ILLUSTRATION LIST