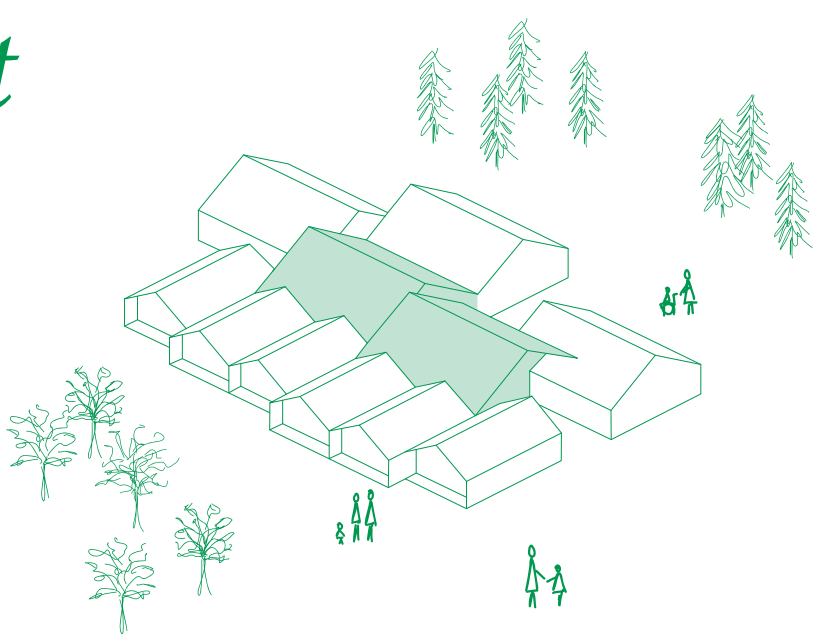
Hjerte*huset*

[/ˈjæɐt.əˈhuˌːs.ət/]



Emma Louise Jensen

Laura Obel Pinstrup

Amber Slabbinck

Title	Hjertehuset - A living community for ill children and their families	**Institution**	Aalborg University
Pages	157	**Department**	Architecture, Design and Media Technology
Appendix	16	**Semester**	MSc04-Group 09, Spring 2023
Thesis period	01.02.23 - 26.05.23	**Supervisors**	Joel Peter Weber Letkemann Endrit Hoxha
Exam date	09.06.23		

abstract

This thesis presents a proposal to enlighten the health-care system with a new user-focused children's hospice in Northern Denmark that acts as a living community for (terminally) ill children and their families. The thesis will address topics such as healing architecture and design for play but also attach importance to the design of a building with a low CO_2 emission through Life Cycle Assessment.

Children's hospices are a new and rare typology in Denmark. However, empirical research in this thesis has proven the importance of a children's hospice for families with a seriously ill child compared to the existing palliative care options for children, as it offers stability and care to the entire family.

Hjertehuset is a result of the exploration about how healing architecture and the evidence-based impact of nature on the mental and physical wellbeing of a patient can contribute to a better life quality for a family with a (terminally) ill child. The design proposal is based on theories, case studies and (empirical) research as well as an attended competition brief by Buildner Architecture Competitions. By addressing healing architecture and it's defined direction into palliative architecture and design for play this thesis prioritizes the user and their needs. Building materials are carefully considered through Life Cycle Assessment to create a building with a low CO_2 emission.

The result of this thesis is a new children's hospice in Northern Denmark that acts as a living community embracing (terminally) ill children and their families while encouraging a close relationship to nature.

"Children's hospice. It screamed in the ears. It screamed of death. When you do not have much knowledge about it, you connect it to the last place, it is the end station. But it is a completely different experience we have now, because we are here today"

"Børnehospice. Det skreg jo i ørene, det skreg jo af død. Når man ikke har den store viden om det, så forbinder man det jo med det sidste sted, det er endestationen. Men det er en helt anden oplevelse vi har, når vi er her i dag."

Mother and Father to Mathilde (Registered at Strand-bakkehuset) (Et døgn i Strandbakkehuset, 2022)

reading guide

This thesis is divided into five chapters which are indicated on the left bottom corner of every spread. The report starts with the prologue followed by the program, design process and presentation. The thesis is concluded upon in the epilogue. The final chapter, the appendix, elaborates on topics mentioned throughout the report with the need of further explanation. Each chapter is indicated with a **green** page and conclusions are highlighted with a **red** color. Case studies can be recognised by their **blue** color.

Through the thesis, the authors attend with their personal experience or opinion to address topics, which is addressed in the text with the pronoun "we" in a few specific sections were the phenomenological perspective is integrated.

The entire thesis is illustrated with photographs, diagrams, drawings, and other graphical material that will be listed in the illustration list. The foundation of the research, literature and information sums the base for the children's hospice. These sources will be referenced according to the Harvard Style and collected in a literature list.

table of **content**

00 *prologue* 1

abstract **3**
reading guide **5**
introduction **8**

01 *program* 10

methodological groundwork **12**
strategy and process 12
integrated design process *12*
double diamond process *13*
evidence based design *13*
methods 14

cases studies **16**
maggie's centres 18
hospice vendsyssel 22
strandbakkehuset 24
tsurumi Hospice 26

healing architecture **28**
nature 30
materiality 33
designing for play 34
healing architecture 36

user studies **38**
history of the children hospice 38
care options for terminally ill children and their families 39
change of assumptions about a children´s hospice 43
the user group (their needs) 44
the character 45
a day at the children's hospice 45
user studies 46

life cycle assessment **48**
regulations 48
the goal 48
the LCA stages 50
the strategy 51
life cycle assessment 52

site studies **54**
site criteria 54
placement of site 56
site section 57
accessibility 58
facilities 59
vegetation 60
site studies 62

final problem statement **64**
function diagram **64**
the design criteria **66**

02 *design process* 68

timeline 70
plan follows function 72
identifying the needs 76
identifying windows and views 78
creating a community 80
life cycle assessment and material choice 84
material study 84
construction study 88
interior materials 93

structural design **94**

daylight studies and indoor environment **96**

03 *presentation* 100

Hjertehuset **102**
masterplan 105
elevation east and south 106
render 108
plan 110

a day in the life of a family living in the hospice **112**
the apartment 114
the Heartroom 118
the office 124
the treatment 126
the kitchen 130
meeting the building 134
meeting the outside 138
elevations west and north 140

materiality **142**

life cycle assessment **144**
the building 145
overall result 146
stages 146
building components 147
building materials 147
energy performance 148

04 *epilogue* 150

conclusion 152
reflection 153
bibliography 154
illustration list 157

05 *appendix* 158

01 interview - Hospice Vendsyssel 160
02 pictures – Vendsyssel 162
03 interview - Strandbakkehuset 163
04 pictures Strandbakkehuset 168
05 interview with Bjerg Arkitektur 169
06 competition submission 170
07 LCA – process 172
08 structural analysis 174
09 24h average temperature analysis 178
10 month average temperature analysis 184
11 daylight analysis – process 186
12 detailed drawing 188
13 LCA results - datasheet LCAbyg 192
14 LCA results - green roof 193
15 energy requirements 194
16 energy requirements - with solar cells 198

introduction

In Denmark, everyone that becomes seriously ill, has a health insurance card, or are visitors in Denmark, have the right to receive free treatment at a hospital. It is a right in Denmark to use the different options in the healthcare system (Sundhedsstyrelsen, 2016). Even though different care options are available and in focus, a children's hospice is a new typology in Denmark. The two existing children's hospices in Denmark opened in 2015 and 2021, placed near Copenhagen and Aarhus to facilitate both the western and eastern part of Denmark (Højer, 2023; Hospice Forum Danmark, n.d.; Strandbakkehuset, 2020). The head of the children's department at Strandbakkehuset that was interviewed, Lisbeth Højer, and empirical research for the thesis indicates the importance of a children's hospice for a family when having a child that is terminally ill or has a life-limiting disease. A children's hospice gives stability, calmness, and care for the entire family. To reduce the logistic planning and transportation time for the families, the new children's hospice will be located near Aalborg to serve the northern part of Denmark with a hospice for (terminally) ill children and their families.

When designing a hospice, it is important to secure a good environment for the children and their family. Studies indicate that nature can improve the mental health condition of humans (Kahn et al., 2009; Ulrich, 1984). But what about the use of materials in a building? Do they have a potential to improve the mental and physical wellbeing of a patient and what influence do they have on the global warming that is going on? The building industry has a high impact on the climate as it is responsible for 38 % of the total global energy-related CO_2 emissions (Broer et al., 2022). With the new Life Cycle Assessment (LCA) requirements in Denmark, designers must carefully consider the design choices in the building industry, where materials can have a big influence (Bolig og planstyrelsen, 2022). By combining the influence from nature on the human's wellbeing, and material choice through LCA, the foundation for the new children's hospice in northern Denmark is defined. This thesis has the intention to enlighten the healthcare system with a new user-focused children's hospice for terminally ill children or children with a life-limiting illness and their families, where the LCA demands are vital throughout the process to justify new buildings. It is a broad topic to work with, therefore key terms that are used throughout the entire project are described further in the following paragraphs. This will indicate the direction of each term and explain the use of them in the thesis, as some have varied meanings and interpretations while some are described for the reader to understand the holistic meaning and use of the terms. It functions as a framework for the thesis, to limit the broad interpretation of well-known terms.

sustainability

The word sustainable is broad and diverse. As well as it is complicated to use the term, it is difficult to describe something as sustainable (Damsgaard, 2022). The environmental sustainability approach is followed in the thesis with the foundation of building with materials that have a low climate impact assessed through LCA analysis. It is not possible to build 100% sustainable, as there will always be an emission, and there will never be a negative emission result of a building. When choosing to be 100% sustainable, one should choose to build nothing. Therefore, the thesis aims to build as environmentally sustainable as possible, by following the current requirements of Denmark, but aiming for the 2023 low emission class of the LCA requirements. When the term sustainability is used in the thesis, it indicates the building's use of materials, and documenting the assess by making Life Cycle Assessments in the software LCAbyg.

healing architecture

'Healing architecture' is a broad term. It is described by different people in different ways and includes most of the time an overall approach that the built environment has an influence on the physical and psychological healing of a patient. The interpretation of Healing Architecture in the thesis is considered more as an analysis with elaborated factors to narrow down the understanding of Healing Architecture in the project. Palliative Architecture will be introduced in the thesis as a subset of Healing Architecture.

The experience and interpretation of Healing Architecture in the thesis is considered as the positive influence varying building parameters have on humans, and in this case, patients. There are different parameters that will be investigated within this field and starts with the knowledge of nature being a vital influence on patients' recovery or psychological health condition. Besides that, the body is experienced to act on the light, aesthetics, sound, as activation of the senses, which also have an impact on the (mental) health. These parameters are used as design criteria to elaborate Healing Architecture and to make the foundation for the design of the new children's hospice.

nature

Nature is seen as a nuanced term in this thesis with different interpretations. With the healing perspective in mind, nature is interpretated as the view outside a window, the view that indicates the sun, the weather, the birds, the plants, the leaves on the trees, etc. Roger Ulrich's studies from 1972-1981 indicate that window views with a natural scene (in this case, trees) have a positive influence on patient's recovery (Ulrich, 1984). According to Ulrich, the natural scene can be trees outside the window. The interpretation of nature in this thesis is the natural scene with trees, skies, sunlight, living green plants, defined by the already existing surroundings of the building. The non-built-up areas and defined fields are also considered as nature.

When nature is not available or the view towards nature is limited, an association to it might be needed. Through the biophilia approach materials are mentioned as an indirect association to nature. Wooden materials for instance, indicate the trees in a forest. Materials will also be used as an association to nature and strengthen the natural scene inside and outside the hospice as from personal opinion, it is believed it makes a positive difference for the patients.

design for play

A large part of the focus at a children's hospice is the mental health of the user, the children (ill and siblings) also need to be activated through imagination and play. Design for play can be done in various ways, but due to the flexibility at the hospice, as there will appear an age gap of the children, the implementation needs to reach different age groups. It is important to notice that a children's hospice also has teenagers, that might not prefer the hospice to be associated with a kindergarten. Despite that, the children need play and interaction with the environment. Two Dutch architects, Aldo van Eyck and Herman Hertzberger, address the building for play in different approaches, as integrated in the building and implemented to the building. Both methods will be studied to accommodate the age gab of the children, resulting in a hospice for the everyday life of children with different needs and ages.

program 01

The program is created as a very first step of the project. It has the purpose of giving the author and reader background information on the subject. The program will zoom in on the used methods, theoretical groundwork, user perspective and needs, site analysis and case studies. The gathered information will be collected in a final problem statement, function diagram and series of design criteria.

methodogical groundwork *12*
case studies *16*
healing architecture..... *28*
user studies *38*
life cycle assessment..... *48*
site studies *54*
final problem statement *64*

methodological *groundwork*

The framework of the thesis is built up with use of methodologies and methods to describe the structure, design process and tools used during the thesis. Methodologies is used as a structure of understanding and organising the process, while methods are considered the tools to answer the problem directly (Brænder, 2022).

strategy and process

The course of action for this thesis is formed upon a combination of the Integrated Design Process (IDP), the Double Diamond design process as well as the Evidence-Based Design approach. IDP is an architectural and engineering design process, formed specifically to combine those professions. The Double Diamond is used as an overall design approach, with focus on gathering knowledge and ideas, as well as scoping down and be more specific with ideas and design. Finally, the approach of evidence-based design is to gain knowledge for the design through existing research. Combining these approaches gives an overview of gaining knowledge through research and understanding, when it takes place in the process.

integrated design process

The Integrated Design Process is a method to combine the professional approaches of both engineering and architecture studies. The IDP is divided into five various phases that result in a creative iterative process, since the phases are repeated when gaining new knowledge. Especially the sketching phase is repeated several times when the design is revised (Knudstrup, 2004).

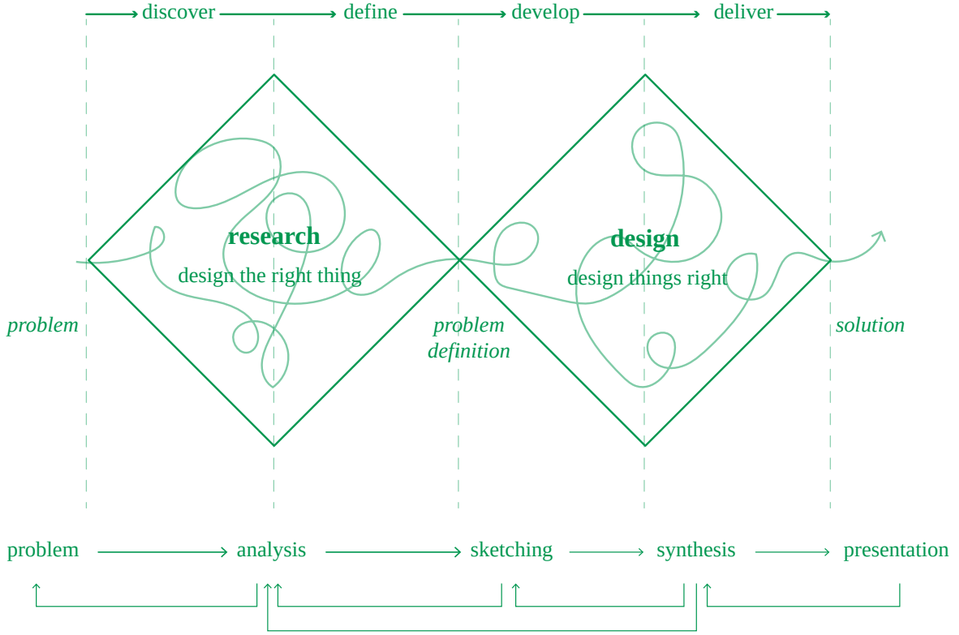
Problem Formulation is the first step to describe the problem or idea (Knudstrup, 2004).

The Analysis Phase ensures the relevant information before starting the sketching phase. It regards the information about the site, topography, microclimate, vegetation, access, infrastructure etc. Another aspect of the analysing phase, is to define the user profile that describes the user's demands and needs for the building, as functions, space etc. The engineering principles for natural or mechanical ventilation, climate shields, etc. are taken into consideration from the purpose of the building (Knudstrup, 2004).

The Sketching Phase develops the best solution as possible while the demands for the user, architecture, construction, energy consumptions as well as the demands for the indoor environmental conditions are considered. This is the phase where the architecture and engineering knowledge are visually combined in the design (Knudstrup, 2004).

The Synthesis Phase are a completion of the design, where all the aspects of the previous phases come together (Knudstrup, 2004).

The Presentation Phase presents the final design solution in the shape of text, drawings, illustrations, physical models, and posters (Knudstrup, 2004).



ill. 2. visualisation double diamond process

double diamond process

The Double Diamond design model has four stages that work as an organisation map for the thoughts during a design process with the goal of improving the creative process. This model is not a linear process, because going back and forth between the stages can be beneficial to improve the results. The first diamond is about designing the "right" thing by gaining knowledge through research, and the second diamond is about designing things "right" by using the gained knowledge for the sketching (Design Council, 2005).

The **Discover** phase starts with an idea or inspiration where the research will be data and knowledge that are gathered to obtain a lot of information. For this phase it is important to understand the extent of the problem, while identifying and contextualising it (Design Council, 2005).

The second phase, **Define**, is the definition of the problem being specified by evaluating the ideas and information. Further analysis, developments, and detailing are made while starting modelling and sketching (Design Council, 2005).

The third quarter, **Develop**, is transforming the idea into a solution. During this phase, different methods are used for designing and different concepts are investigated while the final solution is getting prepared for realisation of the project (Design Council, 2005).

Through the **Deliver** phase, the development of the project has reached completion, as a conclusion of the research (Design Council, 2005).

evidence based design

Evidence based design is a design approach that can be seen as a parallel to evidence-based medicine. This means taking (design) decisions based on research evidence and knowledge from previous completed projects that are scientifically proven to result in the desired effect. This way of taking design decisions is relevant for all those with interest in clinical outcome and objective decision making and thus is often used in healthcare design (Health Care Design Magazine, 2004).

In this project for a children's hospice, we will gather evidence-based data through different methods such as studies, interviews, literature about stories from families with a terminally ill child, documentaries, visits to relevant case studies, etc. and will be discussed later in the program. Using evidence-based information secure proven choices and brings more liability into the design for terminally ill children.

methods

gathering knowledge

Literature studies
A method of gathering existing knowledge to understand the problem of the thesis. To gather knowledge and information of the given topic, the literature studies are primarily used in the early phases. It is used to accumulate knowledge for theories that is relevant for the research (Eriksen, 2016).
Tools: books, articles, databases

Case studies
A study of a particular data material and therefore not general information of a problem
(Aarhus Universitet, n.d.).
Tools: magazine, webpages, databases, interviews, observations

Phenomenological approach
Through the thesis, the phenomenological approach for choosing materials, sensing the atmospheres or nature's effect on people will be addressed through the authors of this project with a personal experience or opinion. Some feelings or thoughts about atmospheres for example are very subjective, to address that, the authors attend with their opinions, which might give associations and understanding for the reader as well. Phenomenological approaches are interpretated as senses affect on the specific stimulation. In the thesis, when a personal experience or opinion is mentioned, it is from the three author's common perspective.
Assessed in the thesis: Personal experience, personal opinion.

user analysis

Interview
Qualitative method to gather an understanding of the opinion, motivations, experiences, etc. of the persons living in or with the problem and topic of the project
(Aarhus Universitet, n.d.).
Tools: interview

on/off site studies

observation / field trip
Obtain valuable knowledge and experience a realistic place or person in relation to the given problem. It gives an opportunity to observe the facilities, atmosphere, motivations, and behaviour, that is not possible to get by reading or searching on the internet. It leads to a narrative description of the investigated facility (Aarhus Universitet, n.d.).
Tools: Interview, visit people or places involving the problem

mapping
Tool to gather information about the project site as well as understanding its surrounding context. By mapping it is possible to obtain information such as accessibility, facilities, vegetation, etc., which leads to design according to local conditions and microclimate.
Tools: Qgis, photoshop, illustrator, AutoCad

idea generating methods

Sketching
Early idea generating and brainstorming for the solution of the previous analyses. It can be done in both digitally 3D and through analogue sketching.
Tools: Digital sketching, analogue sketching

Volumetric studies
Making models can be done by hand or digitally and is a way of converting 2D sketches into 3D models. Models visualises a design and can be used for examining different aspects as shape, volume, scale, etc., that are not understandable from 2D.
Tools: Revit, foam, paper models and cardboard modelling

Simulations/Calculations

technical methods

Made during design process to support design ideas, as well as ensuring that the design solution is aligned with legislation to achieve an approved environment. Another aspect is the materiality and sustainable approach where the calculations of $C0_2$-emissions is a foundation of choosing materials.
Tools: LCA-byg, excel, BE18, 24-hour average, month-average

presentation methods

Report
A presentation of the process with all aspects of the design process from the initial analyses to sketches and ideas, to the final design. By making a report, the reader gets an idea of how the process have been with difficulties and challenges that had occurred.
Tools: InDesign, Microsoft Word

Illustrations
Creates a visual understanding of the material, and com-
municating the design and principles words cannot.
Tools: Illustrator, Revit, Photoshop, AutoCad

Infographics
A visual way of presenting information or data that enhance interpretation of complicated subjects.
Tools: Illustrator, Photoshop

Renderings
Realistic visualisations of the final design generated by the modelling tools. The visualisations show both the exterior and interior as well as the desired atmospheres.
Tools: Revit, Enscape, Photoshop

case *studies*

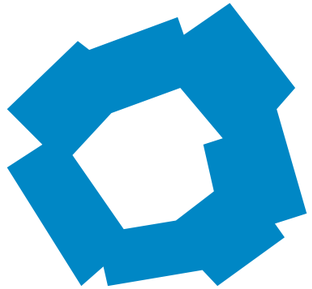
Case studies have the purpose of giving information and understanding about the topic and typology that will be addressed in the future project by studying already existing relevant projects. When making case studies it is important to consider the context it was built in and to be aware of the differences between the already existing project and the future project. It is also very important to look critical at the studied cases, not every case study is a perfect example.

On the next pages there will be presented four different projects; a series of cancer caring centres, an adult hospice, and two children's hospices. Even though they are different in philosophy and typology, they are all considered healthcare facilities where one can learn from in the process of designing a children's hospice.

Information was gathered through different methods, some of the projects were visited, and others were only studied through books and online resources. All the projects are presented through text and analysis supported with drawings and photographs.

Maggie's Centres

typology	*Healthcare - a series of cancer caring centres*
by	*Maggie Keswick Jencks Charles Jencks*
year	*1996 - now*
location	*worlwide*

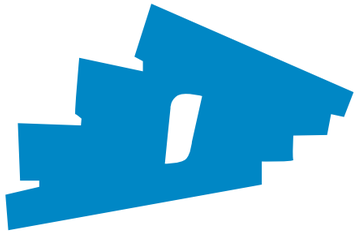


Hospice Vendsyssel

typology	*Healthcare - an adult hospice*
by	*Østergaard arkitekter*
year	*2008*
location	*Frederikshavn, Denmark*

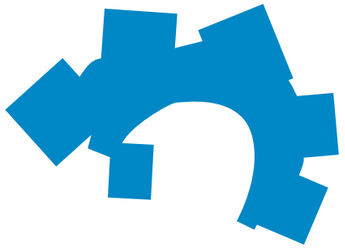
Strandbakkehuset

typology	*Healthcare - a children's hospice*
by	*AART architects*
year	*2020*
location	*Rønde, Denmark*



Tsurumi Hospice

typology	*Healthcare - a children's hospice*
by	*TAISEI DESIGN Planners Architects and Engineers*
year	*2015*
location	*Osaka, Japan*



ill. 3. visualisation healing architecture

Maggie's Centres

typology	*Healthcare - a series of cancer caring centres*
by	*Maggie Keswick Jencks Charles Jencks*
year	*1996 - now*
location	*worlwide*

background

The Maggie's centres are a network of cancer caring centres founded by Maggie Keswick Jencks and Charles Jencks. The centres derived from the personal experience of Maggie Keswick Jencks having cancer and are designed as a home to support cancer patients. The centres have the purpose of extending the life of patients and improve their life quality. Next to that they tend to create hope for patients, relatives and carers and offer support where the hospital/doctors are too busy (Jencks, 2015). The first Maggie's centre opened in 1996 in Edinburgh shortly after the death of Maggie (Jencks, 2015; Maggie's centre, n.d.; Maggie's Centre, n.d.).

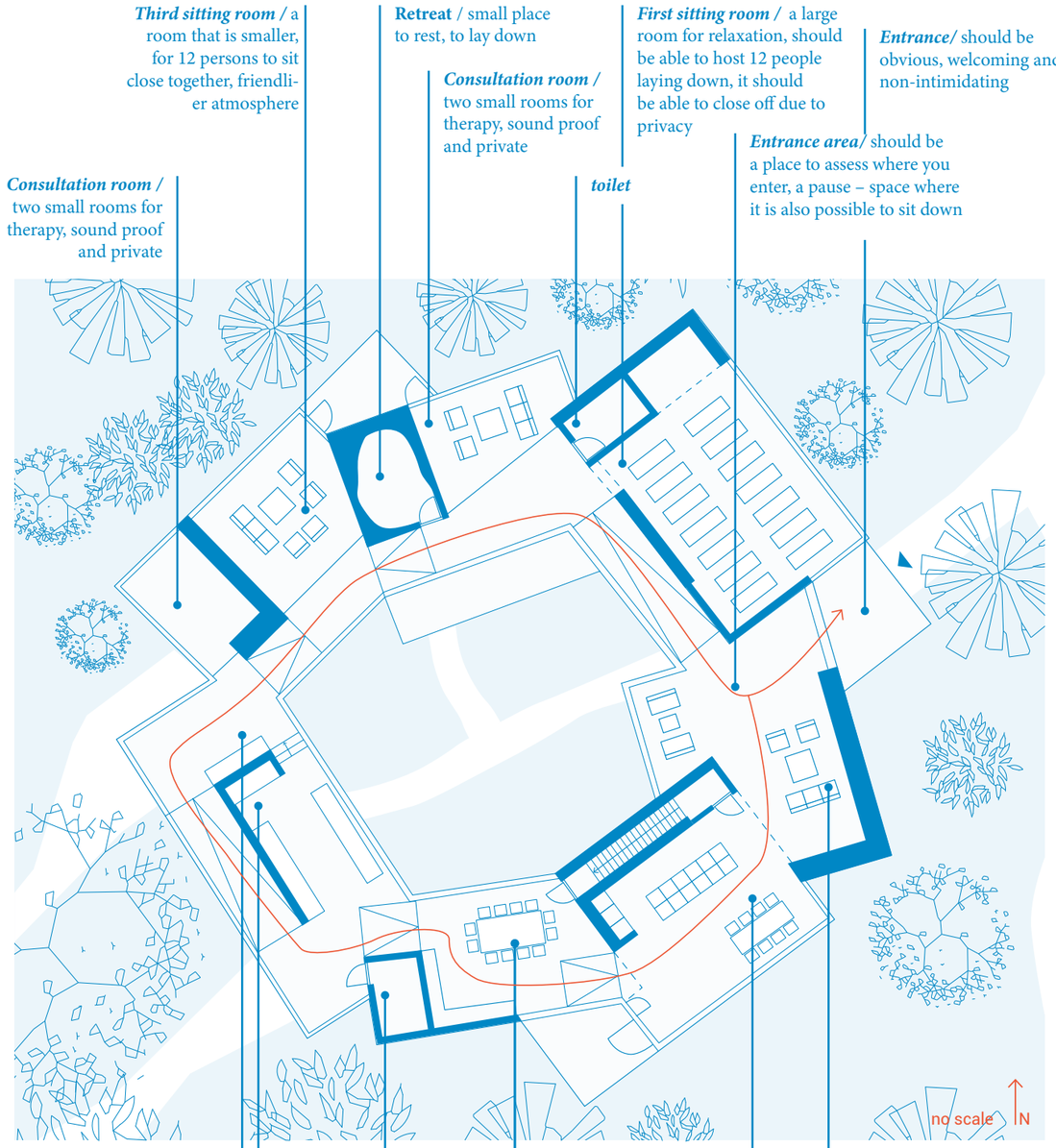
a new typology

This case was studied through literature and online resources to gain more knowledge about how to design for people with health issues. By this study, information is gathered about (the needs of) a ill patient, the vision the centres have towards the role of nature and what they consider necessary for a healthcare building.

The Maggie's centres have a design approach that attaches great value to light and the connection to nature. The spaces are designed calm and welcoming and described as a place to escape the clinical environment of the hospital (Maggie's Centre, n.d.) . The centres are a hybrid mix of use which contrasts to the institutionalised hospital where everything is divided into separate departments. With this vision the Maggie's centres introduced a new building typology. The hybrid function gives a sense of community where people can talk to each other and feel less alone in the journey that they are going through (Jencks, 2015).

"Each centre is like a house that is not a home, an existentialist church that is non-denominational, a hospital that is a non-institution, and a place of art that is a non-museum"

(Jencks, 2015, p.7)



ill. 4. plan drawing Maggie's Centre Gartnavel / OMA

typology	*Healthcare - a cancer care centre*
by	*OMA*
year	*2011*
location	*Glasgow, UK*

ill. 5. pictures Maggie's Centre Gartnavel / OMA

vision for the centres

The Maggie's centres can all be considered as individual and original buildings representing their designers and responding to the local context even though the same design manual, values and vision are used. (Jencks, 2015).

Every Maggie's centre should act friendly, give clarity, be able to uplift the mood and should not be intimidating. The building should look and feel bold and self-confident but also inviting and safe. The design should not be too cozy because it is still a hard reality, it should acknowledge what the people are going through and give the impression of trying to help (Maggie's centre, n.d.).

Maggie's Centre - OMA

A few topics, the design vision for Maggie's centres inhabits are analysed through the case study of Maggie's Centre Gartnavel by OMA. The topics are nature and its relationship with the building, a term called kitchenism and the design of the small counselling room in Maggie's Centre Gartnavel.

Nature
In all Maggie's centres, nature is a very important part of the design. Ideally a path through nature guides the visitor to the front door. This can take away the stress and act as a breathing space between 'hospital life' and 'normal life'. The design should encourage people to look out in nature since the view out on nature, trees, birds and the sky can have a positive effect on the patients, it is a place of safety, sanctuary and transformation (Jencks, 2015; Maggie's centre, n.d.).

In Maggie's Centre Gartnavel nature always feels close because of the openness of the building. The doughnut shape of the building allows an enclosed courtyard in the middle to be a sanctuary garden for the user. The connection with the surrounding nature is made with views through the glass hallways of the building. This way of including nature from the very early beginning when approaching the building and keeping it nearby through visual connections will be assessed within the design of the children's hospice. Including nature will also be one of the main drivers inspired by the approach from Maggie's centres.

Kitchenism
The spaces, that all have a domestic scale should be controlled by the user; it is not the sickness but the person that is in charge of their life. The design should encourage the user to feel at home and do what they want, make a cup of tea, move the furniture, etc. This is done by putting a kitchen central in the building, a philosophy called 'kitchenism'. Next to the kitchen this core space should be designed to create a meeting point so that it is easy to talk to others and feel less alone. At the same time the design should also give the opportunity to have alone, quiet time (Maggie's centre, n.d.).

The 'kitchenism' philosophy is translated into an own vision for the children's hospice. The kitchen in the children's hospice should become an open multifunctional space that encourages the community feeling and allows different ways of using the room.

Reflection space
The opportunity to have alone and quiet time is important for everyone but can be even more important to address in places designed for people coping with a life-threatening illness. A moment of safety and respite is offered in Maggie's Centre Gartnavel through multiple private corners in the building but also by a small counselling room that can be seen as a reflection room. This room is closed off when in use and has a very calm atmosphere, there is one skylight and a bench. The space is characterised by a horizontal oriented wooden interior that is following the curves of the wall. This is a space to withdraw yourself from everything and has the goal of offering a moment of reflection and peace.

In a children's hospice the user goes through a difficult and emotionally heavy period as the user from the Maggie's centres does. Since this similarity of situations, this moment of retreat and reflection is considered important in a children's hospice as well. Therefore, a room like the counselling room in Maggie's Centre Gartnavel will be incorporated in the design of the children's hospice.

Hospice Vendsyssel

typology	*Healthcare - an adult hospice*
by	*Østergaard architects*
year	*2008*
location	*Frederikshavn, Denmark*

Hospice Vendsyssel is an adult hospice located on the edge of the city of Frederikshavn, it is surrounded by nature and offers an ocean view. The hospice has a capacity of nine patients which are mostly elderly spending their last days here. Even though this is not a children's hospice a lot of functions are similar and thus can be learned from. The analysis of this case study gives an inside in the hospice life and a better understanding for the author. This analysis will focus on the relation with nature, the importance of a kitchen and dining area and the needs of the staff. The information used is gathered through a personal visit to the hospice and an interview with two nurses (appendix 01 and 02).

kitchen and dining area

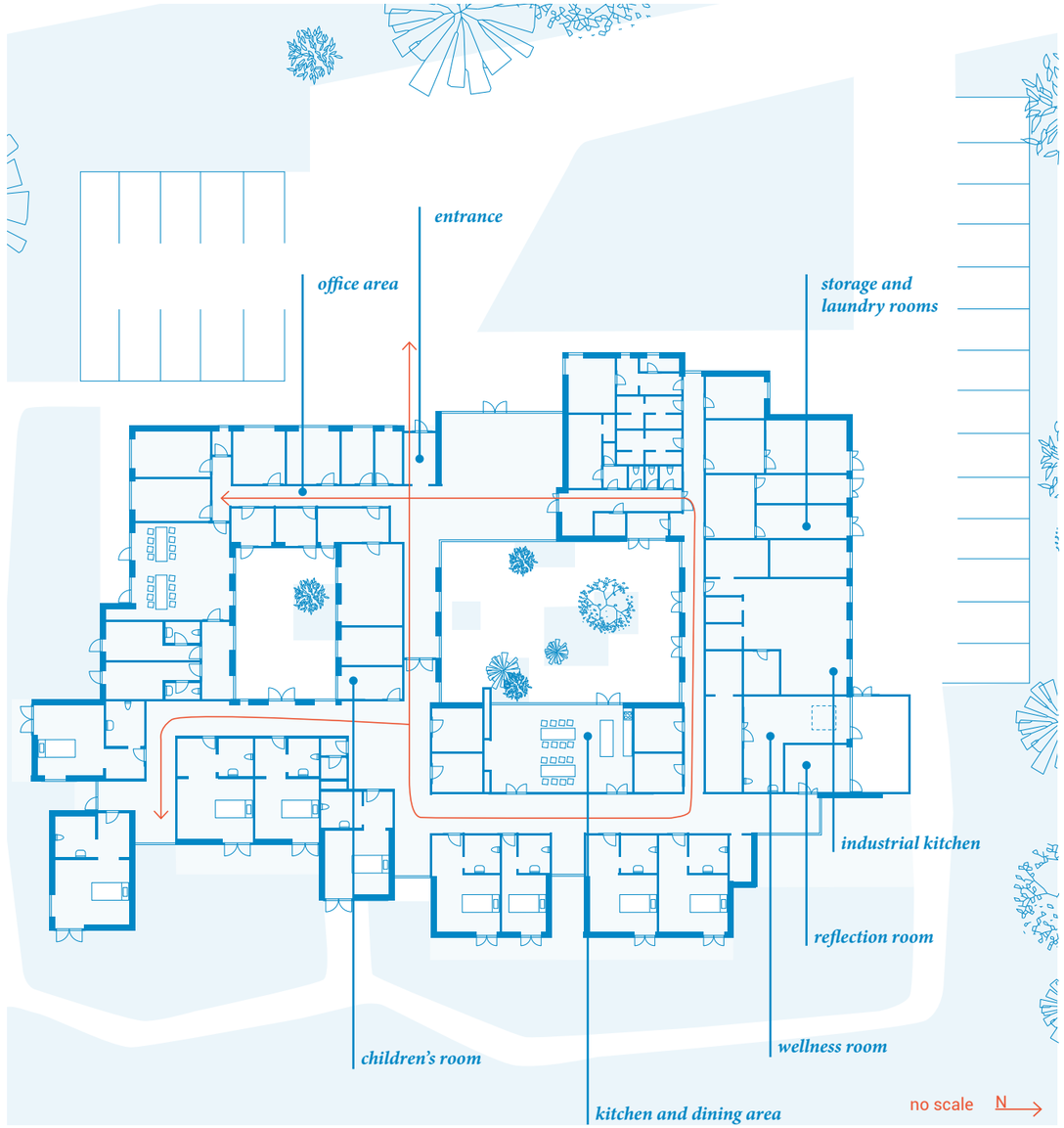
Through personal experience, the hospice had a very serene atmosphere, it was quiet but not sad or heavy. There was a lot of action going on in the hallways, not by the patients but by the staff. Nurses preparing lunch, family of patients arriving, the music therapist walking around with instruments, the cleaning lady, a nurse behind the front desk,... The room that was experienced the most active was the kitchen and dining area, this rooms was used at least three times a day for meals by the patients but also nurses and family. Because the room was near the apartments it is one of the most accessible spaces for the patients besides their rooms. This area was experienced as the core of the building and relates to the' kitchenism' theory by Charles Jencks and Maggie Keswick addressed in the study of Maggie's centres.

nature and courtyard

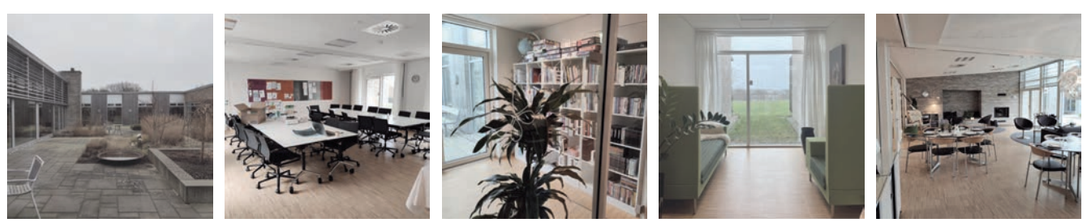
Because of the environment of the hospice, nature is always close by. The patient rooms are oriented towards east and look out over the city of Frederiksberg and the ocean. Surrounding forest in the north and south of the building serves as a home for several animals that give life and interaction to the view the patients have. Even though the hospice is surrounded by nature it still has two courtyards. These spaces are designed for the patients to enjoy a sheltered space outside when the weather allows it but also functions as a central space around which the hospice is oriented. The courtyard spaces also create a buffer zone in between functions while still offering a subtle visual connection.

staff needs

When talking to the nurses of the hospice they addressed how important a separate staff area is. Since they spent a lot of time with the patients while taking care of them but also sharing the meals with them they sometimes feel the need of a break, preferably through spending some time in separate and comfortable staff rooms.



ill. 6. plan drawing hospice Vendsyssel / Østergaard architects



ill. 7. pictures hospice Vendsyssel / Østergaard architects

Strandbakkehuset

typology	*Healthcare - a children's hospice*
by	*AART architects*
year	*2020*
location	*Rønde, Denmark*

understanding a hospice

Strandbakkehuset is built near the city of Aarhus with Skejby Hospital in a 30 minutes drive. It is located right next to the adult hospice Djursland with whom they share certain facilities with. Strandbakkehuset is the first newly built children's hospice in Denmark and the second one of it's typology after Lukashuset in Copenhagen. This case study gave an impression of the needs for families and staff, and how the atmosphere feels like but also gave an insight in apartment layout, the circulation of the building and how the different levels are connected. This case study is based on a visit and interview with the leading nurse and is supported by online sources (appendix 03).

Even though the opposite was expected, the atmosphere in the hospice was not sad and discouraging seen from the author's personal experience. Happy and curious sibling from the patients were running around and playing with the pedagogues, the atmosphere was easy going and positive.

Strandbakkehuset aims to be a home for the families. Therefore, they address the homely feeling as much as possible. One way to do so is dividing each apartment into a family area and a treatment area, with this the family area can be 'shut off' from the more 'medical' area to forget about the sickness for a little bit. Another homely tool is to hide the important and crucial medical equipment, as oxygen, aspirate, and lift, while still have easy access to it. Furthermore, the materials have a big influence on the homely feeling. The floors are mostly wooden, which allows to not wear shoes inside and facilitates the children to play on the floor like they would do at home (appendix 04).

needs of patients and staff

The hospice environment aims to be a warm community where family and nurse are on an equal level and have a close relationship. However the nurses appreciate this approach, they addressed during the interview, that Strandbakkehuset lacks a separate staff area where they can withdraw when they need a pause from their intense nurse duties.

circulation and levelling

The layout of the building is unfolded around the Hjerterum (the Heartroom), that gathers the functions and offers a view in between the different levels and activities. The functions are divided over three floors and a basement that is accessible from an elevator or the stairs in the Hjerterum. A tree in the middle of the Hjerterum supports the experience of the floor to ceiling height. The patient rooms are placed on one side of the Hjerterum in two levels to limit the hallway area, while the more operative rooms as laundry, therapy room, playroom, meeting room, are placed in the other end of the Hjerterum. The few hallways to connect the functions are made winding or with furniture as alcoves creating niches as a calm place to stay. Eventhough the Hjerterum was addressed as the central space for staying but also circulating, the kitchen and living area was also a space with a lot of life and functions as a meeting place for the families. Both could be combined to optimise the Hjerterum as a space where life happens, a space comparable to the living room in a family house.

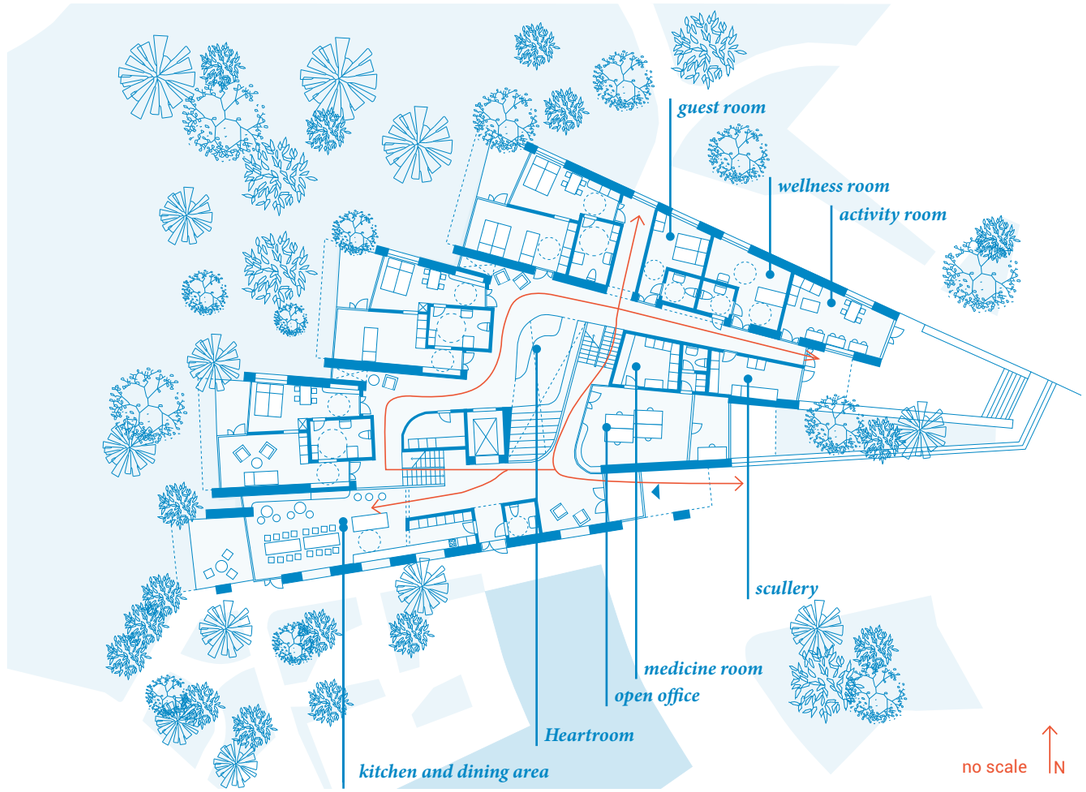
apartment layout

Strandbakkehuset has six available rooms for patients, but are only using four of them, which gives them a possibility to be flexible when a new patient arrives. Each apartment is divided into a family area and a treatment area separated with a sliding door and bathroom. Each area has an entrance for either the family or the staff. It enables the family to have a closed door, when they need privacy, while the staff can look after the ill child. The apartments have a view and a private terrace facing the nearby forest with a lake with activity from animals such as squirrels. According to the interviewed nurse, the children do not attach importance to the view but more about the action that is happening outside their rooms, animals are natural entertainment for them.

ill. 8. pictures hospice Strandbakkehuset / AART architects

"... nogen, de beskriver det, som at de kommer lige fra en krigszone, når de kommer inde fra sygehuset..."

(Translated: "... someone they describe it as they are coming directly from a war when they come from the hospital...")



ill. 9. plan drawing hospice Strandbakkehuset / AART architects

Tsurumi Hospice

typology	*Healthcare - a children's hospice*
by	*TAISEI DESIGN Planners Architects and Engineers*
year	*2015*
location	*Osaka, Japan*

The Tsurumi children's hospice is a new built community supported hospice. Meaning that the employees work closely together with the families staying there to create the best possible life for the children suffering terminally ill or life-limiting diseases. With making a part of the hospice public, it aims to connect people living in the neighbourhood and the people staying in the hospice to enhance the community feeling. The hospice is designed as a 'village' and has five two floors' volumes with a pitched roof that represent the houses in a village, these are connected through a more organic shaped one storey volume considered the street of the village. There are five rooms with each a varying number of beds in them. The architects attached great value on the different places, children want to be in and aim to create these different atmospheres while still being connected to each other.

volumetry

The volumetry of the hospice is addressing the village like feeling the architects want to create. Through the pitched roof volumes, separation of zones become clear in the exterior of the building and shows an individuality for each building volume.

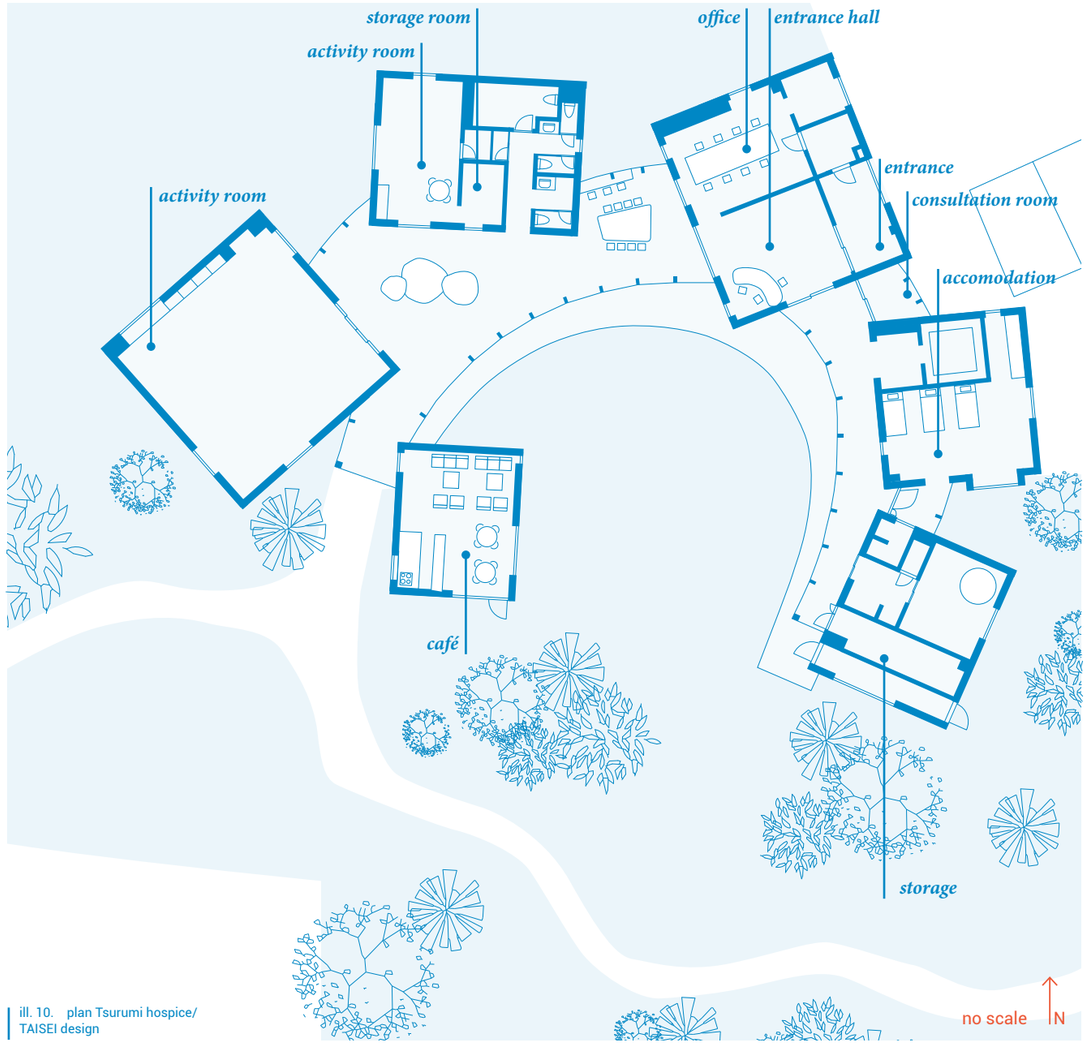
circulation and spaces to stay

The 'street' connecting the separate building volumes is an open space where different zones are created to answer the different needs of the user, places to play or sit, places to hide and withdraw yourself from the community and places to gather with others. This street-like room has a view towards the public garden situated in the middle of the building volume and connects these spaces with views towards each other.

materiality

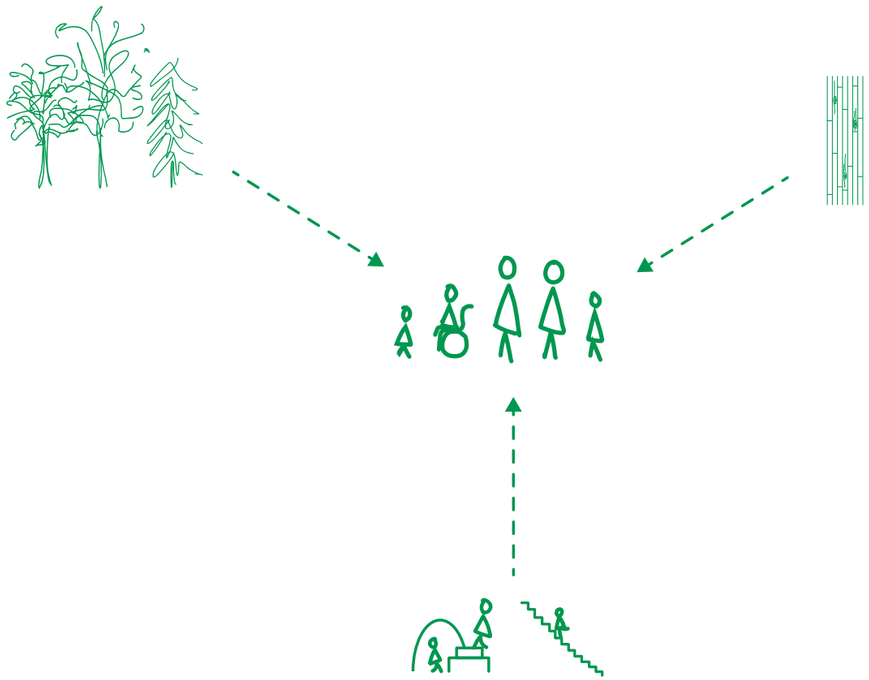
The material choices are described by the architects as a combination of soft materials that enhance touch and pleasure of discovering a building. The design uses a timber structure and implements it in the interior which responds to the topic of biophilic design that will be discussed later in the report. Differences in the materials are made to distinguish zones and functions even though the main material used in the building is timber.

("TSURUMI Children's Hospice / TAISEI DESIGN Planners Architects & Engineers," 2021)



ill. 10. plan Tsurumi hospice/ TAISEI design

healing
architecture



"It is just (…) naïve to expect that architects should never have to confront death in the course of their work. All clients die, eventually, after all. Just as all patients eventually die. Although for the architect, the building 'lives on' metaphorically."

(Verderber and Refuerzo, 2006, p. 4)

ill. 11. visualisation healing architecture

The theoretical framework for a children's hospice takes it point of departure in the term Healing Architecture, as it is closely associated with the healthcare system and improving the health for humans in different levels. It is a broad term as different approaches and methods are used for obtaining healing architecture. The general more overall goal of healing architecture is to stimulate the recovery of a patient with the built environment. One approach is by eliminating environmental stress, connecting patients with nature, increasing the patients feeling of being in control, offering social support, providing positive distraction and stimulating feelings of hope as a combination (Akuneho and Napoleon, 2021). It is a broad category. Another approach is the three parameters of Body, Relations, and Safety, that embraces the healing architecture definition. Three parameters that intercept the dimensions of Healing architecture through architectural categories. The Body parameter relates to the senses, which leads to light, sound, smell, and aesthetics. The Relation parameter are the human interactions, and the facilities and functions at the hospice that enables meetings and interactions, while the Safety parameter relates to the building, structure, and technical considerations. Here, healing architecture is interpretated as an analysis for the three, where the parameters are theories or methods to obtain the intended healing architecture affection on the patients (Frandsen et al., 2009).

When working with a hospice, palliative care is an essential element to increase the patient's and the patient's family's mental health throughout the sickness. The term Palliative architecture describes the approach for a hospice when palliative care is in focus, as the focus on the relatives, facilities, and the stay at the hospice is increased and considered closely in palliative architecture (Verderber and Refuerzo, 2006). The increased focus on the patients as individual human beings, rather than the disease, strengthen the reason of defining the built environment for the specific user of the building and their needs.

"palliative architecture holds the power to re-validate the invalid as a human being "

(Verderber and Refuerzo, 2006, p. 4)

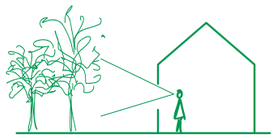
½Healing architecture is a more known term in relation to healthcare buildings. Palliative architecture is a subtopic of understanding Healing architecture. Some of the same elements of healing architecture are repeated in palliative architecture, though some with a higher focus than others. The focus on the relatives and their wellbeing while staying at a hospice has a higher priority in palliative architecture. The length of the stay for the patients is subordinate in palliative architecture as decreasing the symptoms and focus on the treatment is priority (Falk and Timm, 2018). Palliative architecture is closely connected to the built environment and the surroundings, that contributes to an ease mind for the families and the ill children. The atmosphere of the hospice is therefore important to bring a calm and homely expression, rather than a healthcare institution.

"Palliative architecture is compassionate. Its aim is to relieve unnecessary pain, stress, and discomfort."

(Verderber and Refuerzo, 2006, p. 4)

Through the thesis, Healing Architecture will be used as an analysis to frame the vital influences for the patients and their relatives to obtain the impact of Healing Architecture. The user group is an important aspect for a new hospice and needs special attention as expressed in the Palliative Architecture. The two terms are connected through the thesis to obtain the understanding of hospice architecture. Another point of view for the thesis is to understand the hospice as a home for the families, since they will live at the hospice for a longer period. The direction to address this are three chosen main factors in the opinion of describing the direction of the Healing Architectural vision. The factors are; Nature, Materiality, and Designing for Play.

nature



ill. 12. visualisation nature

The influence of nature on mental wellbeing was addressed in 1984 by Edward Owen Wilson. He introduced the term biophilia which describes the genetic disposition humans have towards nature (Mazuch, 2017). From this term the idea of Biophilic Design derived, it addresses how important the role of nature is in improving physical and mental wellbeing by encouraging the integration of nature in our built environment. Therefore, nature is considered a vital engagement for the hospice, both regarding direct nature as daylight and indirect nature as materials.

A lot of studies have been done on the influence of direct nature in the built environment on humans. The first acknowledge study was published in the same year as Wilson introduced Biophilia. The American Professor of Architecture, Roger Steffen Ulrich studied the effects of the view patients had post-surgery on their recovery in between 1972 and 1981. One group of patients had a view towards a natural setting as trees, the other group had a view on a brick wall. Results were remarkably different. Patients with a nature view had shorter post-operative stays, fewer negative comments, took fewer pain medications and had lower postsurgical complications. This was the first evidence based proof of the positive effect nature has on the physical and mental wellbeing of the human being (Ulrich, 1984).

A later study from 2008 done by Peter H. Kahn, a professor of psychology and director of Human Interaction with nature and Technological systems, and his colleagues, was conducted on 90 participants in an office setting in a 16-week period about the influence of nature through a window with view towards nature, a plasma “window” with a real-time HDTV view of nature, or a blank wall. The studies were conducted on healthy office workers, compared to Ulrich’s studies, but despite that, they were investigating the heartrate recovery from low-level stress among the participants. It indicated that the nature view through a window was more restorative than the blank wall and the plasma “window”. The heart rate decreased more rapidly, when they looked through the window, then looking another place in the office. The study was also made in a windowless office, where HDTV plasma-screens were installed showing a nature view. It benefitted their psychological wellbeing, compared to not experiencing nature at all (Kahn et al., 2009). Experiencing actual nature is best, but an association or indirect nature is better than nothing. Biophilia has different approaches for obtaining nature, as ‘indirect experience of nature’ for instance, that will be described further in ‘Materiality’.

Another factor for direct nature regarding biophilia is the connection with light and shadow that changes continuously and creates different spaces and atmospheres from nature (Browning et al., 2014). The different elements in a building, the rooms, the materials, the architectural expression is exact and consistent compared to the light conditions. The daylight, sunlight, and shadows will change hourly, daily, yearly according to the seasons. The same situation occurs with the rest of the weather conditions. It is inconstant (Eiler Rasmussen, 2012). Light can contribute to different atmospheres in rooms, the transition between indoor and outdoor spaces, and establish a circadian lightning experience, where humans stay. Orientation of windows and views is important to considered regarding light as the inside spatial experience depends among others on the entering light. Reflection, illuminance, and diffuse light helps stimulate a comfort for the human eye and ease the mind being in different atmospheres (Browning et al., 2014; Eiler Rasmussen, 2012).

Architects from Bjerg Arkitektur, that operate with well-being for humans who live in their created spaces built on a foundation of climate considerations, have been interviewed and shed light on some factors when designing with nature and children (appendix 05). Nature has an influence on changing light as deciduous trees can change the amount of light that enter a room in the summer and in the winter as a natural shade method. It helps establish a sense of season and time of the day (Bjerg Nørkjær and Wraae Jensen, 2023).

The natural environment has a lot of benefits for us humans whether it is the light entering a building or nature’s transition from outdoor to indoor. In the Maggie’s centres, the natural environment is considered very important and is present in every centre as a garden or courtyard that is directly connected to the Heartroom of the building. It is a key element for the design and described by the users as a place of sanctuary, safety, and transformation (Jencks, 2015). At the children’s hospice, Strandbakkehuset and the adult hospice Vendsyssel, there has also given special attention of integrating the natural surroundings in the building and the experience of the user. Views from the rooms into the natural environment to let light in and show the life in the deciduous forest with dears and squirrels entering the view. Windows are placed in the end of hallways or between rooms to enter the light, and a tree is placed inside the Heartroom of Strandbakkehuset to connect closely with nature where the user has the choice to be outside or inside (appendix 03 and 04). Different approaches within biophilia will be utilised to embrace nature in the children hospice.

ill. 13. visualisation materiality

materiality

At the moment, the building industry is responsible for 40 % of the annual global CO_2 emissions. Thus, there is a great potential of making a change in the building industry, as it has a high impact on the global situation. The change is necessary as without reducing the CO_2 emissions drastically, the global temperature will keep rising and have dramatic consequences (Architecture 2030, n.d.) The choices of materials can impact the total CO_2 emission of the children's hospice, but also affect the (mental) wellbeing of the children and their families, as biophilia addressed with indirect nature.

As a lead from attributing to the Biophilia approaches for experiencing nature, the indirect experience of nature can be obtained through materials. Studies from Ulrich (1984) and Kahn (2008) addressed that nature benefits the human, and an association of nature is better than none (Kahn et al., 2009; Ulrich, 1984). Through the positive stimulating effect materials have on the senses and the transformation of raw materials from nature to tactile building or interior materials, biogenic materials as wood are seen as a contribution to biophilia. The most prominent materials include wood, wool, cotton, and stone used in different elements of a building (Kellert and Calabrese, 2015). Even though scientific documentation is limited on the health impact from biogenic materials, elements of materials connected to nature can still evolve some form of psychological responses as the colour green or the structure of the wood (Browning et al., 2014). Describing the effect, the materials have on the human can be difficult and very subjective. The two nurses interviewed at Hospice Vendsyssel mentioned the wooden floors as a positive warm contributor to the atmosphere in the building (appendix 02). It enlightened the rooms and gave a warmer experience to the rooms (Poulsen and Christiansen, 2023). Strandbakkehuset also used wood in the interior (appendix 04). Wooden lamellas in the roof, niches and covering in the Heartroom as a repeated element, also contributed to a warmer association of the rooms (Højer, 2023). The wooden materials create a more homely atmosphere compared to a white clinic atmosphere in a healthcare institution. At a personal experience, wooden materials are also seen as a warmer material to enlighten the atmosphere and bring in a homely feeling to the children's hospice. Darker tones would be preferable in therapy rooms, where the focus is moved from the environment to the inner thoughts. Lighter colours in common areas gives an association, that the room is big and spatial for all the people at a hospice. The phenomenological approach will be assessed in the thesis for choosing interior and external materials that are visible for the users of the children's hospice. The approach will be followed by the LCA focus for the materials for the building, as they should be assessed with a low global warming potential as well. The two strategies for materials are seen coherently to make the decision sufficient.

design for play

ill. 14. visualisation design for play

During play children are in a different world, it gives them a chance of escaping reality and disappear in their imagination. They can create stories and spaces by simply using this imagination; the space under the table is suddenly their castle and the couch becomes a battlefield. Simple objects and building details can stimulate this interaction and play between a child and its environment (Bjerg Nørkjær and Wraae Jensen, 2023; Hertzberger and Swaan, 2009).

Play is important for a child and thus it is important for the primary user of this project; the (ill) child. However, it should be kept in mind that the patient can also be an older child and thus needs less or different play than a child does. Therefore, different options need to be explored to result in a space that will answer the needs of both younger and older children. Aldo van Eyck and Herman Hertzberger, both Dutch architects active in the second half of the 20th century, devoted their careers to designing for children. Hertzberger designed a wide range of schools all over The Netherlands and van Eyck started his career redefining and designing playgrounds in Amsterdam. Both have leading opinions of what designing for children should incorporate which will be discussed further along with Maria Bjerg Nørkjær and Carsten Wraae Jensen' experience with Kindergartens from Bjerg Arkitektur.

Hertzberger makes building details play, Aldo van Eyck makes play building details.

Hertzberger and van Eyck both worked towards the same goal, they want to let children interact with their environment and draw more attention towards this user group. However, their approaches are slightly different, both works inspiring for the design of the children's hospice with a variation in ages.

Hertzberger values the experience of a building by a child and building details where they can interact with their built environment, he describes it as a 'come play with me' suggestion of the building. In his several designs for schools, stairs have been an important element with a multifunctional use. It is a place for circulation but can also serve as an informal place for interaction, play, rest, and observation. Corridors are also considered having more than one function and are seen by Hertzberger as a multipurpose 'learning street' (Hertzberger and Swaan, 2009). This approach is also recognized in the case study of Tsurumi Children's hospice. To commute from one apartment to another or the different functions in the six separate volumes, there is one big common space, meant for circulation but also to stay and use. Spaces outside the building program can have great value too, a niche under the stairs can be turned into a reading corner by a child that wants to separate itself from the group or can later serve as a castle for children during their play. Different features of a building can be given different functions by its user that has changing needs and wishes. Hertzberger wants the user to 'flirt' with the building and let the user discover different places according to their own needs and in their own pace (Hertzberger and Swaan, 2009). The way Hertzberger addresses interaction with the built environment gives space to design for all ages, without becoming a kindergarten atmosphere where the teenager would not feel comfortable. Maria Bjerg Nørkjær and Carsten Wraae Jensen suggest

It should be like snow in a city, children take over the street, it becomes their territory, the only difference is that snow is not permanent, designing for play can be permanent.

(Eyck, 2008)

when designing for children to place yourself in the children' shoes, literally. The things that might have a normal average size to adults are an obstruction for a child. By placing windows in different heights to comply with the height of the children, and facing the main rooms for the children towards south so they can experience the change in light and seasons, gives the children a higher priority in a building (Bjerg Nørkjær and Wraae Jensen, 2023).

Aldo van Eyck became famous through his designs for playgrounds all over The Netherlands that evolved into a network for children which made them more visible in the city. All the playgrounds were designed with the same elements: a sandpit, small solid concrete elements and tall, slender steel elements. All these geometrical shapes suggest a spectrum of functions and were designed to activate the children's locomotion and imagination while being an element that merges with the city (Eyck, 2008). Multifunctional furniture is also considered precious to let the children play with the architecture. With different age groups in mind, this multifunctionality can address needs from every user and bring them together.

This project aims to combine both approaches from Herman Hertzberger and Aldo van Eyck. Both visions address the need of a child interacting with its environment and the possibilities of their imagination. The first one more passively when using building details throughout the day, it makes the child more aware of its environment and what to do with it. The second one more actively through implementing objects in the environment, that stimulates the child to actively use the (playing) objects. Both approaches are interesting to use due to the variations of children, their needs, and ages.

healing architecture

The foundation of the children's hospice lies on the theories of healing architecture, where palliative care is integrated in the definition to connect the user typology to the design intentions. The palliative and healing architecture arise from the approach of easing the human mind or mental situation through the built environment. The created surroundings should contribute to a calm and ease atmosphere that helps families in a difficult situation with a seriously ill child. Palliative care focuses on the human being, and not the disease. The hospice should therefore give the association of a home, and not a healthcare system.

Nature has an evidence-based great impact on human's mental health through several studies for recovery. Nature is defined as natural surroundings with forest, plants, and the changeable nature through seasons as the light for instance. Both views and direct contact with nature in every direction will give the user an experience of nature's strength. Experience of indirect nature can be obtained through (biogenic) materials according to biophilia. A phenomenological approach will be used for choosing materials, since the choice of a material according to their appeal, aesthetic and atmospheric expression is a subjective opinion. Besides that, a LCA of the materials will also be decisive, as the aesthetic and atmospheric expression is important for the homely feeling, and the CO_2 emission is important in the longer term to change the building industry's high impact on the global CO_2 emission.

Designing for play is vital for a children's hospice where the children should be able to withdraw in their imagination. The project aims to combine the two approaches from Herman Hertzberger and Aldo van Eyck with the children in mind. The age gap for the children is 0-18, which is also a consideration in the design since the needs of the children differs according to their age. Integration of play in the building makes it more visible and prioritised for children, while it also makes the space more flexible for the needs both of a 15-year-old child and a 4-year-old child.

user *studies*

glossary

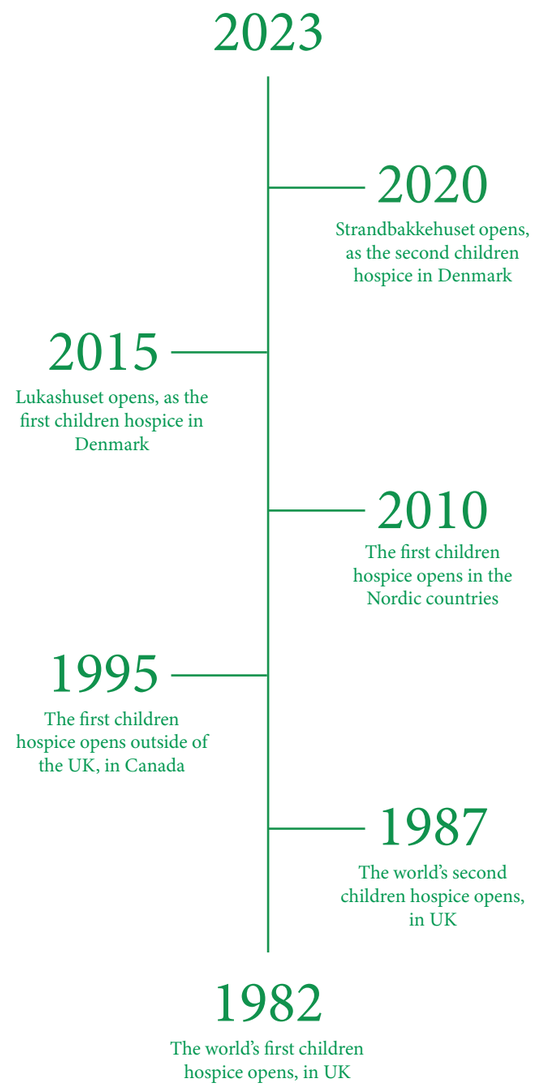
Kreahelte *: Volunteers offering space for creativity, games, imagination for the children*
Hospitalsklovne *= Clowns that strengthen the joy and love of life of the hospitalised for them to get through the illness.*
Familiehus *= A house for the families with ill children that wants to be near the hospitals facilities.*
Hygge *= Something nice, relaxed, comfortable and familiar*

history of the children's hospice

In 1982 the world's first children's hospice opened in Oxfordshire, England, with the inspiration from the parents of a young girl called Helen that was suffering from a life-limiting illness. In 1987, the world's second children's hospice opened in North Yorkshire, England. The first children's hospice outside England appeared 13 years later in 1995 in Canada (Helen & Douglas House, 2022). The northern countries, that include Denmark, Norway, Sweden, Finland, and Iceland, were later in the process of developing a hospice system for children, as the first Nordic children's hospice opened in 2010 in Stockholm, Sweden (Sandberg, 2011).

Right now, there are two children's hospices in Denmark. The first children's hospice opened in November 2015 in Hellerup, while the second opened in December 2020 in Rønde (AART, n.d.; Sankt Lukas stiftelsen, n.d.; Strandbakkehuset, 2020). Before the children's hospice, the provided service were rare, depending on the child's situation, they would use an adult hospice, that is not specialised in children (Højer, 2023). Due to the new typology, there is no known statistic on children's hospices in Denmark.

The hospice as typology has changed during the years as development of understanding palliative care and palliative architecture. The nurse and medical social worker, Dame Cicely Saunders founded St Christopher's Hospice in England in 1967. This was the first hospice connecting palliative care with the pain and symptoms the patients experienced (St Christophers, 2020). The palliative model was conducted into the first children's hospices in England providing palliative care for families with a life-limiting child. As more children's hospices were built in England and around the world, the needs and resources for a children's hospice were revaluated. In the 1990's the attention on transitional spaces and areas for the indoor and outdoor play activities were increased to strengthen the homely feeling. Besides that, rooms with sensory stimulation and different tactility materials were created. The more important requirement that was implemented for children's hospices, comparable with the adult hospices, was overnight accommodations for families to decrease their travel and logistic burden (Verderber and Refuerzo, 2006).



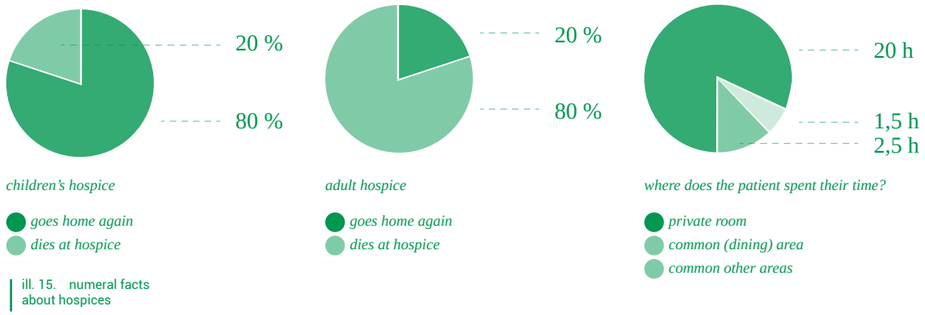
care options for terminally ill children and their families

In Denmark, there are different options for children suffering terminal illnesses life-limiting diseases. They can be offered help from a palliative team, a room at a family house or being suggested a room at a hospice. The different palliative options and placement of those are shown on illustration 16.

The most known option is a hospice. A hospice represents a place, that provides and offers care and solicitude for incurable ill and dying persons and their close relatives. It has the purpose to strengthen their life quality during the last period of their life as the hospice philosophy have addressed since 1967 inspired by Dame Cicely Saunders (Nissen, 2009). If the doctors have declared that the curative treatment has stopped working, an offer for a hospice would occur. The last period of life would be spent with point of departure in the ill person and its individual needs, wishes and resources to accommodate each person's best intentions for the last time. The number of employees is higher at a hospice compared to a hospital. They offer an ease performance by nurses, doctors, psychologists, social workers, physiotherapist, priest, and therapists. Besides that, volunteers will help the registered with performing different practical everyday work, so they maintain the focus on being together and relaxation (Larsen, 2022). The thesis will distinguish an adult hospice and a children's hospice to clarify the difference.

children's hospice

A children's hospice is defined as a place for respite care for families with (terminally) ill children. It is an offer for treatment while establishing and enabling self-realisation and a family life as normal as possible with games, play, gathering, activities inside and outside. A children hospice offers support and care for the entire family, the ill child, the parents, and the siblings (Hospice Forum Danmark, n.d.). The difference between a children's hospice and a regular hospice is defined by the percentage that get discharged. At an adult hospice it is 10-20 % that get released again, while at a children's hospice it is nearly 80 % that is discharged. Besides that, it is the entire family that is being registered and lives together at the children's hospice (Hospice Forum Danmark, n.d.).



ill. 15. numeral facts about hospices

adult hospice

At an adult hospice, the focus is on the patient and it's own health and needs, and less the relatives. Compared to the children's hospice, there is considerations for the entire family for dinner, activities, and space. At an adult hospice, they are offered a room with separate bathroom and a minor kitchenette (Poulsen and Christiansen, 2023). A stay at an adult hospice is shorter compared to the experience at Strandbakkehuset, where a family can stay between two weeks and five months depending on the child, disease, and needs (Højer, 2023). At Hospice Vendsyssel the average stay was calculated to 16,4 days in 2022 as some die the day they arrive, and some a few weeks after (Hospice Vendsyssel, 2023; Poulsen and Christiansen, 2023). Denmark has 19 adult hospices (Hospice Forum Danmark, n.d.).

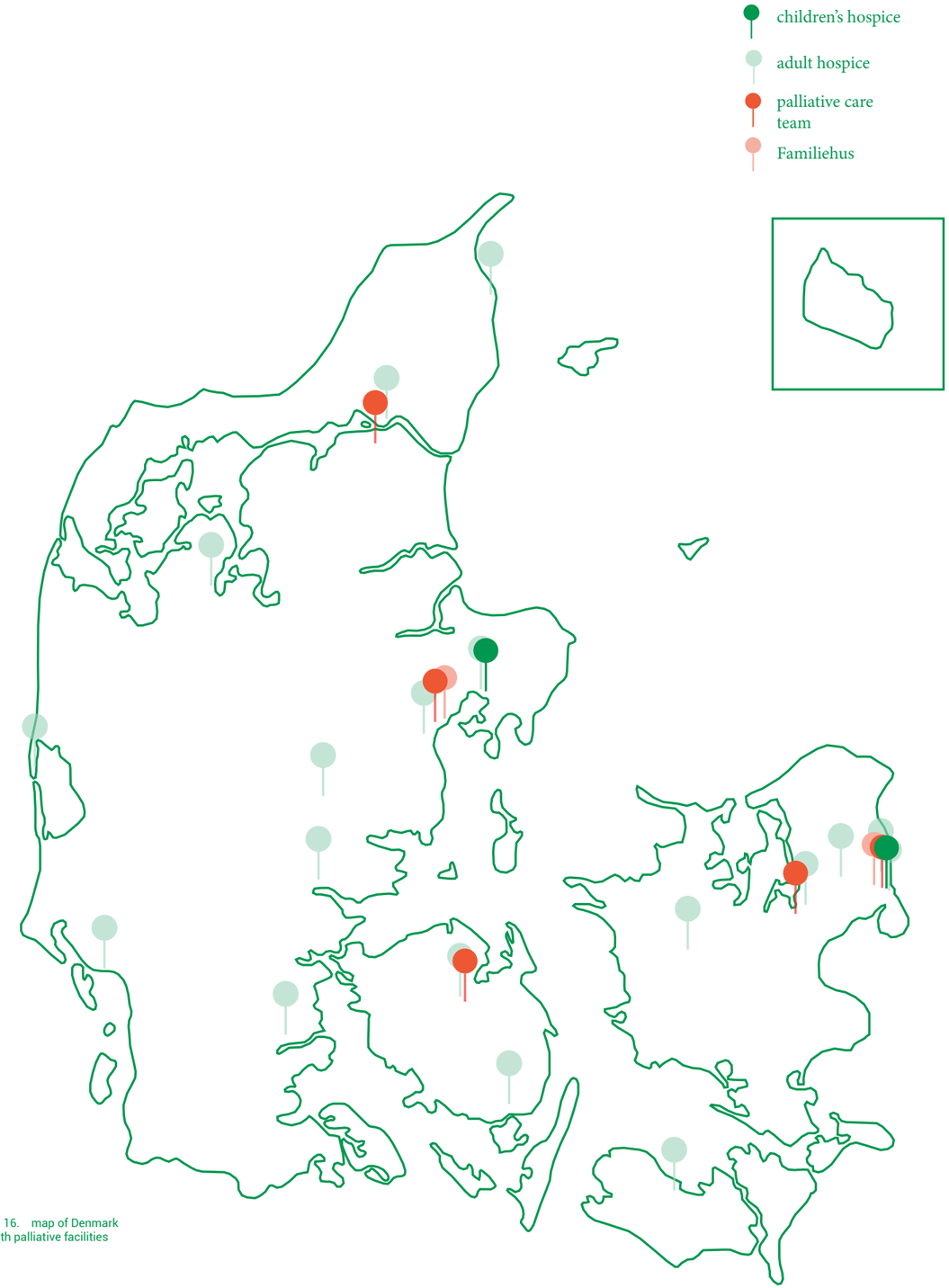
palliative team for children and youth

Another option for children and youth care in age 0-18 is the Palliative Team for Children and Youth. Each region has an attached department to the hospital's department for children that offers specialised palliative initiative for families with an incurable or terminal ill child (Rehpa, 2021). The effort is adjusted to the families and orientated to support the individual needs and conditions to obtain the best possible life quality and strengthen the options for dying at home, if it is intended. The care contains easing the physical symptoms, maintaining the functional level of the child, offering psychological help, guidance for the family, and coordinating the care with the municipality, own doctor, and hospital (Aalborg Universitetshospital, n.d.). The team enables the care for the child and family when they stay at home. It is very important that children can have a normal everyday life and as normal as possible for a child, while being ill ("Familier i sygdommens kløer," 2021).

Familiehus

The vision of the Familiehus is to create a space for the families with a long-term hospitalised child. The families can be together in calm homely settings while they have helping hands near them all the time as each Familiehus is placed close to a hospital. It is mainly run by a manager, secretary, an administrative employee and about 50 volunteers. They are taking care of the relatives with a focus on shadow children (siblings) in contrast to a children's hospice, there are no doctors, nurses, or therapists employed (Nørr and Yde Højrup, 2017).

There are currently two Familiehuse in Denmark, running on funds. The Ronald McDonald House at Rigshospitalet in Copenhagen, and Trygfondens Familiehus at Skejby Sygehus in Aarhus. A third is being developed in Odense, at the University Hospital ("Ronald McDonald Hus," 2022). There are rooms for 22 families at Trygfondens Familiehus were also grandparents and other relatives can stay. Furthermore, there are various living- and activity rooms, as well as a shared kitchen ("Trygfondens Familiehus er," n.d.).



ill. 16. map of Denmark with palliative facilities

”…Det blik jeg får, når de hører, hvor jeg arbejder. Altså jeg er ikke ked af det, du behøver heller ikke være ked af det”

(Translated: The look I get, when they hear, where I work. I mean, I am not sad, you should not be sad either”)
Lisbeth Højer, Nurse, Head of the Department, 2023

”Fordi der er fokus på børnene og ikke på sygdommen, så hjalp det også mig til at kunne se mine børn. Begge to. I det her. Der blev fokus på livet, fremfor behandling og sygdom”

(Because there are focus on the children and not just the illness, it also helped me to see my children. Both of them. In this. There became a focus on life instead of the treatment and the illness.)
Mother to Knud (Registrered at Lukashuset)

”Børnehospice. Det skreg jo i ørene, det skreg jo af død. Når man ikke har den store viden om det, så forbinder man det jo med det sidste sted, det er endestationen. Men det er en helt anden oplevelse vi har, når vi er her i dag.”

(Children Hospice. It screamed in the ears. It screamed of death. When you do not have much knowledge about it, you connect it to the last place, it is the end station. But it is a completely different experience we have now, when we are here today.)
Mother and father to Mathilde (Registered at Strandbakkehuset)

change of assumptions about a children´s hospice

The group visited the newest children's hospice in Denmark, Strandbakkehuset, the 8th of February for a tour around the hospice facilities and an interview with the head of the department, Lisbeth Højer (appendix 03). The headline for the experience is 'Change of Assumptions', as it enlightened and informed us what a children's hospice actually is and feels like, how it is utilised, and how the atmosphere is from an inside perspective. The prejudices for the term 'Hospice' originate most likely from the adult hospice, that functions as the ease treatment for incurable and terminally ill persons. A dark and sad topic. A place for people to attend to use their last time. Death as a taboo.

The case was different for a children's hospice, as the few circumstances that occur with death are rare. The statistics were one example, but the atmosphere and people who were seen and met at the hospice enlightened the building and cleared the area of heavy clouds. The vision at Strandbakkehuset was “LIV, LEG og LINDRRING” (translated: Life, Play and Relief) which made sense according to how Højer was telling about the hospice and seeing siblings to the ill children, playing around in the building, in the Hjerterum, up and down the stairs, laughing and playing games, while we curiously walked around at the tour. The personal experience was associated with a place filled with life and joy as the meaning of life was enhanced, when walking through the doors to the children's hospice.

the user group (their needs)

The user group is divided into three hierarchical groups to set the focus on who to design for and their needs in the children's hospice. Defining the user is developed through the investigated material, knowledge and empirical information created and mentioned in the report.

the ill children

The ill children are the priority. Their needs are individual and important to know for the right treatment and care. The age of the children may differ as the change of children occurs, which requires different facilities and needs in the rooms in order of their individual ages.

Their needs:
Homely feeling and calm surroundings.
Toys, play and tools according to the age.
Experience joy, laugher, and life.
Specialised treatment.

the family (siblings)

The family is the second most important user group and consists of parents and siblings to the ill child. They have the possibility for being registered at the hospice as a family in the available unit. A family would need a room to sleep in and facilities for the siblings to distract their mind from their ill sibling.

Their needs:
Homely feeling and calm surroundings.
Needs to feel like children.
Room for both parents and siblings next to the child.
Experience the change of seasons.
Calm surroundings.

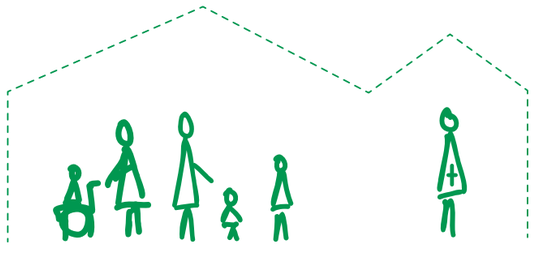
the staff

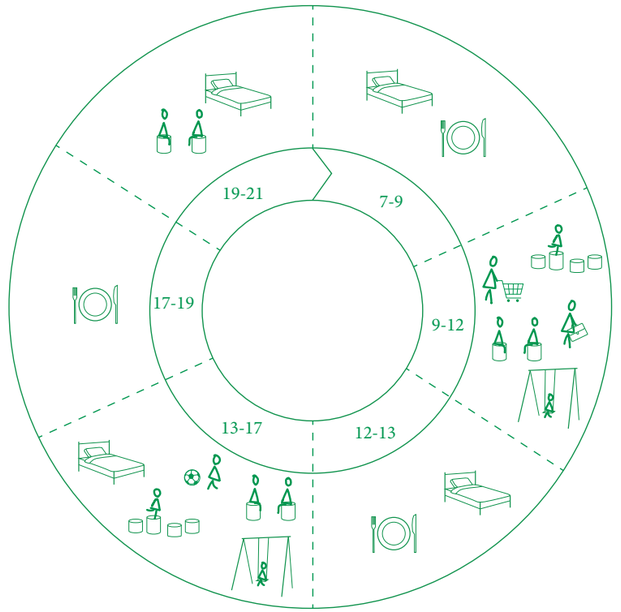
The staff is the third and least important user group, however staff has an important (administrative) role for maintaining a hospice with care, treatment, office work, and the entire service caretaker system. They are needed for the hospice to work and to help the registered families.

Even though the staff is not the priority group they still deserve their space in the hospice that facilitates their needs and wishes. When the carers are taken good care of they can take better care of the patients, this creates a virtual circle of hope and support for both parties (Jencks, 2015).

Their needs:
Office facilities.
Breathing space with a closed door.

ill. 17. visualisation user group





ill. 18. time schedule of living in a hospice

a day at the children's hospice

The child, Theo, is 6 years old, and suffers from a neurological disease that decreases his life function by pain and partly paralysis in the face. He has been registered at the hospice for one month with his family, mother, father, and a younger sister at 4 years old, Trine, and an older brother at 11 years old, Kristian. Because of his illness, Theo depends on the care from the nurses to decreases the pain and relief, partly, the load on the parents. When Theo needs treatment, the parents often spent time with Theo's siblings to make sure they do not feel left out. They paint or run around outside on the playground. The nurses are also helpful to bake waffles or find activities for the children, while the parents take care of their work or do groceries during the day.

Before coming to the children's hospice, Theo and his family lived in Thisted, where both parents are working. Three days in the week, Theo's dad needs to drive to Thisted for work. The brother, Kristian, receives online lessons from his school, while they stay at the hospice. Trine needs activities and games. Theo uses most of the hours in his room, in the bed or a chair, as his disabilities make it difficult to be a part of the activities. He joins the family for the meals in the common kitchen to strengthen the homely family feeling.

One day at a children's hospice is never the same as the one before. The activities change, the registered families change, and the staff changes. Some common activities may be scheduled for the same time every day, while other periods the families can choose for themselves what they prefer. The treatment would also differ according to the individual child and needs and when this treatment would occur. On this page a character child and its family will be followed throughout the day to give an understanding what life at the hospice looks like.

The character, Theo, needs treatment three times during the day, while the two siblings either have lessons or play around. The parents might achieve doings in the meantime or relax. Another situation could be, that the child is 15 and suffers from the repercussion of a leukaemia process and is functioning enough to drive around in a wheelchair, while the younger siblings need more attention after the hospital process. The timeline is made as an example for a day at the hospice inspired by the visit at Strandbakkehuset and Hospice Vendsyssel, and the narratives from families.

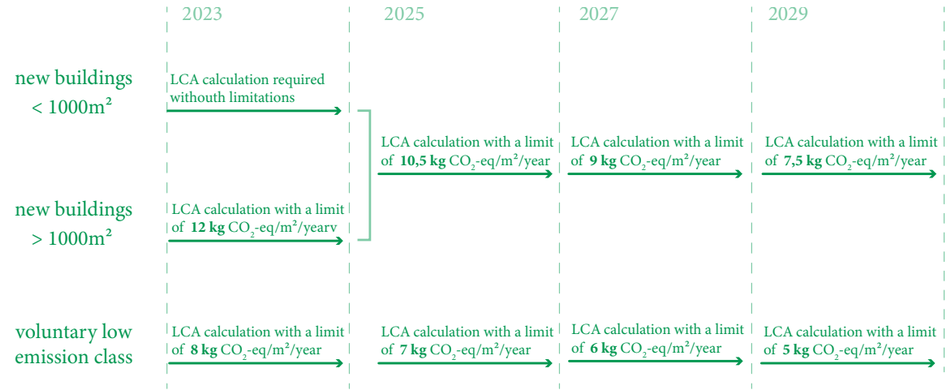
user studies

A children's hospice focusses on the entire family, besides the (terminally) ill or life-limiting child. The respite care and ease, and the resources and needs for a room, takes the point of departure in the individual child and age. The overnight accommodation is vital for the parents and siblings to cope with the logistic situation and feel slightly relieved.

It is important to secure a normal as possible everyday life for the children and their families while staying at a hospice. Arranging activities and given facilities for different games, play, creativities, and laugher both inside and outside takes the mind of the disease.

The focus is placed on life and joy at the children's hospice due to the hospice function and statistic, that 80 % get discharged again, while it is only 15-20 % that dies at the hospice. Each child is different and has different needs, illness, and age. The accommodation should offer flexible options to include every user profile.

life cycle *assessment*



ill. 19. visualisation LCA regulations Denmark

regulations

With the goal of lower CO_2 emissions and to contribute to a better future, Denmark has set up new regulations that started in January 2023 and are getting stricter in the upcoming years. According to the new requirements, every new building must document its global warming potential (CO_2) by a Life Cycle Assessment (Bolig og planstyrelsen, 2022).

Life cycle Assessment is a tool that is able to calculate the total environmental impact of a building during its entire life cycle, by implementing generic data or data from product specific declarations from for instance Environmental Product Declarations (EPD)) (LCA Centre, n.d.).

During the assessment, different stages are defined: production, construction process, operation, end of life and other external influential factors. All these stages have different influences on the result. Some of them are more energy-use related while others are more about the material use or construction method. The assessment will result in a final number given in Global Warming Potential (GWP) ($kgCO_2\text{-}eq/m^2$) (Kanafani, 2022). Life cycle assessment is ideally used during the design process to give extra information that can help in taking decisions influencing the CO_2 emission of the building positively. When used during the design process, the chance of reducing the CO_2 emissions of the building will be the highest. Therefore, a life cycle assessment will be made and used during the design process to assess the different possibilities and help choosing the most sustainable option.

the goal

The goal for this project is to reach the Danish regulations for the voluntary low emission class of 2023, which is 8 kg $CO_2\text{-}eq/m^2/year$. The focus of the calculations is Global Warming Potential of each material and the final construction in total, because of the current regulations, and because it is relevance in relation to the climate change that is going on globally.

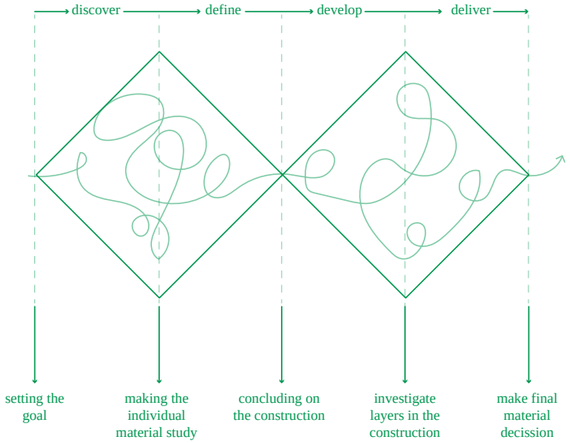
The architectural material goal is to create a building that respects the surroundings by using materials that are associated as much with nature as possible, while keeping the expression as simple as possible.

The new LCA requirement that is active from 2023 in Denmark limits the GWP of buildings over 1000m² to 12 $kgCO_2\text{-}eq/m^2$, for buildings under 1000m² there needs to be an LCA analysis but there are no limitations yet. From 2025 for all buildings, no matter the size, there will be a limit of 10,5 $kgCO_2\text{-}eq/m^2$ reducing to 7,5 $kgCO_2\text{-}eq/m^2$ in 2029 (Bolig og planstyrelsen, 2022).

stage	product			con-struction process		operation							end of life				external factors
module	raw material supply	transport	manufacturing	transport	construction installation process	use	maintenance	repair	replacement	refurbishment	operational energy use	operational water use	de-construction / demolition	transport	waste processing	disposal	potential for reuse, recovery, recycling potential
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D

included in LCA analysis

ill. 20. visualisation LCA stages



ill. 21. visualisation LCA through double diamond design model

the LCA stages

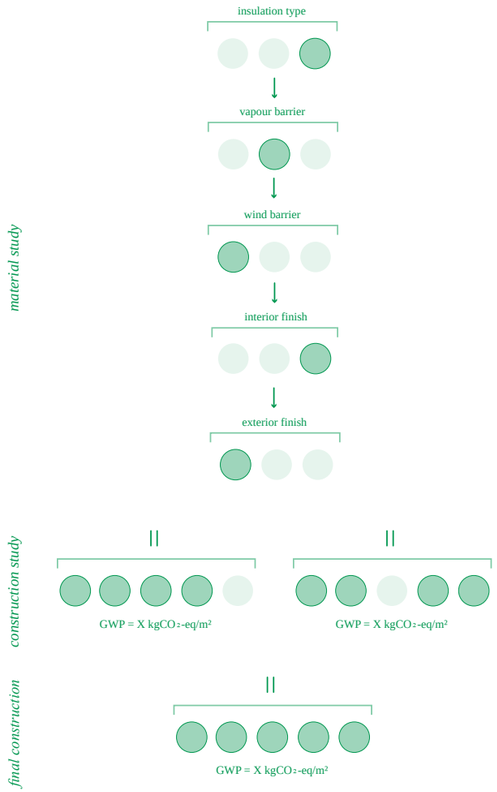
A1-A3 production
In this stage, the environmental impact from the extraction of raw materials, transport to production, and the production itself is described.

A4-A5 construction process
In this stage, the environmental impact of transporting materials and soil to the construction site is described. In addition, material waste and energy consumption on the construction site are also included.

B1-B7 use
In this stage, the calculations only include B4 and B6. B4 is replacement during the calculated period, which means that if a material has a shorter life than 50 years (the period the LCA is made for), a replacement is included in the life cycle assessment. B6 is the energy consumption that relates to the heating of the building and building operation energy. These values are calculated in the energy framework.

C1-C4 end of life
In this stage, the environmental impact is described when the building is not used anymore, and it must either be taken down or demolished. The disposal of the materials and their handling are evaluated. In this stage, only C3 and C4 are included in the analysis, which includes the treatment of waste and disposal.

D beyond the building life cycle
In this stage, the potential gain from reuse, recovering, and recycling of the materials is considered.



ill. 22. visualisation LCA strategy

the strategy

The structure of the life cycle assessment is divided into three stages: an individual material study, a combination study, and the final study resulting describing the emission of the finished design. The material study is split up in structure, insulation, vapour barrier, wind barrier and interior- and exterior cladding for the exterior wall. Also, a material study is made for roof cladding and ceiling.

The choice of materials is based on both their global warming potential and on the phenomenological experience of them. As learned from research and theories (Kahn et al., 2009; Kellert and Calabrese, 2015; Ulrich, 1984), nature based materials have a positive impact on the wellbeing of the human but also on the wellbeing of the planet (Building Centre, n.d.).

This initial material study is followed by a combination of the elements with lowest GWP into different constructions of exterior- and interior walls, roofs, and slabs to investigate the efficient performing construction for the building that will then result in the final construction combination.

life cycle assessment

This thesis aims for the low emission class 2023 of 8 kg CO_2-eq/m^2/year, following the Danish regulations, with focus on GWP. The strategy of reaching that is by implementing LCA in the design process through material- and construction studies, to address the best performing materials and constructions for the final design proposal. To assess the materials and constructions, different factors and stages are taken into account.

Another aspect of choosing materials for the building is through a phenomenological approach, by own experiences and opinions. The final building proposal request for a simple expression, that fits into the natural surroundings.

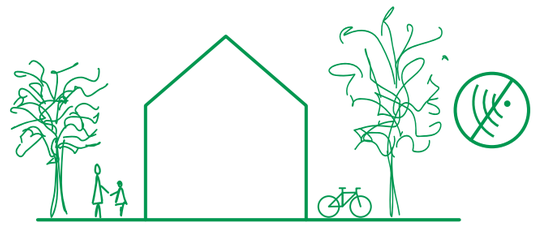
site **studies**

site criteria

As the children's hospice will serve the northern part of Denmark the site should be located in Northern Jutland. To be able to assess a more specific location, some important site criteria have been developed through the research presented earlier in the report.

As nature is a very important part in the vision of this project, being surrounded by nature is the most important criteria for the site. The ill child and family should be able to enjoy the calm and quietness but also activity from nature, experience the seasons and retreat themselves from the busy life. At the same time life, shops, sport facilities and other daily activities should not be too far away since the family should not feel excluded from the world outside the hospice. Therefore, a supermarket should not be further than a 5 min car drive away and the site should be nearby a hospital, no further than a 30 min drive by car, considering a child might need medical (urgent) treatment from time to time.

...surrounded by nature



... in a calm area with only slow traffic around, decreased noise and quietness

...within a maximum 30 min cardrive to a hospital with children's department

... within a maximum 5 min cardrive to a supermarket

ill. 23. site criteria

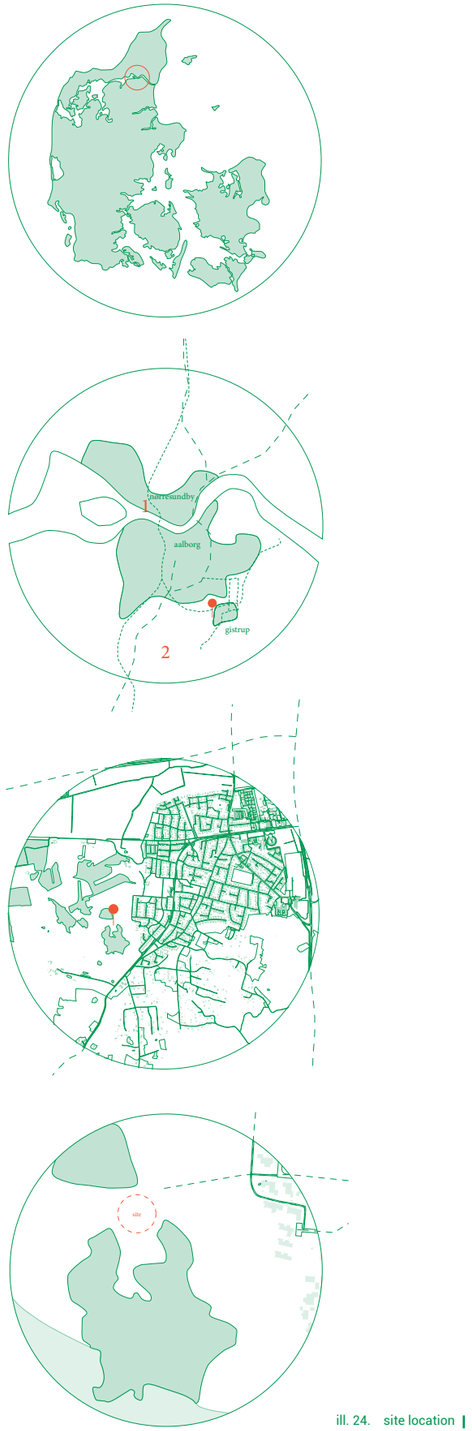
placement of site

Choosing the location of the project is starting with assessing different locations according to the criteria that were set before. The area around Aalborg is nearby a hospital and has enough supermarkets and recreational activities around, therefore, several locations near Aalborg have been explored. At Nørresundby (1), north of Aalborg, an abandoned area with a view towards the Limfjord was considered. This site did not meet the criteria for calm area with slow traffic. The train passes next to this location, while it is near a main road with noisy traffic. Furthermore, a future highway is possibly being constructed west from this site.

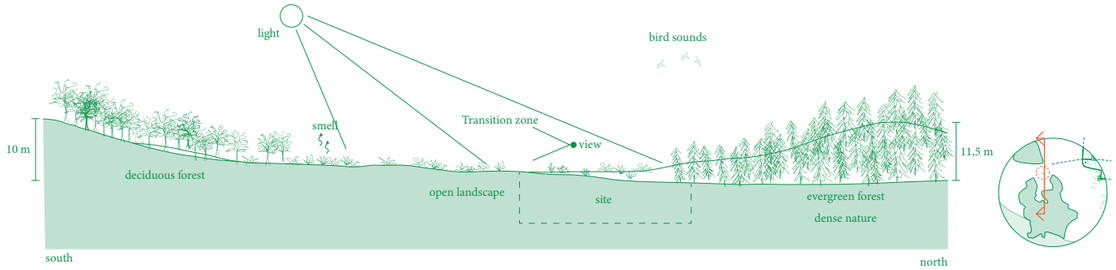
Another location close to the lake of Poulstrup (2) where considered. The nature around the lake is preserved and makes it difficult to build the children's hospice. Furthermore, there is a long distance to the nearest supermarket, which would require more time for the families to be away from the hospice.

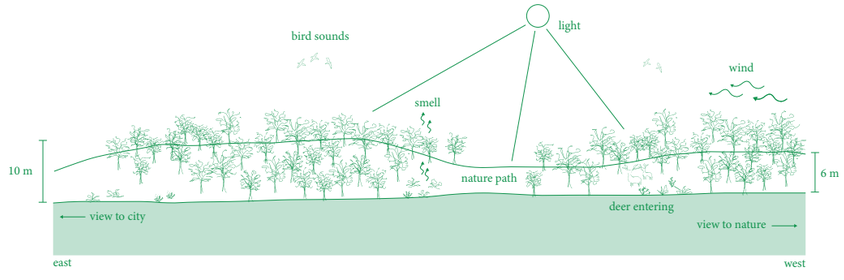
The chosen location is in Gistrup (3), south from Aalborg. The site is surrounded by nature in a calm area near a residential neighbourhood with light traffic, and has the facilities required by the site criteria nearby.

Since there is no district plan or municipality plan for the site in Gistrup, the strategy plan of Aalborg Kommune is valid in the area. According to this strategy plan, Aalborg Kommune aims for a sustainable and environmental conscious behaviour as the foundation for green transition (Aalborg Kommune, 2023). As this goal suits the goals for the thesis, this area will become the site for the development of the new children's hospice.



ill. 24. site location





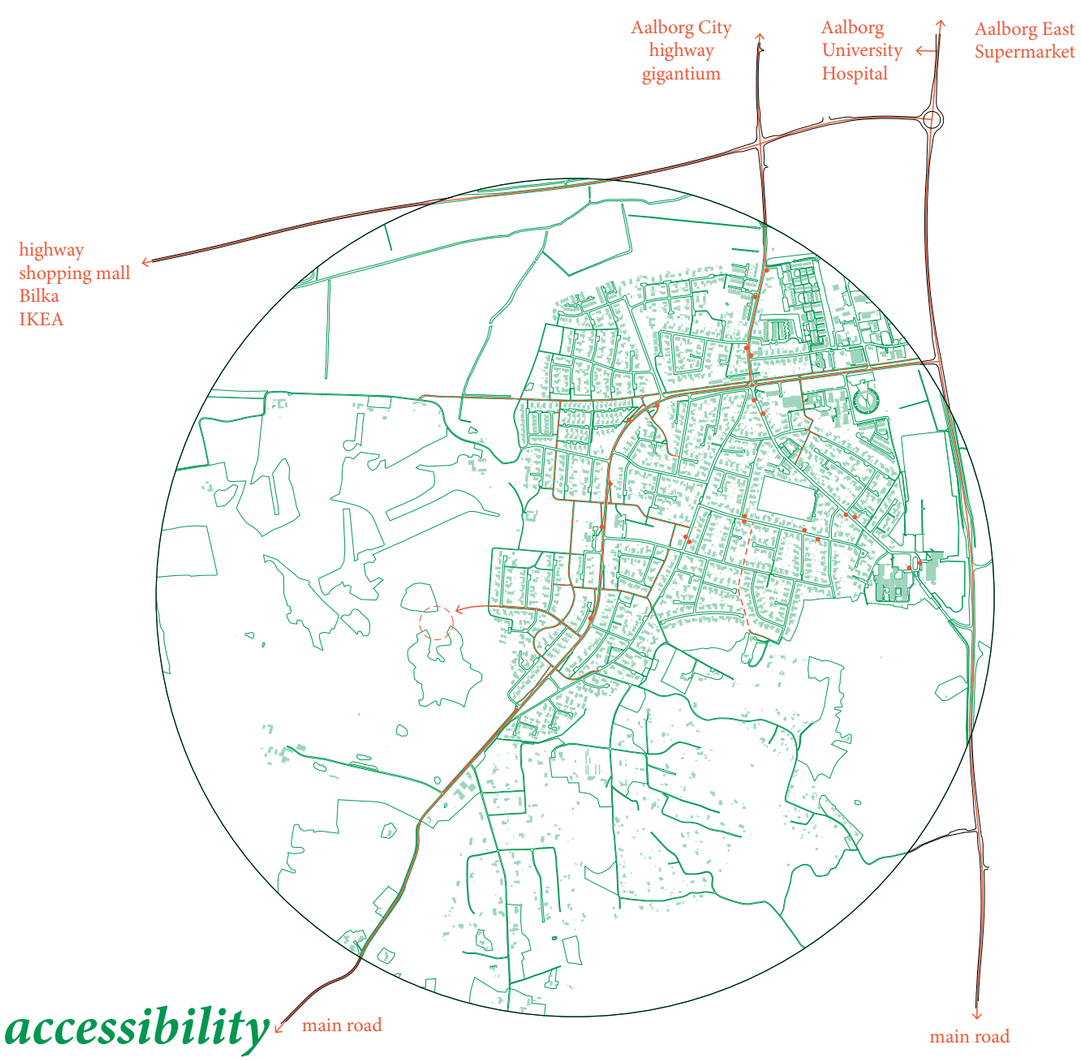
ill. 25. phenomenological experience site

no scale

site section

The site was visited through two times at noon during March and May to get an understanding of the site, its change of seasons and the atmosphere, when staying there and experiencing the site from a phenomenological approach.

Seen from a personal experience, the site gives the expression of a wild area of nature that unfolds as it wants. The site is only a few 100 meters from the first houses in the village, which results in an almost completely quite area with only the sounds from the birds singing in the trees. A breeze arrives occasionally and enhance the smell from the leaves and forest floor. The topography curves slightly down in a minor valley, where the children's hospice would be placed, in between the evergreen and deciduous forest. The site has a transition zone between the two forests, where it levels off and creates a sunny and quiet area. Minor wild bushes are spread in the middle of the area that scale the nature down in a reachable level.



accessibility

Gistrup can be considered as a village with one main road through the city from north to south, with minor connecting village roads. For pedestrians and bicycles, there is a network of retracted paths following the main road. The paths are surrounded by nature and in a more safe and calm space retracted from the cars and busses.

There is a drive of 6 km to the highway which leads to northern and southern Denmark. From the site, there is easy access for the crucial facilities, as two supermarkets and the University Hospital are accessible through the main road by car or the minor paths by walking. Furthermore, the main roads lead to a shopping mall 10 km towards west, or Aalborg city centre 12 km towards north, as well as to Gigantium with sport events as handball- and ice hockey matches 5,6 km away.

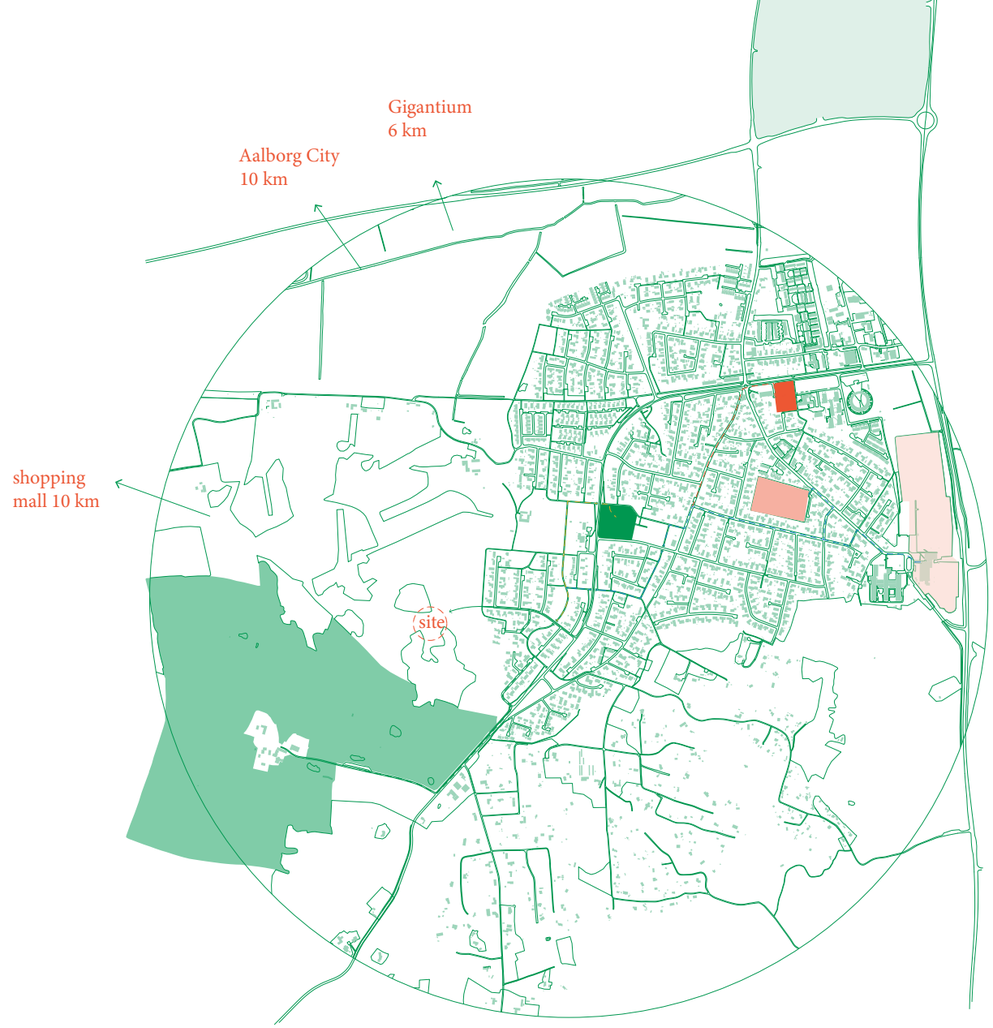
1:21660 N

bus stop

bicycle and pedestrian path

car road

ill. 26. accessibility of the site



facilities

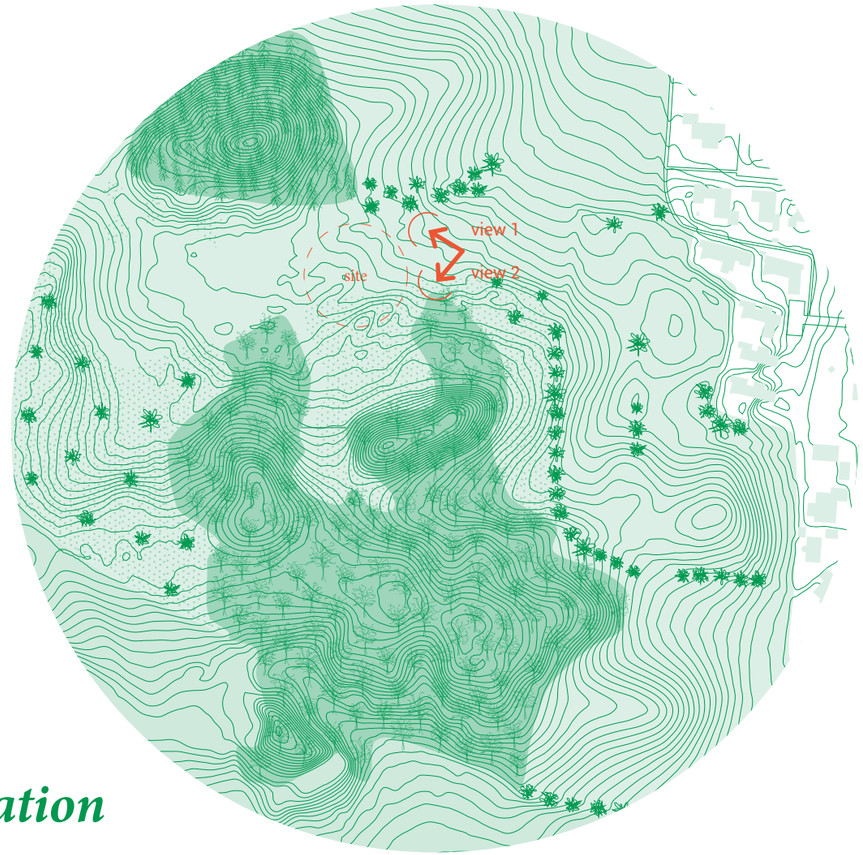
1:21660 N

golf court	1,5 km / 19 min walk
church	0,8 km / 10 min walk
supermarket	1,7 km / 20 min walk
Aalborg University Hospital	3,6 km / 6 min drive
football field	1,6 km / 20 min walk
sports center	2 km / 24 min walk

ill. 27. neighbouring facilities of the site

Gistrup is a small size suburb, 12km away from the city centre of Aalborg. The city of Gistrup accommodates several facilities for the whole family. There are different sport facilities, shops, recreational areas, and a lot of nature. There are two supermarkets within 1,8 km from the site, and the University Hospital is 3,6 km from the site. Gistrup offers many opportunities for sports activities as a nearby football field, and a sport centre with paddle tennis, football, badminton, tennis, basketball, etc.

Since Gistrup is located close to the city centre of Aalborg and a shopping mall south of Aalborg, there is a lot of opportunities to utilise facilities as a cinema, shopping, restaurants, culture, etc. for the entire family.



vegetation

The site is surrounded by untouched nature with an evergreen forest towards north and a deciduous forest towards south. The trees in the south have the opportunity to prevent overheating in summer but allow the winter sun to fall in in the dark months. The deciduous forest is not as dense as the evergreen forest, which allows walks and play in between the trees. The two times, the site was visited in March and May during noon, the seasons had changed through winter to spring, which gave an insight into the colours that would appear at the site and surrounding the children's hospice. The evergreen forest had its continuous dark green colours, while the lighter and brighter green colours were unfolded in east, west, and south.

Furthermore, there is areas of dense bushes and free-standing trees, that makes the site feel completely embraced by nature. The site is placed near fields and a golf court that enhance the green landscape for the children's hospice.

1:4000 N

evergreen forest
deciduous forest
golf court
fields
trees
bushes

ill. 28. vegetation on and around the site

view 1 march

view 2 may

view 1 march

view 2 may

ill. 29. the site in winter and summer time

site studies

The site of the children's hospice is located south of Aalborg at Gistrup. It meets the criteria for the children's hospice, with a close distance to supermarkets and the University hospital. Different sport activities are available in Gistrup for the families, and other facilities are located nearby Aalborg with malls, culture, and shops, if the families need diversity.

The site is placed near a village with slow traffic, that reduce the noise at the site. Nature surrounds the site and keeps the area green all year round. A deciduous forest towards south enable sun to pass the trees in the winter period and takes some of the heat during the summer. An evergreen forest towards north maintains the intended nature of the healing architecture approach on the site.

final **problem** *statement*

How can the built environment and nature contribute to a better life quality of a family with a (terminally) ill child at a children's hospice, where the community feeling helps overcoming the illness, while assessing materials according to the global warming potential and aiming for a low CO_2 emission class?

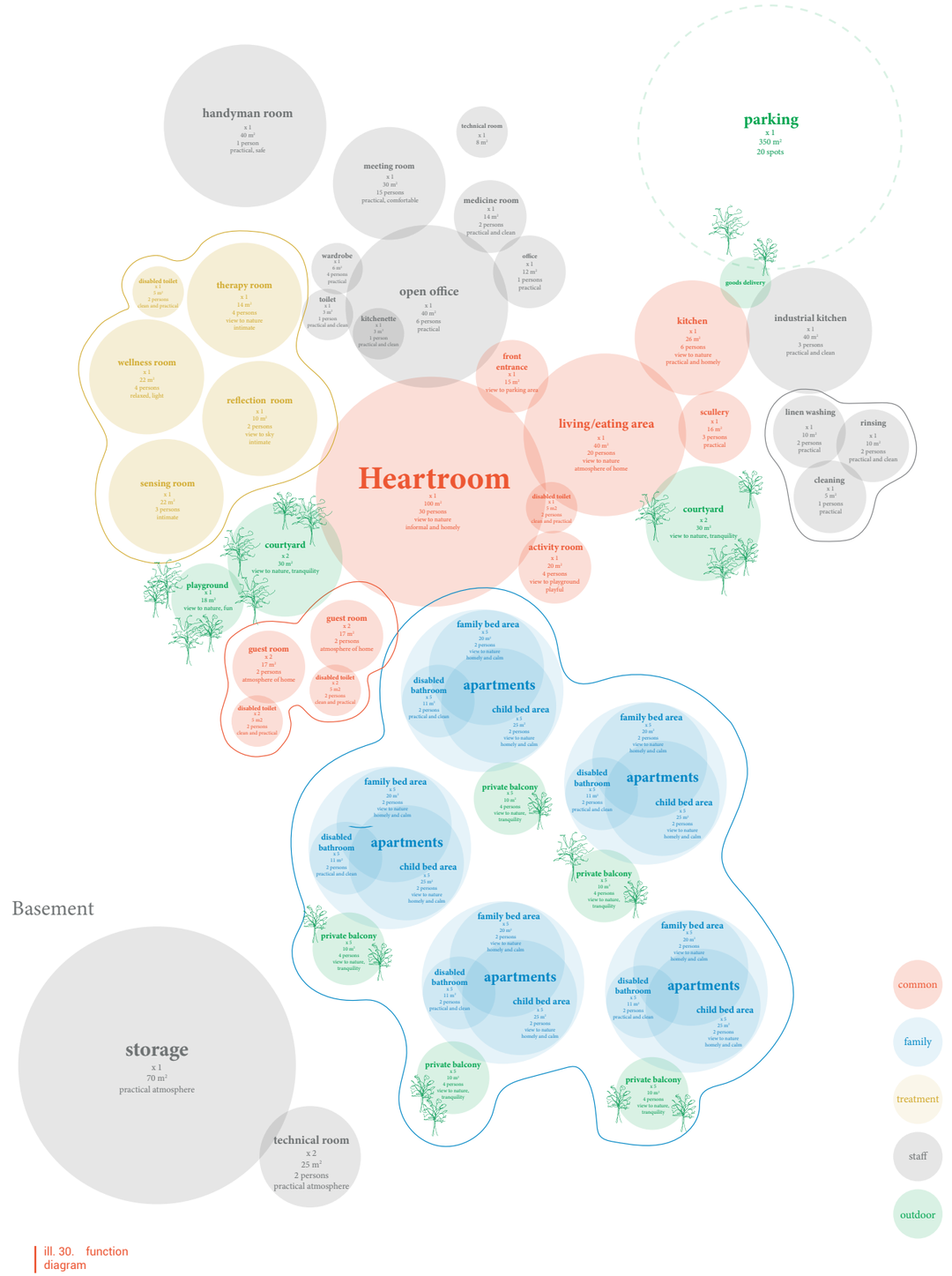
The problem statement is the foundation for the thesis based on the research, cases, and analysis studies. It sets the setting for the design process developing the children's hospice with a point of departure. Elaborating on the problem statement, it focuses on the Healing Architecture approach with the defined parameters as Nature, Materiality, and Designing for play, that as combination create the foundation for a community at the children's hospice. The community unfolds from the case studies 'Maggie's centre', where the community is addressed through "kithenism", and at 'Strandbakkehuset', it is addressed through a "Heartroom" as a centre for the families. It contributes with safety and care to the entire family. Accounting for the term 'hospice' has also clarified the meaning of being together as a family, with other families in the same situation, where the children's hospice as a palliative care option distinguishes.

The children's hospice should address the question about the building industry's impact on the global CO_2 emission, why assessing materials is a focus to obtain a low CO_2 emission. The goal is to reach the 2023 Danish regulation for low emission class at 8 kg CO_2/eq/m²/year by investigating different materials, and how they fit in with the users and the environment at site.

function diagram

A function diagram is made to give a visual understanding of the different functions and their interrelations within the design. The functions included in the diagram are functions considered necessary for a children's hospice according to the research that has been done previously to making this diagram. The children's hospice also takes inspiration from the competition brief from Buildner Architecture Competition, which were also participated in (appendix 06). Some of the functions, that were required for the competition, are considered for the thesis as well.

In this function diagram each function in shown as a circle. The colour of the circle groups the function into different zones and the size of the circle shows the area and importance of the function. The interrelationship of the functions is shown where the circles touch each other.



ill. 30. function diagram

the design should...

...be close to nature
There should be a close link between outdoor and indoor spaces. This can be done by giving the user the chance to open up multiple spaces towards the outside. Nature should be included in the interior design of the building while creating a healthy balance between the use of the nature outside and the preservation of it.

...stimulate play/interaction with the building
The design should activate play for the (ill) children through the design of the hospice by integrating play 'objects'. These play object should offer a distraction and let the children escape in their fantasy world. There should be left space for the children and their families to fill in according to their needs.

...create a home for the family
The hospice should oppose the clinical hospital atmosphere and act as a home for the family. It should be a homely and comfortable space where the children and their family can walk around in socks, the children can play on the ground and get around without a supervising adult.

...create a space for a supportive community and privacy
The design should create a supportive community for the entire family. It should bring together families in the same situation and encourage contact and support while also offering relief and retreat when necessary.

...have a core in the building to avoid hallways
The building should not act as a hospital but as a home and therefore not have major hallways. As seen in Strandbakkehuset a Hjerterum will serve the building as the core where everything happens and as the connecting elements between the different functions. The Hjerterum should act as the living room in a family house.

...materiality as a healing element
The materiality of the design should be carefully considered according to their global warming potential but also according to their phenomenological impression. This parameter should also oppose the clean, white hospital atmosphere and translate the homely, warm feeling.

...apartment with calm view towards nature and south
As noticed in the case studies (Strandbakkehuset, Hospice Vendsyssel) and assessed as beneficial through the research of healing architecture, the apartments should offer a view towards nature and ideally be oriented towards south so the children and their families can experience the change of day and season during their time at the hospice.

ill. 31. design criteria

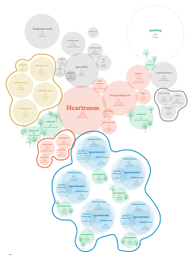
design process 02

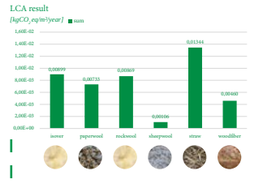
The design process is an iterative process where various elements of the design, both aesthetics and engineering are explored and brought together through different methods. This process will be shown in a simplified way to lead up to the final design and presentation of the project. Analogue drawings, diagrams and models are supported by digital analysis and drawings that will be scaled according to the necessary detail level. These will be illustrated in this part of the report following the different phases of the design process starting with a timeline to clarify these phases and show the general development of the design. This will be continued by the functional diagram as a base for the first iterations. The detailed needs for the different functions will be explored through case studies, research and discussion. The creation of a community-based design is followed up by the detailing of the plan. Life cycle assessment and material considerations are followed up by the structural analysis and indoor environment studies.

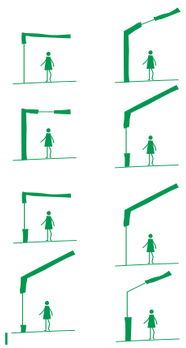
timeline *70*
plan follows function *72*
identifying the needs *76*
identifying the windows and views *78*
creating a community *80*
life cycle assessment *84*
structural concept *94*
daylight studies and indoor environment *96*

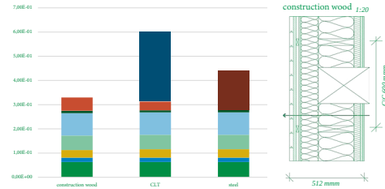
field trip

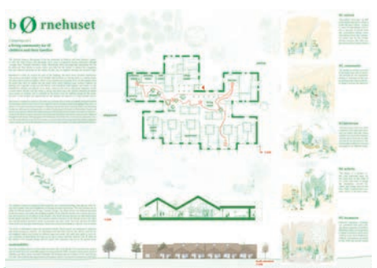
to understand the site and surroundings and to exactly locate where the design will be placed.











field trip

to understand the site in summer time

start design

status

design freeze

project

process

seminar

competition deadline

deadline

01 plan follows function

02 identifying the needs

03 creating a community

04 LCA

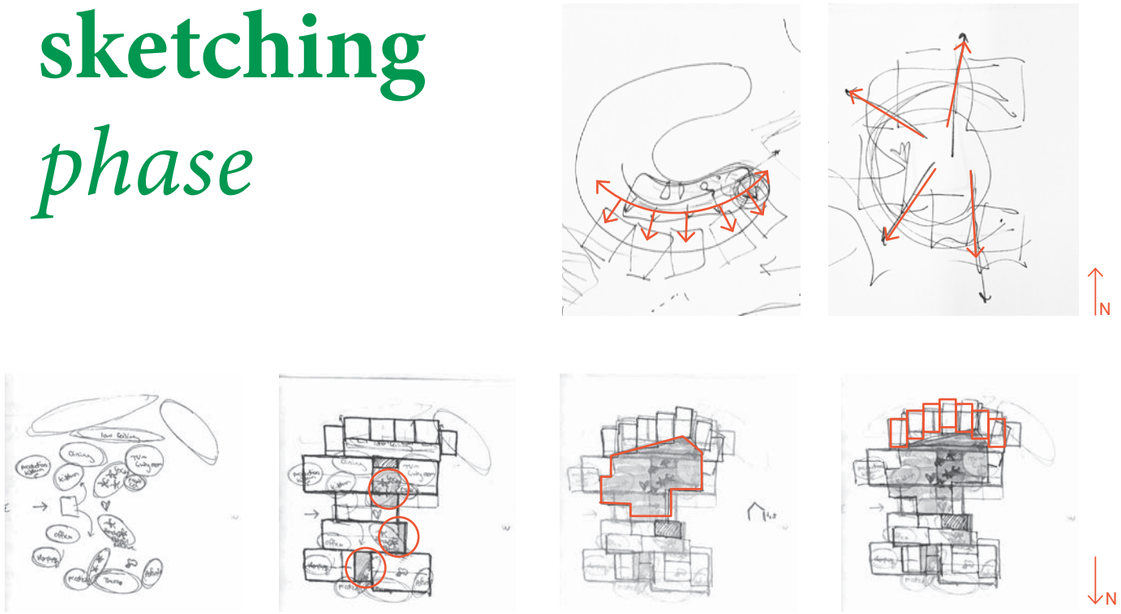
05 structural analysis

06 daylight and indoor environment studies

= sketching phase

ill. 32. time line of the design process

sketching *phase*



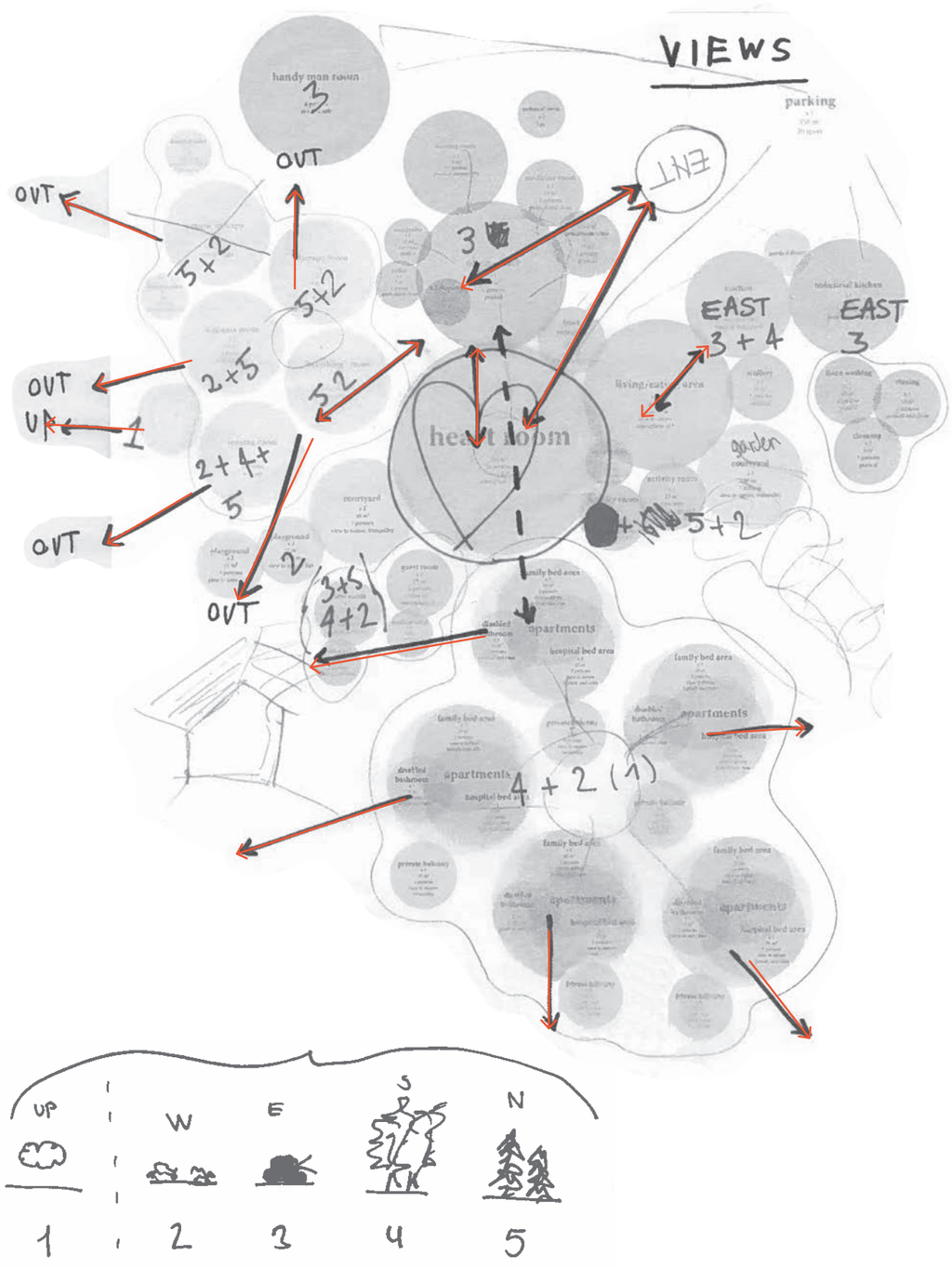
ill. 33. early design iterations - plan

plan follows function

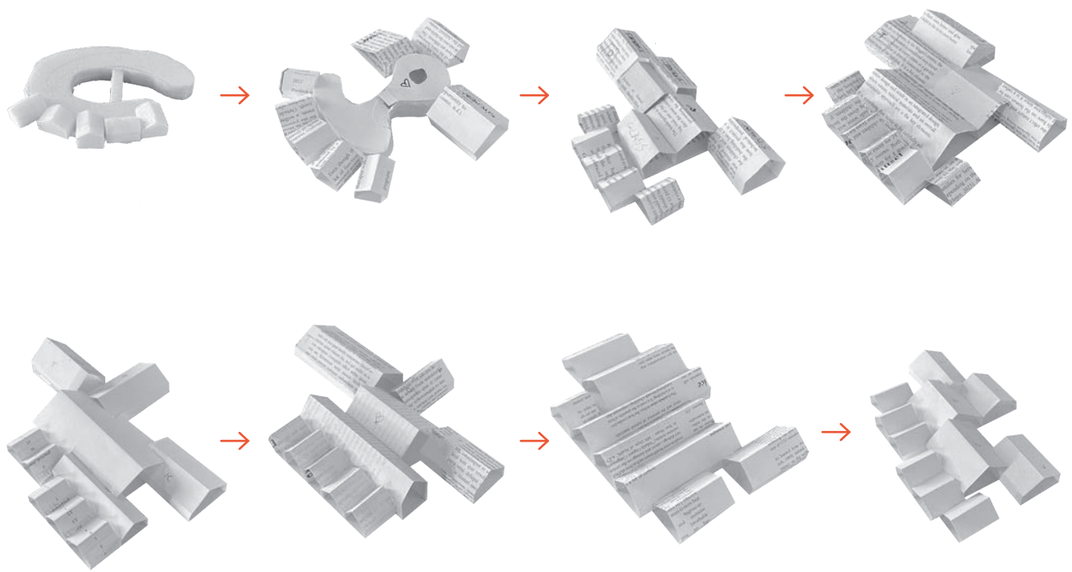
The design process is an iterative process. It begins when starting up the very initial phase of the project and does not end until the final project is delivered but even then it can continue. To simplify these phases the design process begins where the analysis phase ends: with the functional diagram (ill. 34). Elaborating on the functional diagram gives a better understanding of the needs of the different functions. Aspects such as orientation, views, and relation in between the different functions are visualised in the functional diagram.

The relation to nature, an important part of the vision for this project, can be translated partly in the orientation of the different functions towards the different types of natural surroundings. The evergreen forest in the north creates a very intimate and private atmosphere fitting the needs for the treatment rooms. The east of the site is oriented towards the village and the west side is oriented towards low-density nature. Naturally the entrance will be from the east which also makes a perfect orientation for the kitchen since it is desirable to have it easily accessible for delivery. The west part of the children's hospice is oriented towards nature and thus can host a lot of different functions. The nature surrounding the building in the west is perfect for an active outside area that can be embraced by the building and bathe in the evening sun. The open nature followed by a deciduous forest in the south of the site is a perfect view for each individual apartment.

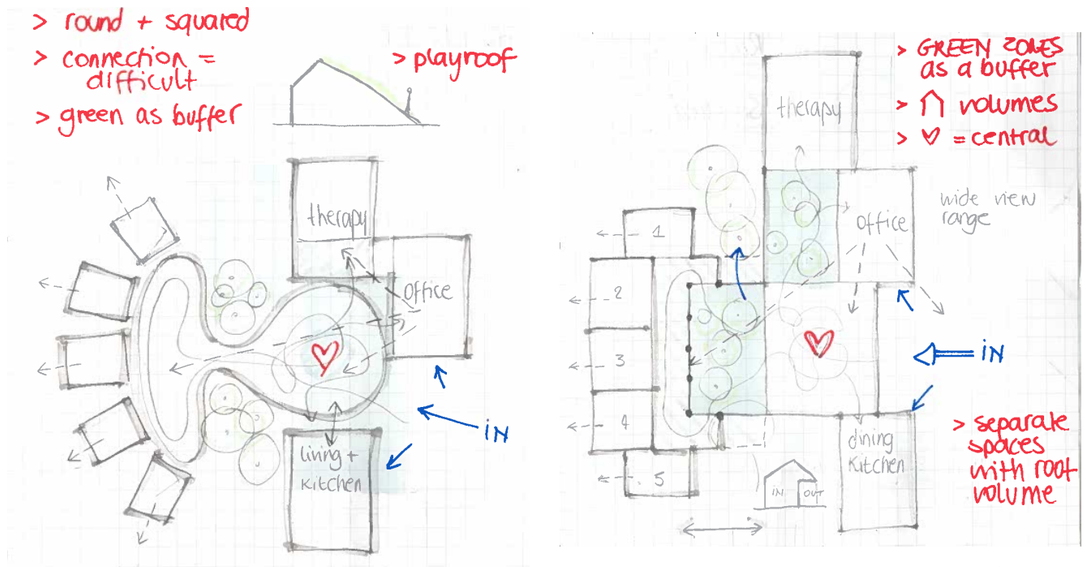
With the intention of opposing the clinical, sterile, hospital environment, the design should avoid hallways. When having 5-6 apartments this became a challenge. Different situations were explored (ill. 33). A straight or slightly curved line of apartments creates easily and naturally a hallway. More round extraverted orientated volumes create a very big space in between them and makes the relation between this space and the apartment itself very direct. However, this space could be turned into something that is highly wished for in the building: the Heartroom. A room which is comparable to the living room in a family house. A space for living and gathering but also for circulating.



ill. 34. analysing the function (diagram)



ill. 35. early design iterations - paper models



ill. 36. early design iterations - plan

At the same time as designing in 2D, the volume of the building was studied in 3D. By making simple paper models, the scale of each function and thus the entire building, became very understandable. Initially there were explored more organic shapes next to more geometrical shape but also a combination of those. Because of the homely feeling the geometrical volume recalls, this was continued with. To keep the domestic scale, which is important to the design, the volumes have been split up.

The orientation and size of the different volumes should express the function of it but should also suggest a hierarchy of the level of activity inside the volume. Throughout the entire process the smallest volumes have always been the apartments. By giving the family their 'own house' the feelings as individuality and independency are enhanced. These feelings are considered important, even when living in a community.

The orientation of the other volumes has been studied through models in combination with the functions that were categorised. Aside the apartments there is a staff area, a treatment area, a kitchen and then the connecting element: the Heartroom. These 'categories' each have their own volume to make the children's hospice readable and to make zones through the volume. To oppose the very individual apartments, the other volumes has been oriented the other way creating a difference between individuality and community.

Case study references

Hospice Strandbakkehuset

In Strandbakkehuset the apartments are divided over two floors connected to the Heartroom of the building. This reduces the footprint of the building and the need of hallways but also makes the elevator an unavoidable and very important element in the building. It also prevents the access from some apartments to the outside.

However, the staff of Strandbakkehuset addressed that the building spread over several floors worked perfectly, it was decided to keep this design on one level. Every user type will be equal by giving everyone the same chances and opportunities into using the children's hospice.

Hospice Tsurumi

In the Tsurumi hospice, rooms are spread all over the building. This makes it very dynamic but also more busy around the rooms. Since the apartments in this thesis will act as a calm area for the families to retreat this spreading of rooms is not intended. The circulation addressed in the Tsurumi hospice, is very open and dynamic without many hallways, is closely connected to the vision of this thesis. The circulation is a hybrid of a place to circulate through and a place to stay. Play area's, sitting corners, ... are merged with the circulation and makes it oppose the hospital environment. A design approach that will be incorporated into the design of this new children's hospice.

identifying the needs

To understand the specific needs of the functions in a children's hospice, research was done through case studies and a personal visit at the children's hospice, Strandbakkehuset. Ceiling height/shape, atmosphere and window placement are considered as three important factors in the design of the children's hospice and will be elaborated on in the following text.

Because of the pitched roof volumes, the interior spaces become very expressive. The ceiling shape and height go hand in hand with the atmosphere of the room. In some spaces with common, open functions where people come together, an open and active atmosphere is intended and can be created by a generous pitched ceiling volume. In other spaces with more intimate functions this volume can be too overwhelming and spacious. Functions such as therapy rooms where an easy, intimate, and quiet atmosphere is strived for, a low, flat ceiling is preferred.

Since the buildings have pitched roof but some rooms have not, there was a challenge into addressing the free space created on top of the flat ceiling room. An upstairs children's playroom was considered as a space for the children to be in without the presence of adults. It could be an active zone but also a relaxing space for the older teenagers that might be staying at the children's hospice. However, this design proposal was archived due to accessibility questions. An upstairs room for children is not inclusive towards less mobile children, even though there is an elevator.

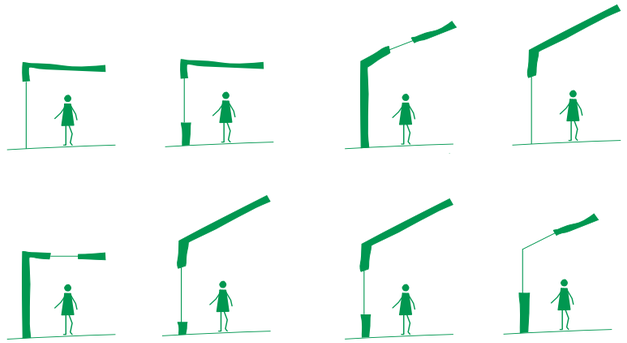
Furthermore, in the apartment zone a second level has been investigated. In the children's hospice Strandbakkehuset this worked with three apartments on each floor and created interesting relations between the different levels. However, the scale of the building in relation to the surroundings which are all one storey family houses, would become too big and the building would on some level exclude the less mobile user to move around freely. After these considerations, it was decided the entire building will be one level.

Going through the different functions and elaborating on the atmosphere, use and materials in each room, a common discussion was created through inspiration images, words, and drawings on paper and manifold (ill. 37) . It helped the process of understanding, how we individually and common experience the different moods in each image and material. Besides that, it created a language for the functions at the children's hospice, and how they should be addressed. The approach was utilised multiple times during the process, as for placing the functions and considering the views for each function.

ill. 37. grouproom communication tool

identifying windows and views

Views towards nature have been considered early and carefully in this design. The balance between private and public is an important consideration throughout this entire design and differs per function. These different requirements can be addressed through the orientation of the functions as discussed earlier but also through window openings and the relation to the outside. Some spaces such as the Heartroom, kitchen, activity room and apartments benefit from a direct access towards the outside. Other functions such as the wellness room require complete privacy while still having a subtle relation to the outside. The -in between- functions such as therapy room can have a big window but with an orientation towards a non-accessible outside area that gives enough privacy while still being open and offering a connection to the surroundings.

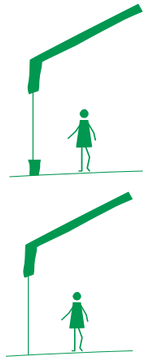


ill. 38. window study

therapy room

The therapy room has a main purpose of being a place for conversation and therapy. Besides this it can also serve as an extra office if needed, a room for parents who might have to work every now and then, need some rest or a reading corner. The room should be comfortable, homely, and intimate but also express some seriousness.

activity room



The activity room is a space for the children to game, play, be creative, and hang out. Different corners are created for the different activities.

wellness room

The wellness room is a place for special wellness therapy mainly for the ill child but can also be a place for the parents to relax and find contemplation. It has a relaxing atmosphere, as it is being private and intimate.

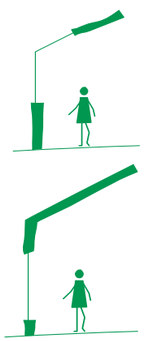
sensing room

The sensing room is a room for special treatment using special equipment. It stimulates the senses through light, sound, vision, and touch. Specific equipment to do so will be installed. The room should be comfortable and intimate and should be able to be dark and quiet.

office

The office is a zone existing out of multiple rooms. The open office is a space that is active because of the connection it has to the Heartroom. The closed office, intended for the head of department, and the meeting room are separate quiet spaces, closed off from the Heartroom. The room of the handyman is a separate function but considered as a part of the office.

kitchen



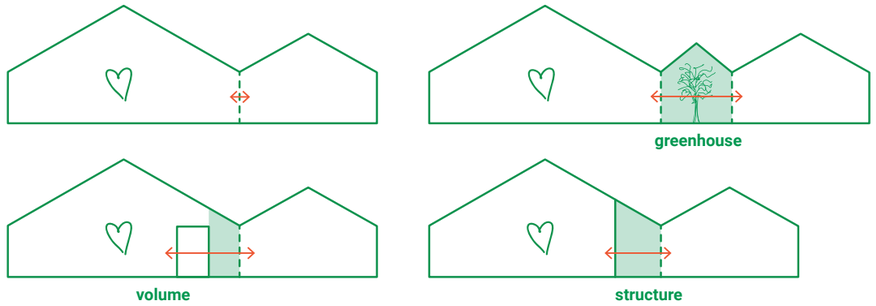
The kitchen can be considered as a part of the Heartroom. It is a place that encourages the community feeling, is very active and where different users come together. It is an open space for cooking and eating but allows other things to happen as well.

Heartroom

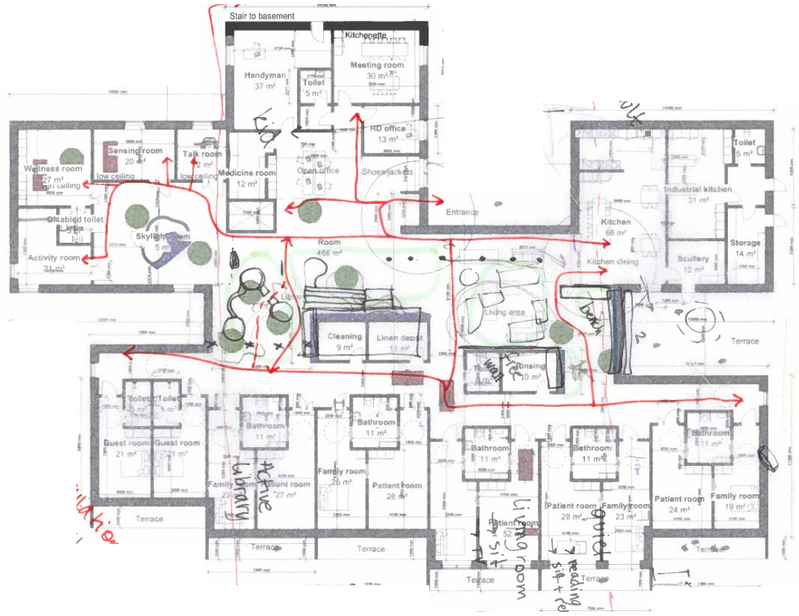
The Heartroom is the core of the building. It functions the same as a living room in a family house. It is always in use and therefore very active. Different atmospheres are created such as an active play area, a more easy-going sitting area, and niches where individuals can retreat themselves.

reflection room

The reflection room is a small intimate room meant for individuals to reminisce and have a break from the community life. It serves as a quiet, comfortable room where one can be alone.



ill. 39. early design iterations - relation between Heartroom and apartments



no scale N

ill. 40. early design iterations - circulation

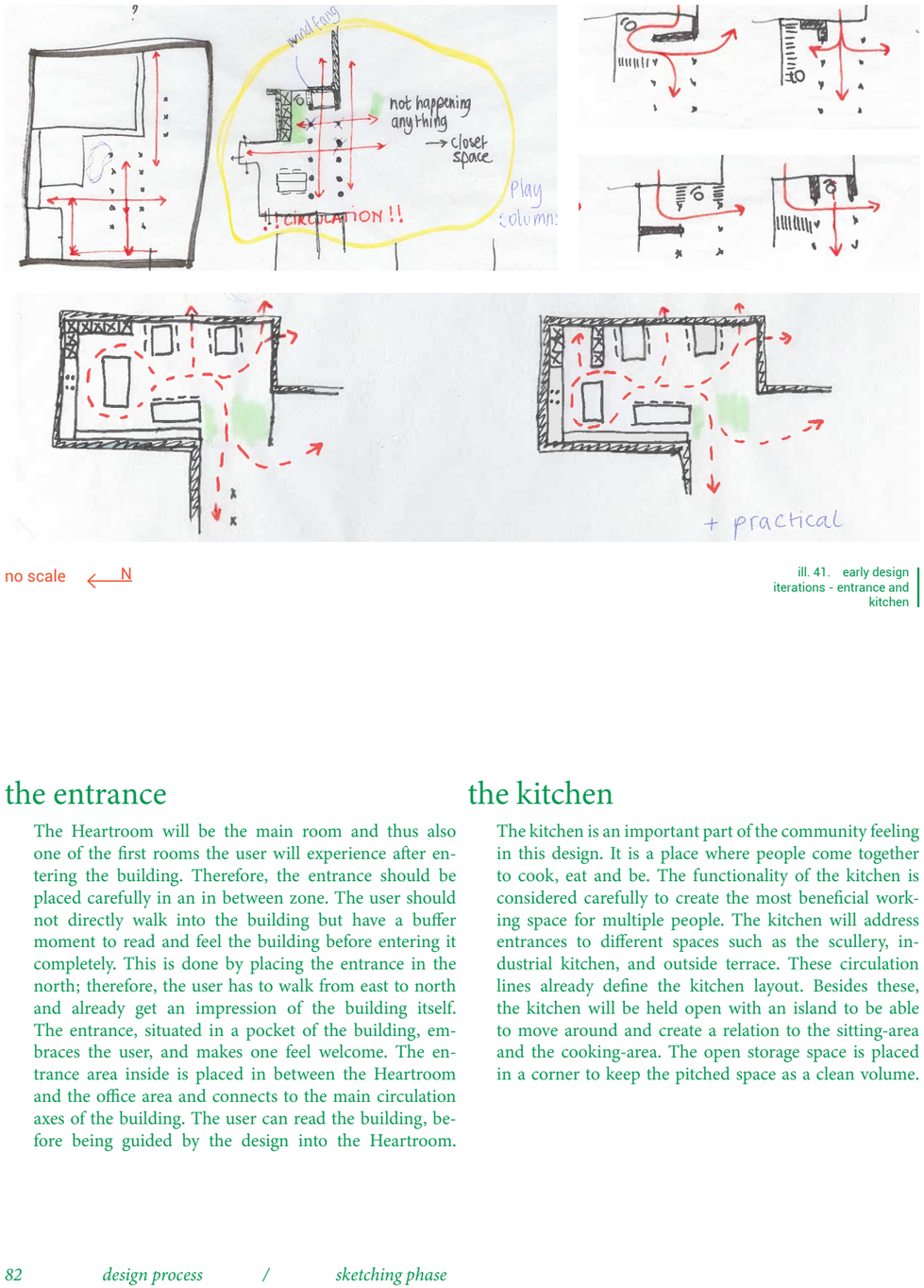
creating a community

One of the key stones this thesis is built upon is creating a supportive and warm community for all user groups. The case studies that were introduced in the beginning of the report help to identify the needs for creating this community. The most important space for this community is the common functions; the Heartroom and the kitchen. They both have the purpose of bringing people together and creating support.

Other zones have been found important such as the entrance, the first experience the user has, is deciding how the user will feel. This experience should be welcoming and warm. However, living in a community also asks for retreat from it, therefore the apartments have been designed as individual volumes with attention to the homely feeling.

the Heartroom

The Heartroom is the core of the building and the community. Opposing Strandbakkehuset it should be more of a living space than a circulation space. The connection the Heartroom makes with the apartments is very important and can be addressed in different ways. The balance between volume coherence and a separation between functions is considered carefully to make sure it will not create hospital-like hallways. Different iterations (ill. 39) each create different relations between the Heartroom and the apartments. Directly into eachother, with a greenhouse as a bufferzone in between, with a volume inside the Heartroom as a buffer or a separation through the structure. The final design should identify a buffer space in between both without creating a hallway.



no scale ← N

ill. 41. early design iterations - entrance and kitchen

the entrance

The Heartroom will be the main room and thus also one of the first rooms the user will experience after entering the building. Therefore, the entrance should be placed carefully in an in between zone. The user should not directly walk into the building but have a buffer moment to read and feel the building before entering it completely. This is done by placing the entrance in the north; therefore, the user has to walk from east to north and already get an impression of the building itself. The entrance, situated in a pocket of the building, embraces the user, and makes one feel welcome. The entrance area inside is placed in between the Heartroom and the office area and connects to the main circulation axes of the building. The user can read the building, before being guided by the design into the Heartroom.

the kitchen

The kitchen is an important part of the community feeling in this design. It is a place where people come together to cook, eat and be. The functionality of the kitchen is considered carefully to create the most beneficial working space for multiple people. The kitchen will address entrances to different spaces such as the scullery, industrial kitchen, and outside terrace. These circulation lines already define the kitchen layout. Besides these, the kitchen will be held open with an island to be able to move around and create a relation to the sitting-area and the cooking-area. The open storage space is placed in a corner to keep the pitched space as a clean volume.

the apartments

The apartments were from the beginning considered for an entire family. A family with different needs and size should have their own private room for them to feel relaxed and at home, while staying at the children's hospice. They are designed to be narrow and minimalistic to only offer the necessities for the families. This helped reduces the length of the children's hospice and the hallway, that is needed to serve the apartments. Each apartment should require space for a double bed, a table, and floor area to have an extra madras in the room, if the family have extra siblings. The layout of the apartments is inspired by the apartments at Strandbakkehuset, where two rooms had separate entrances, one for the family as a private entrance, and one for the staff to enter. The two rooms are divided by a toilet, that contain the necessary for an ill child and in different ages. The toilet can be entered from both rooms, which makes the apartment an expression of being one unit under the same roof.

Case study references

Hospice Strandbakkehuset

Strandbakkehuset has shown the idea of building a community upon the common areas. The apartments were not big which made the families come out and share moments in the Heartroom and kitchen. In Strandbakkehuset, the Heartroom is the central room which all functions are oriented towards, as circulation was the main purpose of this room. The kitchen was large and had enough space for multiple families and staff to be together.

Maggie's Centres

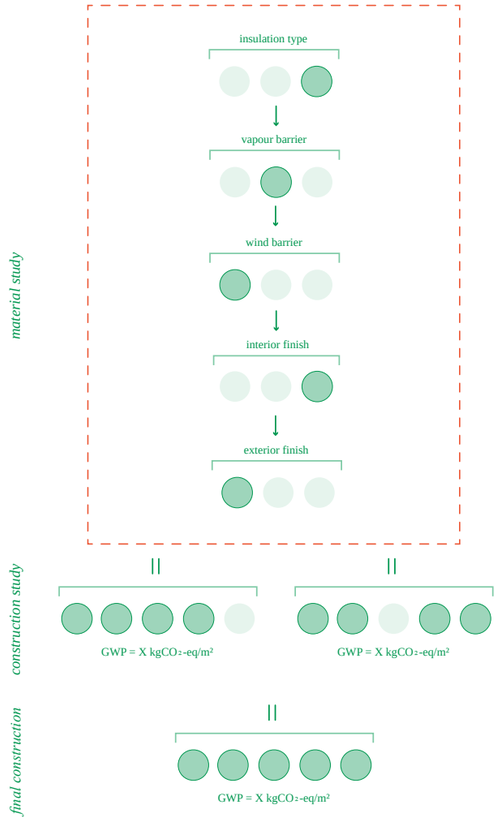
The phenomenon by Charles Jencks and Maggie Keswick as 'kitchenism' was addressed in the Strandbakkehuset, as experienced at the visit, where the kitchen became the gathering point for meetings and talk. The common lunches and interacting over a cup of coffee happens in the kitchen. This phenomenon is addressed in all the Maggie's centres around the world. The kitchen plays a key function where all users come together and can find support.

lca and **materiality**

material study

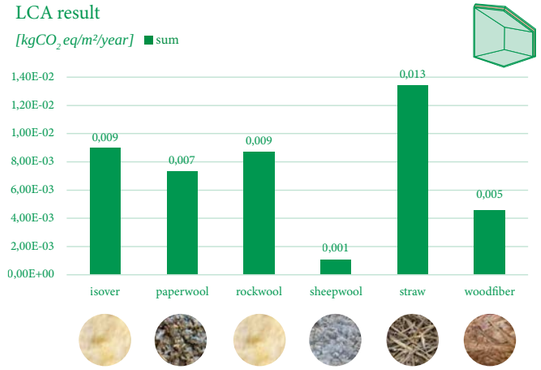
The LCA studies were started with a study of individual building material relevant to the design. Materials have been categorised according to their function in the construction; insulation material, structural material, exterior and interior wall cladding, and vapour- and wind barrier material.

A study of each individual material was made based on the amount of material needed for the construction one square metre wall. The goal of these studies is to understand the global warming potential of the studied building materials to assess them and make material choices according to their CO_2 emission. Next to this, other advantages of the materials such as the phenomenological experience of them and their possible influence on the mental wellbeing are included.



ill. 42. visualisation LCA strategy - material study

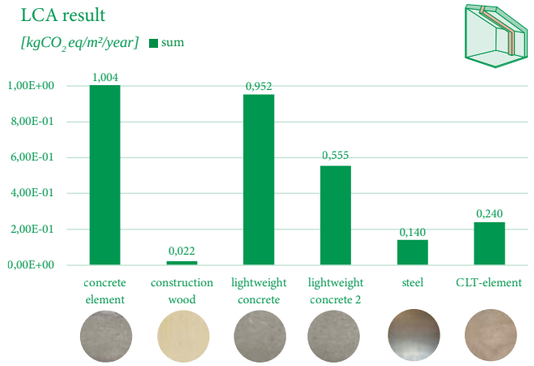
exterior wall construction



insulation

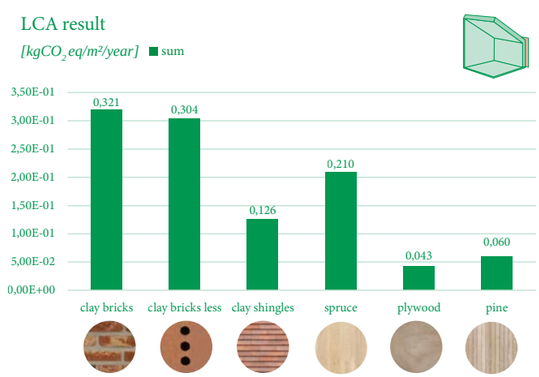
To give a perspective of the different insulation types that are available and their performance, multiple materials are studied. To understand these materials and make them able to compare, the R-value (the resistance of a material against conductive heat flow) is set to the same value. The expectation of this study was for the wooden, and straw insulation types to perform best, according to their GWP result. However, straw insulation had an unexpected high result due to a high thermal conductivity, that results in the need of more material than the others to reach the same R-value (Møller Andersen et al., 2001).

Another important property of insulation materials is their resistance to fire. Mineral wools tolerate higher temperatures and are therefore classified better than sheep wool or wooden insulation types (isolena, n.d.; Rockwool, n.d.). Sheep wool is fire classified B1, which is better than wooden insulations classified D2 (briiso.dk, n.d.). Additionally, sheep wool have several environmentally advantages, as is naturally regulates moisture and purifies the indoor air (briiso.dk, n.d.; isolena, n.d.). As a result, sheep wool is chosen as the preferable insulation.



structure

The structure study is made both for heavy and light structural materials. It is important to notice that this study is not made by calculating the right amount of materials in relation to the loads they are supposed to take. The amount of material needed is decided from other construction examples, as well as generic materials in LCAbyg. By looking at the global warming potential, it is clear that the light structure is having the smallest CO_2 emission. To decide the right light structure, an additional study will be made later in the process.



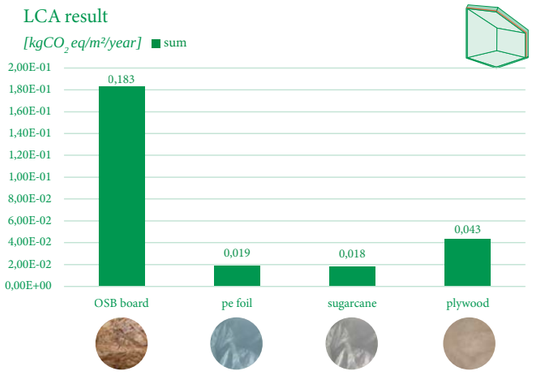
ill. 43. visualisation LCA results

exterior cladding

To compare different possible materials for the facades, both bricks and wooden materials are studied. For the wooden materials, pine is chosen because of the production location. It is common and widespread in the Danish forests and produced in Scandinavia (Frøslev, n.d.) Several surrounding houses to the site's location are cladded with red bricks, but due to the LCA result as well as the desire to blend into the natural surroundings, clay bricks are not preferred. Among the wooden materials, plywood and pine are performing the best result. Combining this with the desired architectural expression, pine is chosen as the exterior cladding.

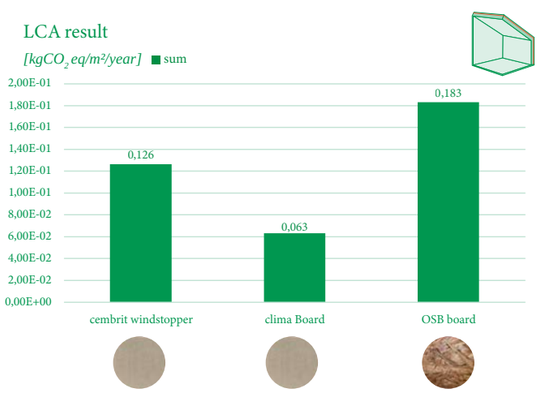
interior cladding

According to the global warming potential, clay plaster, rammed earth, and plywood are giving the best result. From the architectural perspective, three different materials with different tones, textures, and expressions are needed to distinguish between rooms and functions. Therefore, plywood, white painted gypsum, and clay plaster are chosen due to the GWP and architectural aspects. Clay plaster is having especially good qualities for bathrooms due to its ability to regulate humidity (clay-works.com, n.d.).



vapour barrier

A vapour barrier comes in different appearances. It can be a foil barrier or a wooden material that is open to diffusion. Different options are studied. The best performing vapour barrier is the sugarcane Gram vapour barrier. This is a renewable PE foil made from sugarcane, and is the chosen one for the final construction (bewi.com, n.d.). The big difference in the result is mainly the amount of material needed, the OSB and plywood barrier are thicker boards than the thin foils and therefore require more material to give the same result.

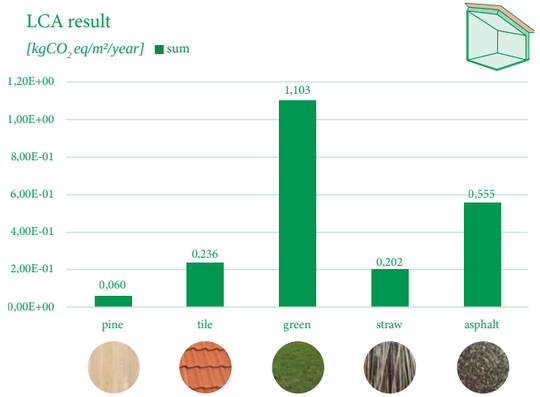


wind barrier

A wind barrier is supposed to be open to diffusion, to avoid moisture inside the construction (Cembrit.dk, n.d.). Therefore, a fibre cement board, a gypsum board, and an OSB board is studied. Due to global warming potential, the gypsum Clima Board is having the lowest impact, which makes it the chosen material for the wind barrier in the final construction.

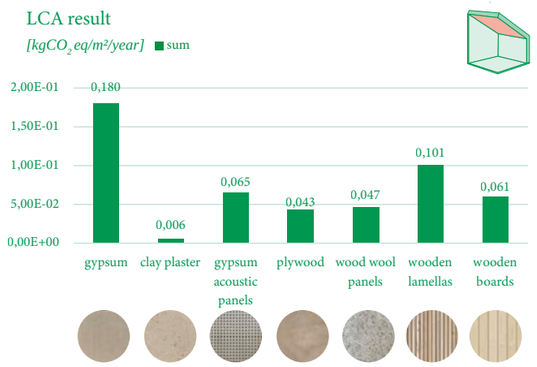
ill. 44. visualisation LCA results

roof cladding



exterior cladding

The roof is desired to give an expression of blending in with nature, therefore a wooden cladding is preferred. To study the performance of wooden cladding types and make it comparable to others, different materials are taken into consideration in the exterior cladding study. From the architectural- and nature perspective, pine, a green roof, and straw is blending in the best, while the surrounding roofs are tiles and asphalt roofing. Due to the global warming potential, the green roof is having the highest impact, but also has a lot advantages, as it helps insulating, supports biodiversity, and absorbs rainwater (Growtec.dk, n.d.). This is why it is still taken into consideration in the next studies, together with pine that has the lowest influence.



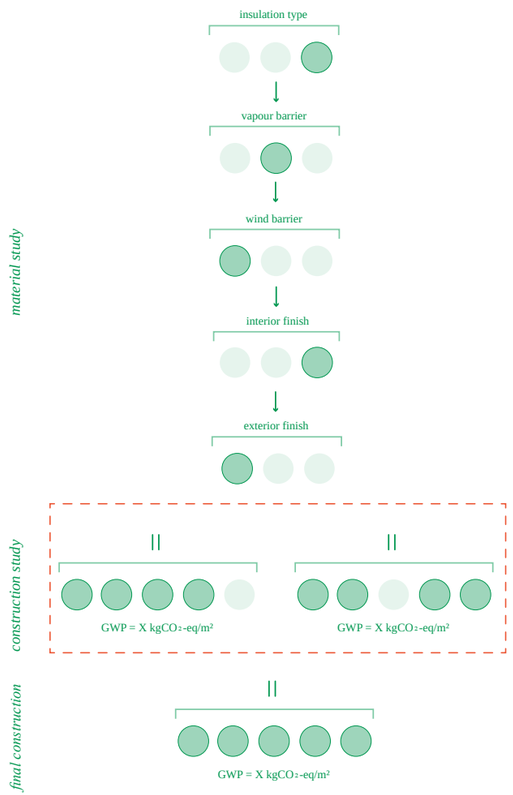
interior cladding

Different materials are studied for the ceiling. In relation to the global warming potential, clay plaster, plywood and wood wool panels have the lowest global warming potential. From an architectural perspective, it is desired to keep the material expression calm and without too many textures and colours in the same room while still creating different zones and separating functions through the material choice. Due to the interior wall materials that have been decided on, clay plaster and plywood, it is obvious to also choose these materials for the ceiling, together with gypsum acoustic panels to improve the acoustic performance in potentially bigger rooms.

ill. 45. visualisation LCA results

construction study

The chosen material for the construction is based on the previous material studies. Furthermore, there are added layers for instance to make the construction more fireproof or to mount the cladding. To start with, the focus is the exterior wall, where it is mainly the bearing construction that is not decided on yet. After choosing the final exterior wall, the construction will be repeated in the roof, where the cladding needs to be decided on. The interior walls are presented with the needed layers of materials chosen from the previous material studies. Finally, the slab is created based on standard solutions supported by a line foundation.



ill. 46. visualisation LCA strategy - construction study

exterior wall

LCA result

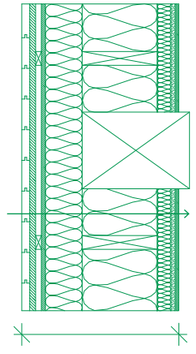
[kgCO$_2$ eq/m²/year]

All materials, except the bearing structure, is already decided on from the material study presented before. The exterior wall is through the previous material study, decided on as a light construction due to the lowest emission result. A GWP study on heavy constructions is made (appendix 07).

The CLT elements have a remarkable higher emission than steel, which is caused by the higher amount of materials needed for the construction. From an architectural aspect is it desired to have an honest, and thereby visible bearing structure that fits into the vision of having a close connection to nature. From the LCA aspect, construction wood has the lowest GWP, which is then specified to pine construction wood as the resulting bearing structure for the building.

ill. 47. visualisation LCA result exterior wall

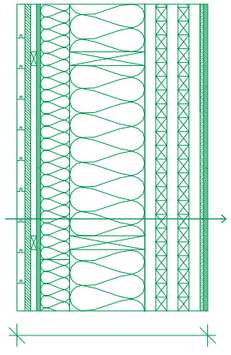
construction wood 1:20



512 mm

pine board cladding	*26mm*
cross rafter	*19x45mm*
air gap with rafter	*19x45mm*
gypsum board wind barrier	*13mm*
sheepwool with rafter	*120mm*
(pine structure)	*350x250mm*
sheepwool with rafter	*245mm*
sugarcane vapour barrier	*0,2mm*
sheepwool with rafter	*45mm*
gypsum board	*13mm*
plywood	*12mm*

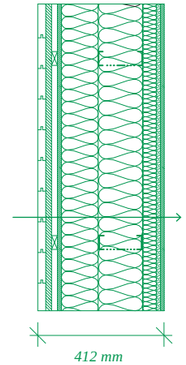
CLT 1:20



634 mm

pine board cladding	*26 mm*
cross rafter	*19x45mm*
air gap with rafter	*19x45mm*
gypsum board wind barrier	*13mm*
sheepwool with rafter	*95x45mm*
sheepwool with rafter	*245x45mm*
sugarcane vapour barrier	*0,2mm*
clt element	*180mm*
gypsum	*13mm*
plywood	*12mm*

steel 1:20



412 mm

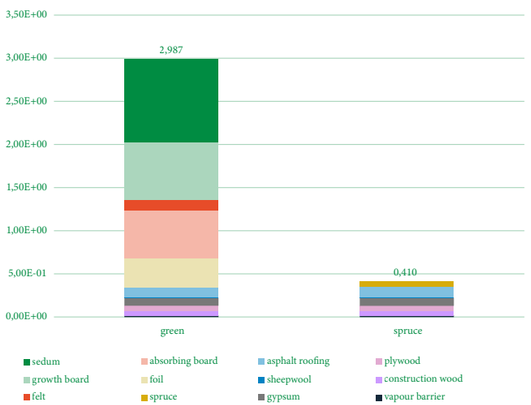
pine cladding	*26mm*
cross rafter	*19x45mm*
air gap with rafter	*19x45mm*
gypsum board wind barrier	*13mm*
sheepwool with z-profile	*120mm*
sheepwool with ry profile	*145mm*
sugarcane vapour barrier	*0,2mm*
sheepwool with profile	*45mm*
gypsum	*13mm*
plywood	*12mm*

ill. 48. detail sections exterior wall analysis

roof

LCA result

[kgCO$_2$ eq/m²/year]

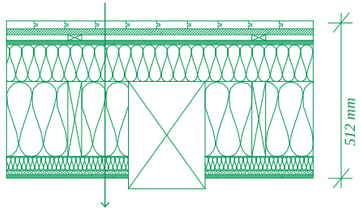


From the study at the previous section, it was decided to use a light construction as a wooden construction. The decision of the pitched roof volume imply that the construction should consist of construction wood, as it is commonly done in construction wood, when it is a pitched roof. Since, the wall construction has been decided to be construction wood, the roof construction will follow this decision. Therefore, the next focus is the exterior cladding, that will be studied in this part.

To reach the goal of being under 8 kg CO_2-eq/m²/year with a combination of the architectural goal of a simple expression for the building, it is chosen to extend the exterior wall cladding to the roof cladding. To keep the study of green roof in mind, because of the many other advantages as mentioned previously, the final LCA building calculation will be made for both types of roof cladding.

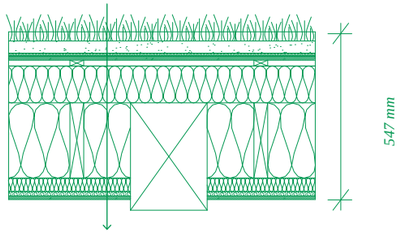
ill. 49. visualisation LCA result roof

pine cladding 1:20



pine board cladding	*26mm*
cross rafter	*19x45mm*
air gap with rafter	*19x45mm*
under membrane	*2mm*
plywood	*12mm*
sheepwool with rafter	*120x45mm*
(pine structure)	*350x250mm*
sheepwool with rafter	*245x45mm*
sugarcane vapour barrier	*0,2mm*
sheepwool with rafter	*45x45mm*
gypsum board	*13mm*
plywood	*12mm*

green cladding 1:20



sedum	*30 mm*
growth board	*40 mm*
felt	*0,2 mm*
absorbing board	*8 mm*
protection layer	*0,2 mm*
under membrane	*2 mm*
plywood	*12 mm*
airgap with rafter	*19x45 mm*
sheepwool with rafter	*120x45 mm*
(pine structure)	*350x250 mm*
sheepwool with rafter	*245x45 mm*
sugarcane vapour barrier	*0,2 mm*
sheepwool with rafter	*45x45 mm*
gypsum board	*13 mm*
plywood	*12 mm*

ill. 50. detail sections roofl analysis

interior wall

LCA result

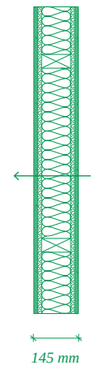
[kgCO$_2$ eq/m²/year]

The material study from before is translated into the construction for the interior walls as well. The interior walls are made from timber rafters with sheep wool insulation in between. There is placed a fireproofed gypsum board and finally the cladding, which is either plywood or clay plaster, depending on the room.

There are two different types of interior walls, a standard one which is between the common rooms, and a separation wall between the apartments with an air gap and extra layer of insulation to make it more soundproof.

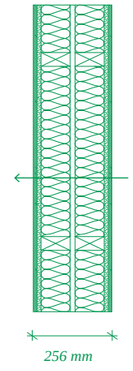
ill. 51. visualisation LCA result interior wall

standard 1:20



plywood	*12 mm*
gypsum board	*13 mm*
sheepwool with rafters	*95x45 mm*
gypsum board	*13 mm*
plywood	*12 mm*

seperation 1:20



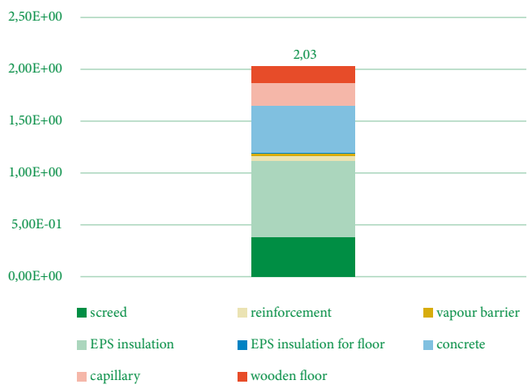
plywood	*12 mm*
gypsum board	*13 mm*
sheepwool with rafters	*95x45 mm*
air gap	*16 mm*
sheepwool with rafter	*95x45 mm*
gypsum board	*13 mm*
plywood	*12 mm*

ill. 52. detail sections interior wall analysis

slab

LCA result

[kgCO$_2$eq/m²/year]



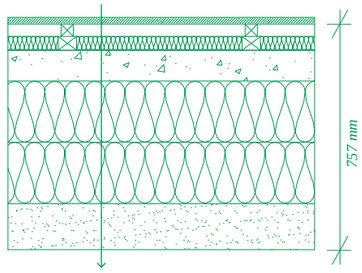
Due to lack of experience and missing knowledge about the necessary calculations to secure enough bearing capacity of light slabs, the slab is chosen upon standard solutions that works in combination with a line foundation.

Therefore, as a limitation of the project, the slab is not studied further. If improving the LCA performance of the building is necessary, it would be relevant to investigate possible alternative slab constructions.

The interior floor is chosen to be mainly wood for phenomenological reasons. It is desired to have a floor that is warm enough to sit on playing or walking around without shoes, as many people do at home.

ill. 53. visualisation LCA result slab

slab section 1:20



wooden floor	*22 mm*
step sound insulation	*3 mm*
rafter	*45x45 mm*
sheepwool with rafter	*45 mm*
radon barrier	*0,2mm*
concrete	*100 mm*
EPS insulation	*400 mm*
capillary	*150 mm*

ill. 54. detail sections slab analysis

no scale N

ill. 55. material scheme

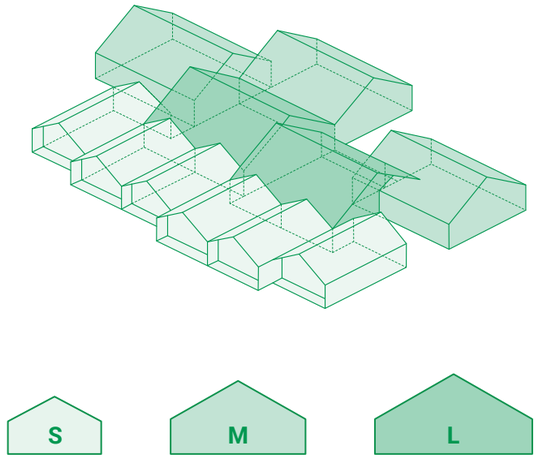
- plywood
- white gypsum
- clay plaster
- wooden floor
- terrazzo floor
- concrete floor

interior materials

After studying the materials and constructions according to their performance in the Life Cycle Assessment, the different choices of interior claddings for the different rooms were decided according to their function.

In the Heartroom, the construction is visible with white gypsum in between columns and beams. Details as integrated furniture and the walls from the practical rooms are cladded with plywood. The floor is wooden to make it comfortable and warm to walk- and sit on. Spaces such as the office, kitchen, apartments, and creative room are cladded with plywood on wall and ceiling, while practical rooms, such as the industrial kitchen, medicine room, etc., are cladded with white gypsum. The sensing- and therapy room are also cladded with white gypsum to get it light since they are smaller rooms and have a low ceiling. Finally, the bathrooms and wellness room are cladded with clay plaster because of its good performance according to the indoor environment in wet rooms. The floor is practically cladded with terrazzo, which is a diverse material that appears in many colours and nuances.

structural
design



ill. 56. (structural) building volumes

The structural analysis of the design is made as an integrated part of the design process. After assessing different constructions in LCAByg and at the same time as dimensioning the volumes, the structural capabilities of the lightweight structure were investigated. This part of the design process has been addressed rather conceptual. Initial calculations were made for the most critical structures without detailing the entire structure of the design.

As known from the LCA studies the construction material with the lowest Global Warming Potential is construction timber. The most convenient method to use this material structurally for the desired volume shape is using frames. Timber frames can span long distances but also match the architectural values of this project. The frames allow a lot of spatial freedom and the interior volumes created with a pitched roof can be kept free from beams and columns.

In the design there are considered three different structural volumes; small, medium, and large. The small volumes are the apartments, the medium volumes as the treatment area, kitchen and office, and the large volumes as the connecting heart volume. The sizes of these volumes have been determined by research collected from the different case studies and the functional requirements for a children's hospice. The structural analysis for the timber frame method started with these initial measures wherefrom a structural grid has been developed.

The structural research has been done on two levels. At one hand the structural grid was defined for every volume size, meaning defining distance in between the frames. Going back and forth between the grid and the initial plan while adjusting both, resulted in a structural grid and functional plan fitting each other.

At the other hand the dimensions of the columns and beams has been studied. Through Robot simulations the sizes for columns and beams were determined (see appendix 08 for further calculations). Since every volume has different dimensions and thus different loads, all sizes have different minimum sizes of columns and beams.

S volume
The structure of the small volume is a simple frame that is hidden in the ceiling. The column and beam dimensions for this volume are 150 x 250 mm with a 2,2 m distance in between the frames.

M volume and L volume
The Medium and Large volumes meet in several places, sharing structural elements. Therefore, the columns and beams have been dimensioned according to the largest section needed. This section of beams and columns is 200 x 350 mm with a 2 m distance in between the frames.

Because of the large span in the L volumes, the frame requires extra supporting columns. Several options for this have been explored resulting in adding two straight columns in the frame. Next to their structural function they also serve as a space separating element by suggesting a difference between circulation space and living / playing space.

2m in between frames
2,2m in between frames

no scale N

ill. 57. initial structural system

daylight *and* **temperature** *studies*

Framing nature and views has been addressed earlier in the design process. To investigate if the desired characteristics of the earlier decided windows also perform as desired, daylight studies and energy calculations will be made.

The apartments are placed directly towards south for several reasons. They should have a prioritised view towards the southern deciduous forest to experience the nature change throughout the seasons and have generous sunlight as a factor in the biophilia approach for nature. Since many hours of the day are spent in the apartments, according to the ill child's condition, the room should be well lit and comfortable. An analysis of the most critical apartment is made through window studies, daylight analysis and a 24-hour average temperature calculation. Working back and forth between these tools, results in an integrated choice for windows with both aesthetics and engineering aspects in mind as equals.

To study the amount of daylight and the comfortable indoor climate in the apartments, the daylight factor analysis from Revit, the 24-hour-average temperature and month-average temperature have been used. Three different iterations for windows in the apartments have been studied according to daylight and expression.

01

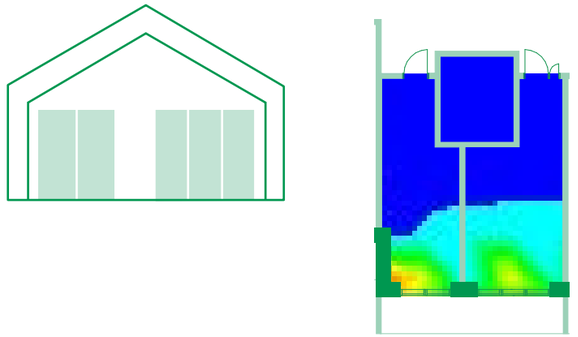
The intended expression in the first iteration was to open towards nature and offer as much view as possible. This gave a positive effect for the daylight inside the rooms, but also resulted in overheating of the rooms. The month-average indicated a cooling need, and the 24-hour-average indicated an average room temperature of 23,2 degrees, and a maximum temperature at 26,1 degrees in July. The rooms are only 23 m^2 for the family room and 27 m^2 for the patient room, which limits the needs for wide windows. Since the apartments actually are quite small but deep, the daylight has difficulties to enlighten the entire room.

Chosen month: July	t_u = 21°C
24-hour average	t_i = 23,2 °C
Temperature variation	Δt_i = 5,8 °C
Max. Temperature	$t_{i,\,max}$ = 26,1 °C

ill. 58. daylight study - iteration 01

02

The second iteration gives a more anonymous expression with repetition of the same window. An expression that was not the intended for a children's hospice. The daylight analysis showed a more acceptable daylight factor inside the apartment. The 24-hour-average was still high with an average temperature of 22,6 degrees in July. The month average still indicated cooling needs during the summer months.



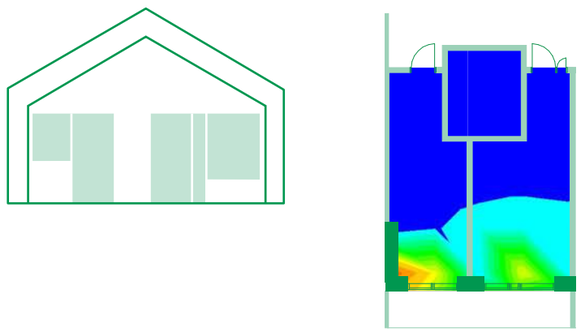
Chosen month: July	t_u = 21°C
24-hour average	t_i = 22,6 °C
Temperature variation	Δt_i = 5,2 °C
Max. Temperature	$t_{i,\,max}$ = 25,1 °C

ill. 59. daylight study - iteration 02

03

The third iteration was with minor and more playful expressions of the windows. Both the family room and patient room have doors towards the terrace and windows in different heights. The large window in the patient room starts at 40 cm, which creates a sitting area and gives a better view for the ill child in bed to observe the nature. The daylight factor is acceptable, but since the room is 8,4 meters deep the sunlight has difficulties of enlightening the entire room. The 24-hour-average indicates an average room temperature on 22,4 degrees, which is still a bit high. The maximum temperature is at 24,9 degrees, which is under the regulated requirement of 27 degrees as maximum. The month-average also gave a better result here, without a cooling need, and a lower energy consumption for an apartment.

The 24-hour-average for each iteration and the month average is detailed in appendix 09 and 10.



Chosen month: July	t_u = 21°C
24-hour average	t_i = 22,4 °C
Temperature variation	Δt_i = 5,0 °C
Max. Temperature	$t_{i,\,max}$ = 24,9 °C

ill. 60. daylight study - iteration 03

no scale N

To secure the regulated demand for daylight in an area for stay, the 10% rule for daylight has been used in one apartment. It calculates the amount of glass area compared to the floor area, which must be above 10 % to secure enough daylight in a room. The calculation is only considering the glass area. The family room has 2,65 m^2 of glass, which is 11,54 % according to the floor area. The patient room has 4,24 m^2 of glass, which is 15,72 %. It is not a high percent of window, but above the acceptable. The consideration of rooms, where families stay and an ill child sleep in should also be remembered, which might not prefer overheating in the rooms, why the number of windows have been decreased to the acceptable.

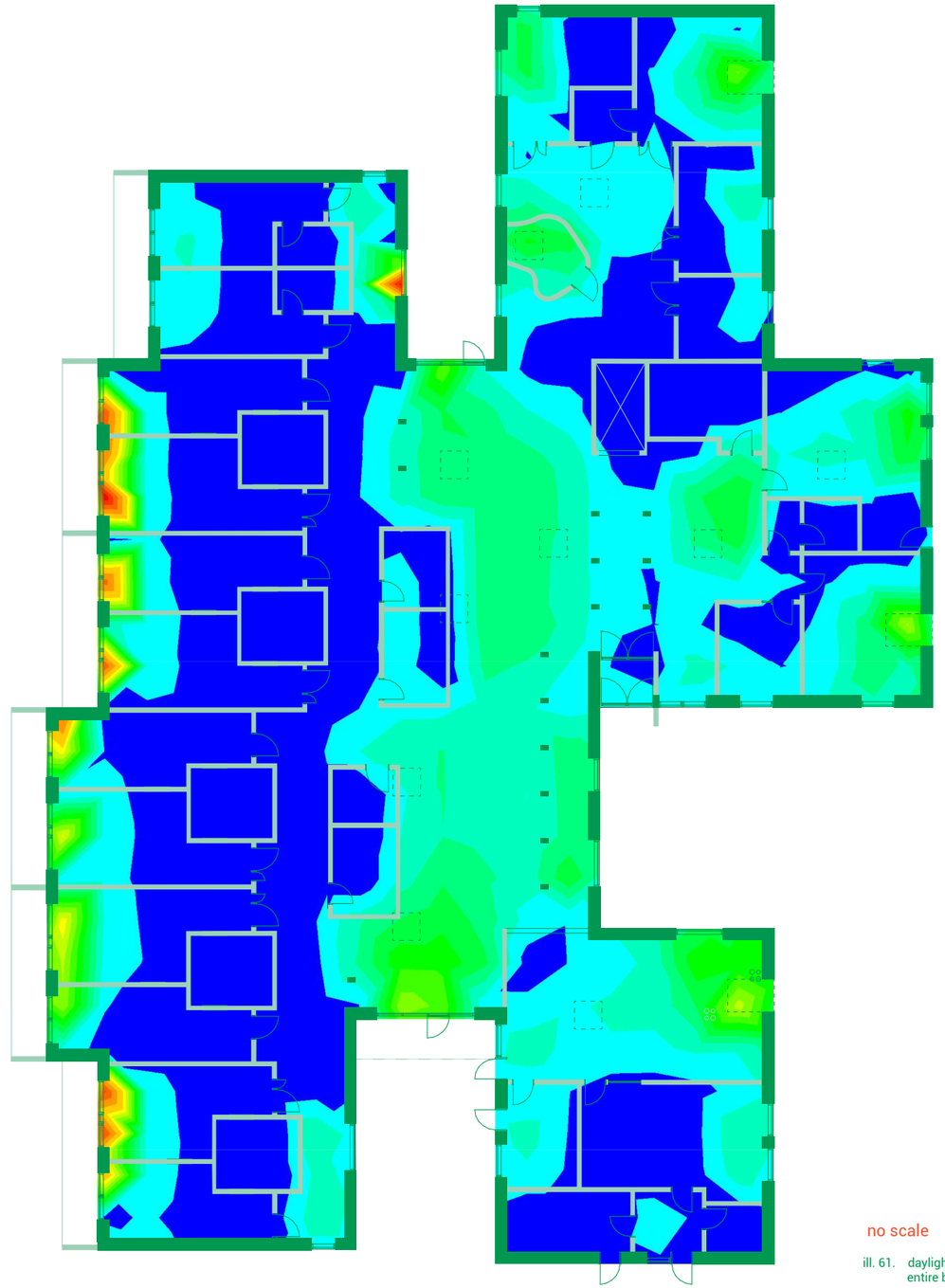
	Family room	Patient room
Floor area	23 m^2	27 m^2
Glass area	2,65 m^2	4,24 m^2
Percent	11,54 %	15,72 %

overhang

Since the windows are entirely towards south, an overhang is integrated in the roof to decrease the overheating issues that might occur. The overhang has been taken into account for each iteration and their analysis. The overhang follows the roof and frames the view towards nature and each individual apartment. It creates a buffer zone between the private apartment and the public outside area. An accessible terrace from both rooms and in bed or wheelchair gives the family a closer connection to nature.

daylight in the children's hospice

For the entire children's hospice, a daylight analysis has been made in Revit to examine the amount of daylight. Since the apartments are placed towards south, the Heartroom has decreased potential of getting direct sunlight from south. The Heartroom has therefore large window openings towards west and east. This contributes to a higher daylit room, openings to lead nature inside the building and define the height and importance of the Heartroom. To compensate the lack of windows towards south, skylights have been added. The overall building ADF (Average Daylight Factor) is at 1,8 % and is considered slightly low for the children's hospice (appendix 11). Compared to an intended average daylight factor should be at 2 % or more, where the room would be appropriate daylit, the average calculation at 1,8 % of the entire children's hospice indicates a low daylit, that would need electric lightning (Velux, n.d.). The daylight analysis is made with an overcast sky condition, which indicates a more average experience of the daylight inside the children's hospice. The slightly low factor for the building might rely on the multiple rooms that do not require daylight, as bathrooms, practical rooms, hallways, the industrial kitchen, that prefer diffuse light or electric lightning. The placement of the apartments towards south also limits the larger spaces as the Heartroom, circulation spaces and office of having daylight from the south. Larger windows would increase the building ADF but might also affect an overheating or add a cooling need. The overall result from the ADF is with all the enclosed rooms into consideration, which also decrease the total number, while some rooms are well daylit with no need of electrical lightning as the kitchen and meeting rooms (appendix 11).



no scale N

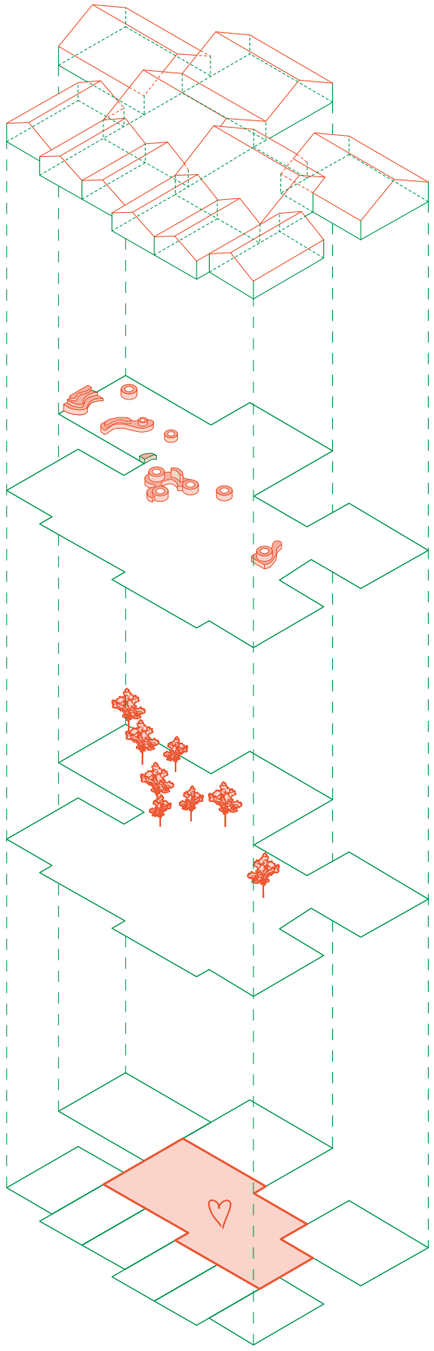
ill. 61. daylight study entire building

ill. 62. site location

03
presentation

This part of the report presents the final design which combines all the earlier done analysis and studies in an integrated design of a children's hospice. The final design will be presented with an introduction to the concept and main drivers of the design followed by visualisations of the result giving an overall impression of the building. This will be followed by a more detailed presentation of every function by following a day in the life of a family living at the hospice. Their story will be illustrated with drawings and supported by plans, sections and other graphical material needed to show the entire design. The presentation chapter will be closed by the more technical and engineering part of the design by presenting the LCA and energy performance of the final design.

Hjertehuset.....102
a day in the life of a family living in the hospice.....112
materiality.....142
life cycle assessment 144



ill. 63. conceptual drawing

Hjertehuset

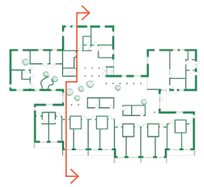
A living community for ill children and their families

The vision of the thesis is based on Healing Architecture and its defined parameters as Nature, Designing for play, and Materiality. With the foundation of the Healing architecture and its parameters, the children's hospice, Hjertehuset arise. Hjertehuset is the living community for (terminally) ill children and their families, that provide stability, safety, and relief to the families. It is built up from the core of the children's hospice, the Heartroom, functioning as the living room in a family house, where all life and interactions unfolds.

Hjertehuset should create associations to a family home, to make the families and the ill children more comfortable and at home, while staying. All the functions originate from the Heartroom to enable the option of being together as a family, with other families in the same difficult situation. Under the same volume the community feeling arise in the Heartroom when several users attend the room according to their needs and inclination.

Nature is consuming Hjertehuset from the wild landscape outside the window frames and dragged into the two pockets in the volume to make nature accessible for the children and their families. Likewise, the Design for play is accessible from the outside and inside of the children's hospice in different levels and shapes to meet the different needs and age groups, that would occur of the children staying at Hjertehuset.

The strategy of choosing materials for Hjertehuset is addressed through the two approaches; phenomenological and Life Cycle Assessments. By looking at different materials options to obtain the low emission class of 2023 Danish Regulations at 8 kg CO_2-eq/m²/year, the children's hospice addresses the global warming issue, that the building industry have a huge impact on. Hjertehuset is the community of a children's hospice for families with (terminally) ill children in the surroundings of nature in a low CO_2 emission building.



1:250

ill. 64. section office-Heartroom-apartment

Hjertehuset is located south of Aalborg at Gistrup to include the northern part of Denmark in the palliative care option of a children's hospice. As one of the main visions for the design is the importance of nature, a site nearby a city yet in the wild nature has been chosen. The site is placed inside a pocket of nature while still addressing a subtle connection with the city Gistrup in the east. The arrival to Hjertehuset happens though a minor road that end with a parking area in the north, where the family, visitors or staff can park their car before walking the last part into a tree patch, where the children's hospice arise after. If the need appears for having a car close to the entrance of the hospice, the road continues after the tree patch to get closer to the entrance. All traffic is maintained towards north to keep the area south from the children's hospice more quiet. The building is entered from the north, guided by the pavement and paths.

The outside area is created according to the functions inside Hjertehuset, where the playground and open landscape towards west is for play and activities. The wild nature in south is maintained in front of the apartments to keep the life in the forest actively. It offers the ill children and their families a natural scene to look out at and expereincing the change of colours and seasons. The east is the transition zone between nature and the nearest village. A terrace is placed towards east to enjoy the morning coffee outside and having lunch served in the fresh air. The view towards the village gives a closer connection to the everyday life, that occurs outside the children's hospice.

Hjertehuset is addressing a home feeling, where everyone is gathered under pitched roofs, that together creates the community in the children's hospice, both for the staff at the office, the ill children, and their families. Life occurs under every volume. All the required functions are placed in the same level at the hospice, while the technical equipment as the mechanical ventilation system and storage is placed in the basement to keep the pipes out of sight and enhance a homely expression at the ground floor.

ill. 65. masterplan

1:750 N

1:300

ill. 66. elevation east

1:300

ill. 67. elevation south

ill. 68. detail elevation south

1:50

ill. 69. visualisation entrance

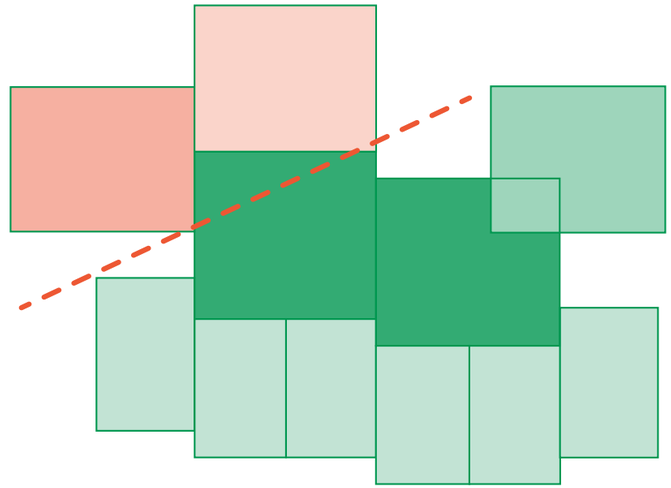
ill. 70. visualisation entire building

Hjertehuset is placed in the pocket of the forest, and the entrance is in the pocket of the children's hospice. In between two volumes, the entrance opens towards north between the wild nature to maintain the site's original wildness. Observing the community from the above, the pitched roof in the landscape stands out and enhance the minor community in the forest, where safety and stability are addressed as key underneath the roof. Inside the children's hospice, the pitched roof is also visible, with a few exceptions, as some rooms is preferred with low ceiling. All the bathrooms, and the sensing room and therapy room have low ceiling to obtain a more private and intimate atmosphere compared to the Heartroom, kitchen and apartments with high ceilings. The different volumes and ceiling height express the hierarchy of Hjertehuset according to the function and the amount of people using them. The apartments have the small volume to indicate a minor family house. The medium volume is the therapy, the kitchen, and the office, that is the functions that makes the children's hospice work. The Heartroom has the large volume, as it is the core that connects the other functions, where different zoning and life appears.

1400 m²
1:250
N

ill. 71. plan 1

Heartroom
kitchen
apartments
treatment area
office area
functional split: hospice function and homely functions



1:500
N

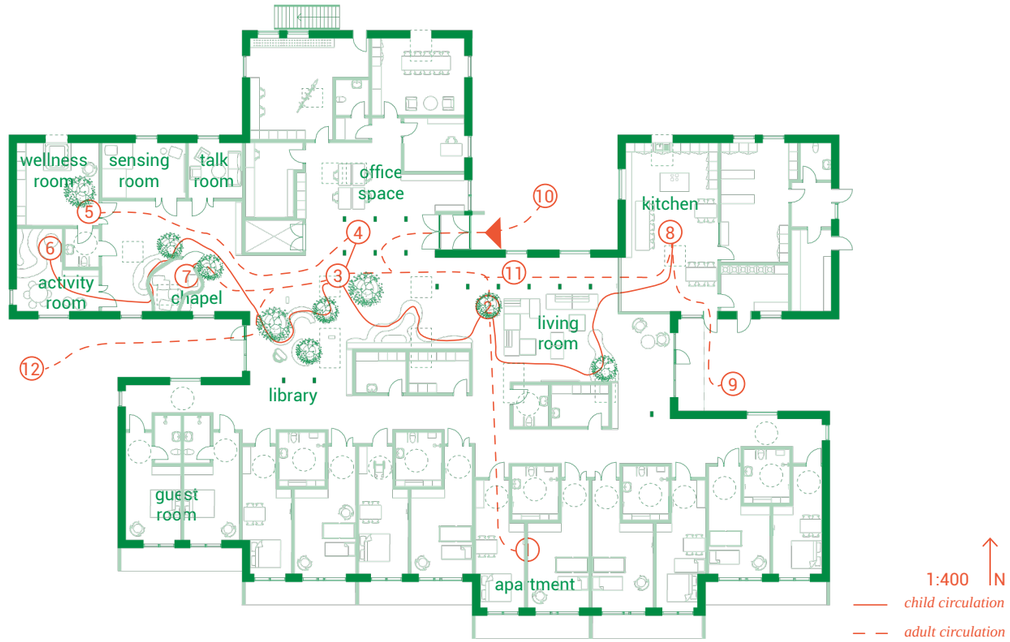
ill. 72. diagram of function placement

Hjertehuset is at 1400 m² with five apartment units, two guestrooms and a Heartroom to contain the core of the entire children's hospice. The plan of Hjertehuset follows the functions along with the volumes. When entering the children's hospice, the ill child and its family is meet with the open office where nurses are working and securing the needed treatment for the children. The volume towards west contains the different therapy options for the children or their parents. The activity room is also placed in the west to have a creative corner for the children. The kitchen is considered a part of the Heartroom only separated by a sliding door, that can extend the Heartroom.

In the south of the Heartroom the five apartments are situated for the ill children and their family. If the family have siblings or grandparents visiting, two guestrooms are offered as a flexible solution. Detailed drawings of the plan and sections of the children's hospice, and an area list with square metres is find in appendix 12. The plan of the children's hospice can be separated between the hospice function and the home function, as shown on the diagram illustration 72. The displacement of the Heartroom volume simplify the hallway area that separates the Heartroom with the apartments. It decreased the area of the hospice and made a closely connected to the apartments.

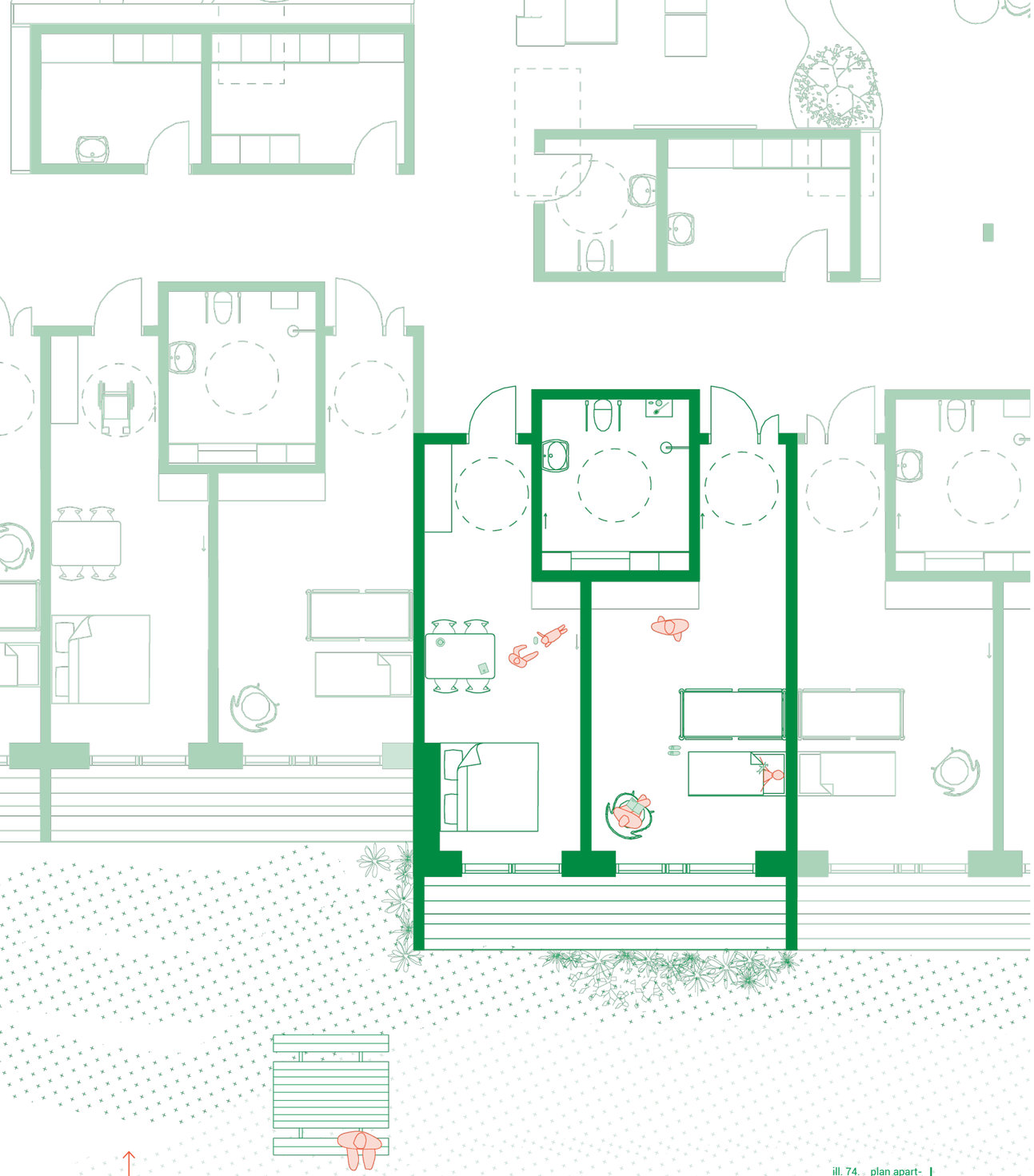
a day in the life of a family living in the hospice

The presentation on the following pages will follow a day in the life of a family staying in Hjertehuset. While following the family in their day, each function will be elaborated on with a descriptive text about the design, a plan, section, and other relevant graphical material. Sketches will illustrate the story of the family that will be recognisable through another font. The story is presented on a plan (ill. 73) where the red lines with numbers show the order of the presented functions. The difference in lines on the plan represent different circulation paths suggested by the design. One line is suggesting the adult circulation; a straight line that goes from the beginning to the end in the most efficient way possible. The other line is representing the circulation designed for the children. Integrated furniture and objects suggest a secondary more adventurous circulation that reaches from the Heartroom in the east until the activity room in the west and integrates play in the design.



Theo is 6 years old and is, together with his family, staying in the hospice. Theo suffers from a neurological disease that decreases his life function by pain and partial paralysis in the face. His family; mother, father, a younger sister of 4 years old, Trine, and an older brother of 11 years old, Kristian are registered at the hospice for 1 month.

ill. 73. plan with story line



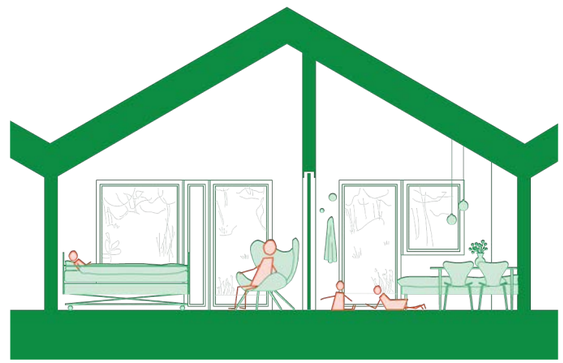
1:100 N

ill. 74. plan apartment

1:100

the apartment

The apartments are an essential part of the hospice as it is a space where many families will spend a lot of time even though the hospice design encourages the family to make use of the common functions. Both the family and the patient will stay at the same apartment while having their own room. By separating the rooms but giving the possibility to open up towards eachother by a sliding door, both can have privacy when needed. The patient's room is bigger than the family room for practical reasons such as moving around a hospital bed and a wheelchair but also for comfort reasons. As the patient will sometimes be too ill to get out of its room, it should have enough space inside the apartment. The family room is smaller and only serves the family for sleeping or retreating for a while from the community life going on outside their apartment. Both rooms have separate entrances, the entrance to the patient's room is reserved for medical interventions and nurses taking care of the ill child while the parents are not present, taking care of the siblings or asleep. The entrance to the apartment is for all other circulation and should address the more homely feeling. The apartment should act as a calm space where the entire family can be together in 'their own house'. The orientation towards south and the wild nature frames the surroundings. A private terrace that is accessible from both rooms makes the connection with nature and serves as a buffer zone between apartment and the active outside area.



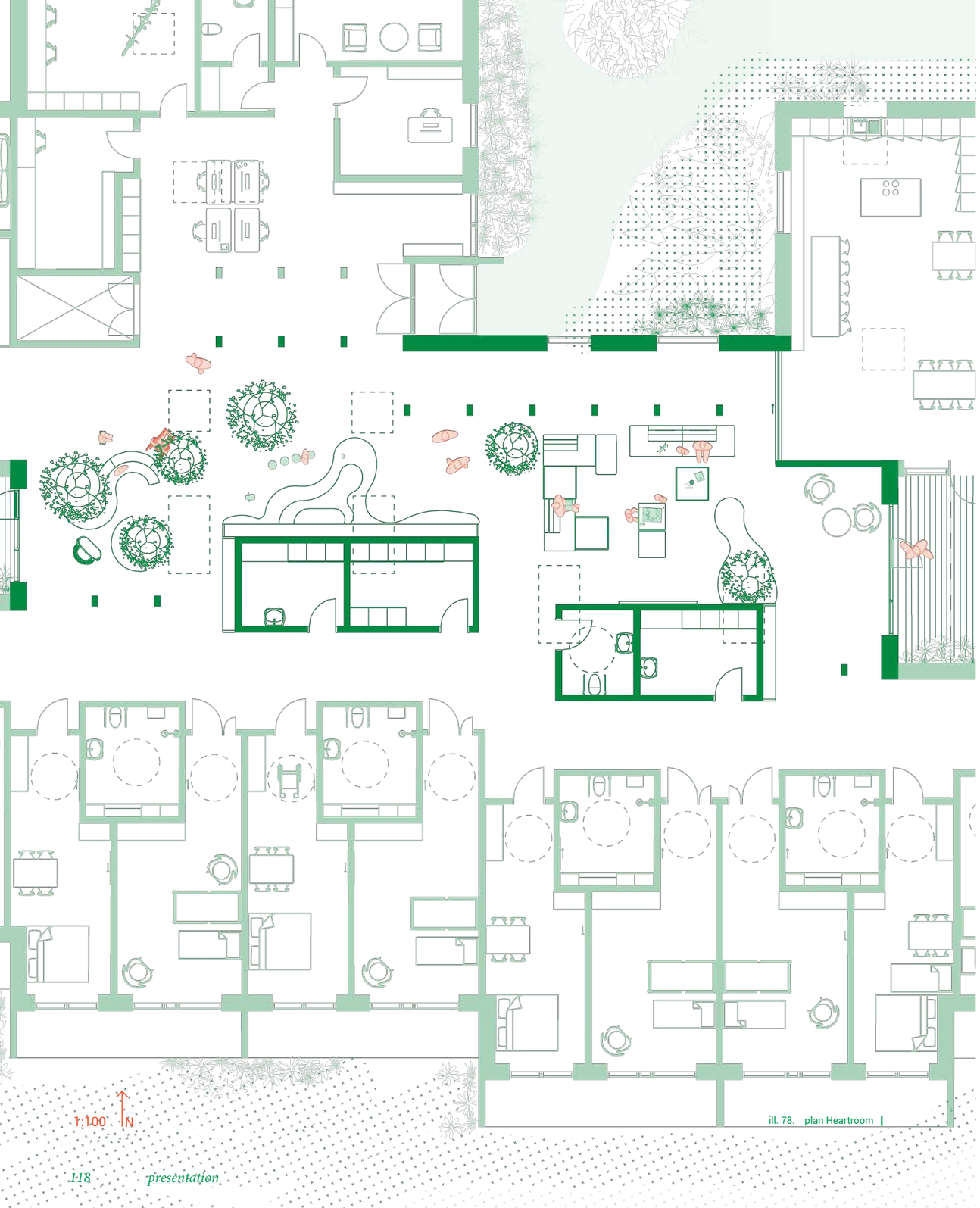
ill. 75. section apartment

After waking up in their separate rooms, the family is getting ready for the day. The siblings, Trine and Kristian, are playing together in the family room.

ill. 76. story sketch - family room

Because of his disability Theo is not very mobile and therefore a nurse comes to help him get ready for the day. While waiting for the nurse, one of the parents is keeping Theo company while the other one is finding him clothes suitable for the early summer weather.

ill. 77. story sketch - patient room



1:100 N

ill. 78. plan Heartroom

the Heartroom

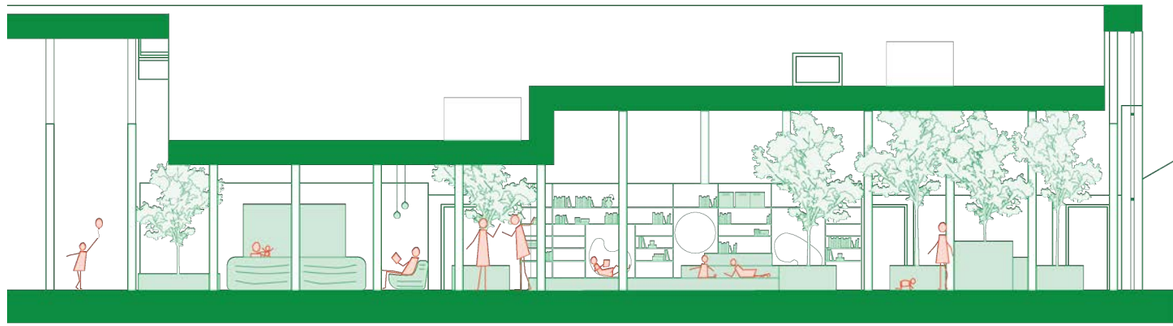
The Heartroom is the core of the building and a generator for the community life going on in the children's hospice. The space has the purpose of acting as a living room in a family house or a townhall in a city, a place with a lot of activity and different atmospheres while serving the needs of all user groups.

The Heartroom is split into different functions, it addresses places for stay but also hosts the circulation. The division between these two functions is made through the structural columns suggesting an open circulation. The space is interrupted by two volumes hosting practical functions such as storage and cleaning facilities. The boxes are a very important room divider for the space. It distinguishes the different zones and creates a transition zone in between the apartments and the Heartroom.

To address the different needs of different user groups and age groups, the Heartroom addresses different atmospheres and functions. The calmer part in the east is furnished with couches to create an easy and slow-activity space. The space transitions into a more active area towards west where a space for the children and play is created in the library. Integrated curved furniture addresses the need and design for play and the separate circulation reserved for the children. In the entire Heartroom, niches are created to serve the need of a quieter space to retreat oneself from the community. These are shaped like reading corners in the wall of the service boxes or large windowsills that make it possible to sit in.

Through the entire Heartroom, nature is dragged inside, starting with terraces on both ends connecting to the Heartroom through big windows that offer generous views towards the natural surroundings while lighting up the space with the help of skylights. Several trees are placed in the building to continue the feeling of close by nature inside the building.

1:100



ill. 79. section Heartroom

After having breakfast, the day continues in the Heartroom together with other families staying at the Hjertehuset. One family is still having breakfast in the kitchen while another one has an early start in the living room with some reading and play.

ill. 80. story sketch - Heartroom living room

Kristian has started reading a new book and retreats himself in one of the niches in the wall of the library area. Trine has a lot of energy in the morning and enjoys playing with the other children. They use the swing, jump on blocks and play hide and seek around the curved furniture.

ill. 81. story sketch - Heartroom library

ill. 82. visualisation
Heartroom

"It was like being crushed under a huge rock, and then it felt like, it was being lifted away, so you could actually relax."

"Det var ligesom at blive mast under en kæmpe sten, og så var det som at den blev løftet væk, så man kunne rent faktisk slappe af"

Father to Knud (Registered at Lukashuset)

ill. 83. plan office area

ill. 85. story sketch - open office

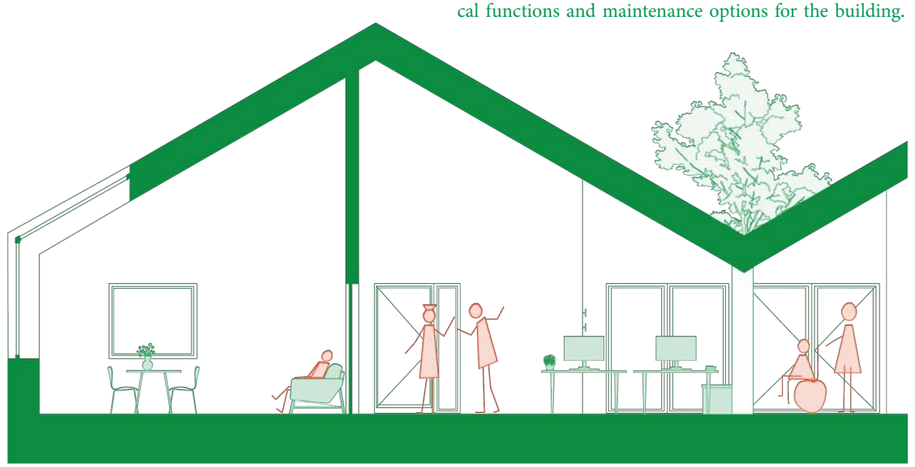
Because Theo has not been feeling very good this morning due to sore muscles, his parents decide to go talk with the nurse in the office for possible treatment today. They agree that Theo needs physiotherapy and a warm bath afterwards as soon as possible.

the office / staff area

The open office is accessible for everyone and allows close contact between the staff and the families. It is a transparent space that creates trust and minimalises hierarchy between the different user groups. The office is located close to the Heartroom and next to the entrance. While the user, after entering the building, is guided into the Heartroom through the roof volume opening up, it can still feel the close relationship and openness of the office.

The structural columns define this in-between entrance space and gives the user a moment to read the building and choose directions to the Heartroom or the office. As the staff is equally important to the families in the design, their needs are taken carefully into consideration. According to the research done in the analysis phase of the project, a separate room for the staff to take a break was considered essential. To meet this need, a multifunctional meeting room has been placed at the end of the office volume. This room is oriented towards the entrance and the calmer north area of the site to offer a break and retreat for the staff when needed.

Working spaces are placed central and are lit by skylights. A separate office is placed against the façade and has a view over the entrance zones outside while at the same time overlooking the open office. Other functions such as a medicine room, elevator to the basement and wardrobe for the staff are addressed in this volume next to the handyman room. This space in the north of the office volume hosts practical functions and maintenance options for the building.



ill. 84. section office area

1:100

the treatment

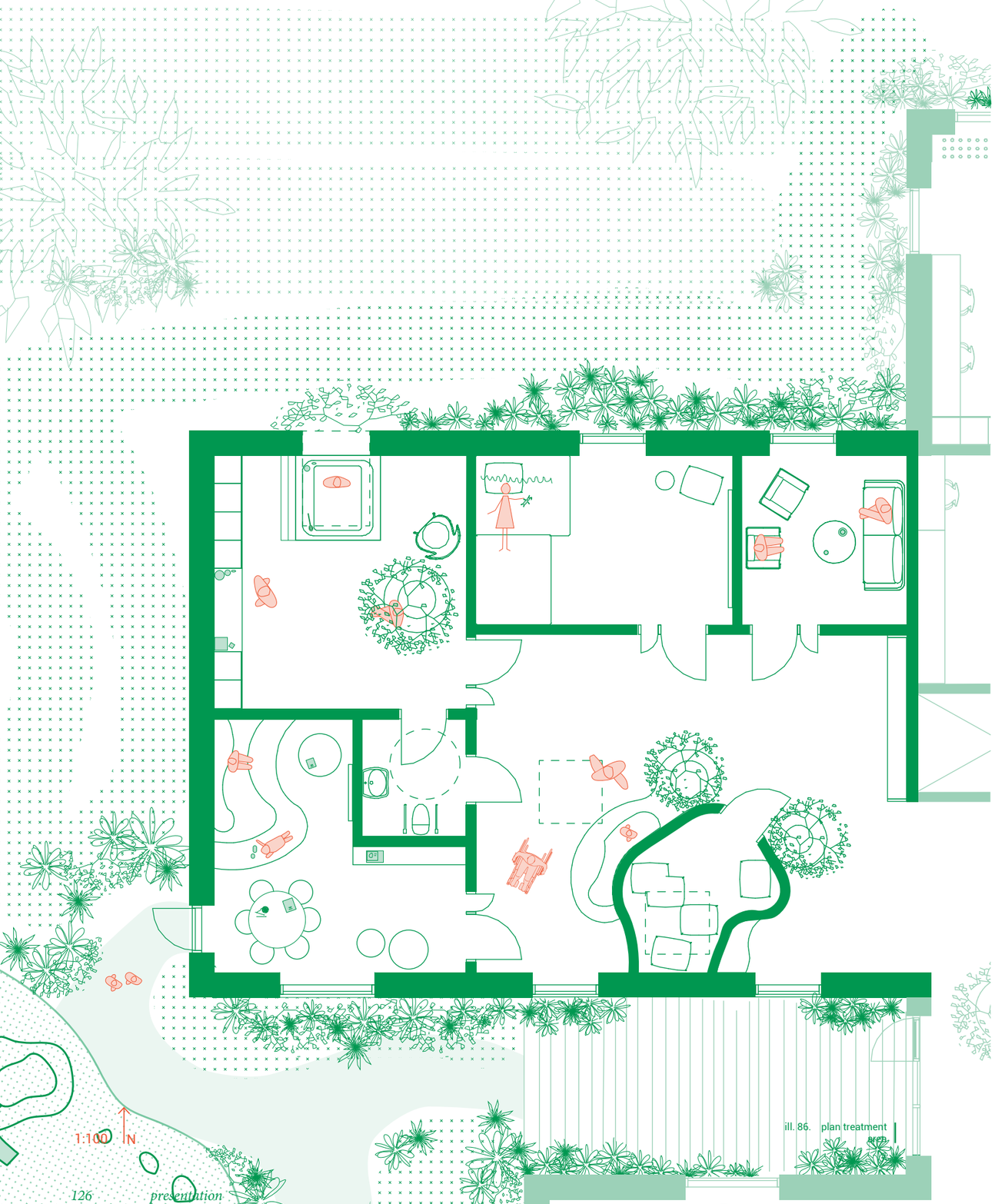
The treatment area of the building is one of the functions that makes the children's hospice what it is; a place for families to live but also a place to take care of the illness they are dealing with. The treatments that are offered are supposed to enlighten the family and patient physically or mentally.

The treatment area can be seen as an extension of the Heartroom reaching out towards west and splitting up in different rooms offering different treatments. The treatment facilities that are placed in the north part of the volume are the more private ones. The orientation allows views and openings towards the evergreen forest while still feeling private and intimate. The functions placed here are the therapy room, the sensing room and the wellness area. Other rooms addressed in the treatment area are the activity room and the reflection room.

The therapy room is an intimate room meant for talks, music therapy or a moment of pause. Together with the sensing room it has a flat ceiling to enhance the feeling of privacy and intimacy. The sensing room is a special treatment room that was seen in several case studies. It has the possibility to stimulate the different senses and bring relief to the user. The room has the option to be closed off from light to be able to create different atmospheres to stimulate the visual senses. Other senses such as hearing and feeling are stimulated through music, nature sounds, and touch.

The wellness room is a room dedicated to bathing but also physical therapy. It is meant for the patient but can also be used by another family member or several at one time. The window is raised for more privacy in this very intimate room and continues into the roof. The activity room is considered less of a treatment area and more of a recreational area for the children to use. Different zones and activities are addressed such as a gaming corner, a creative corner, and a book corner, to meet the needs of the different age groups. The room connects to the outside through a big window with a sitting option and makes the connection to the outside playground. By integrated curved furniture and playing objects that reach from inside the activity room to the Heartroom both rooms are connected and make space for play and stay.

The last room in the treatment area is the reflection room. A room for the user to be in alone and reflect while retreating from the community. It is a small but high room lit up by a skylight. The serene atmosphere encourages the user to slow down while experiencing time passing by through the clouds.



ill. 86. plan treatment arch.

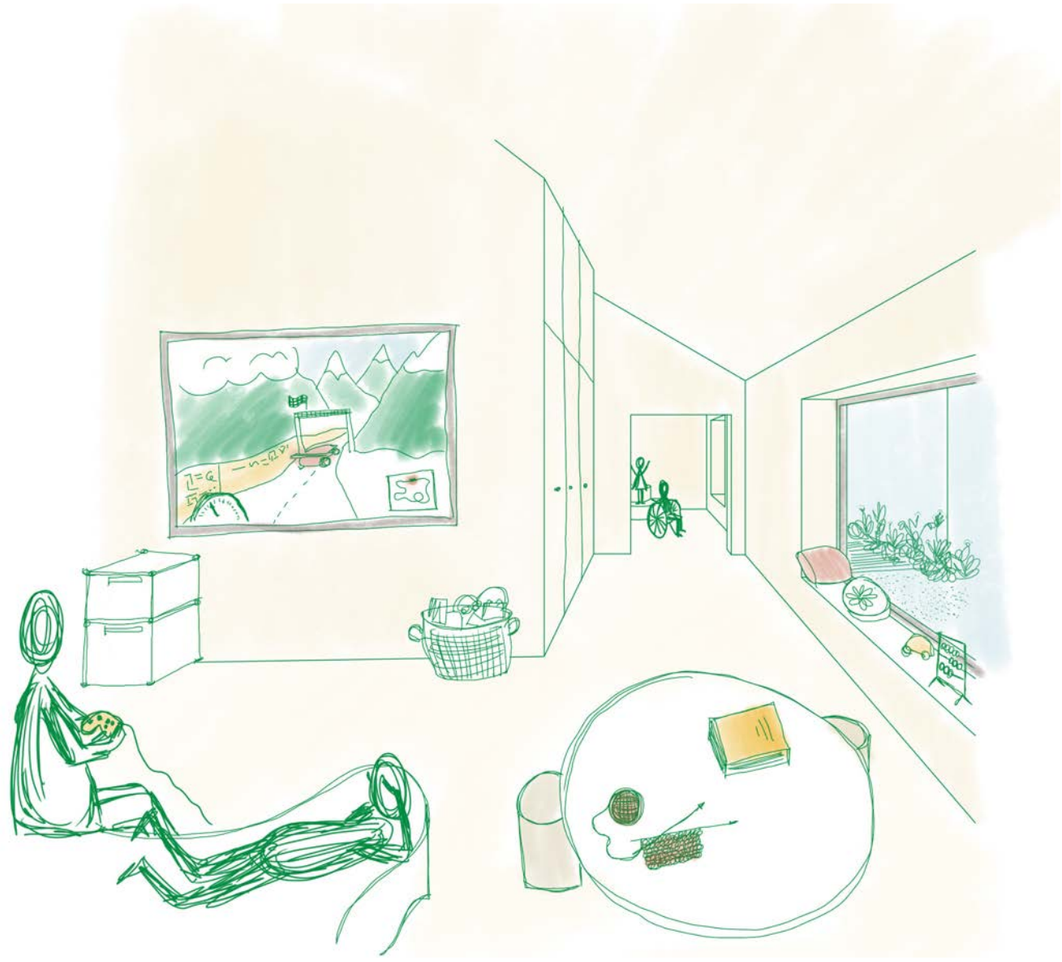
ill. 87. section treatment area

1:100

ill. 88. story sketch - reflection room

After Theo had physiotherapy, he is helped into the bathtub in the wellness room. One of his parents keeps him company and reads the newspaper while the nurse makes sure Theo is kept warm and comfortable in the bath.

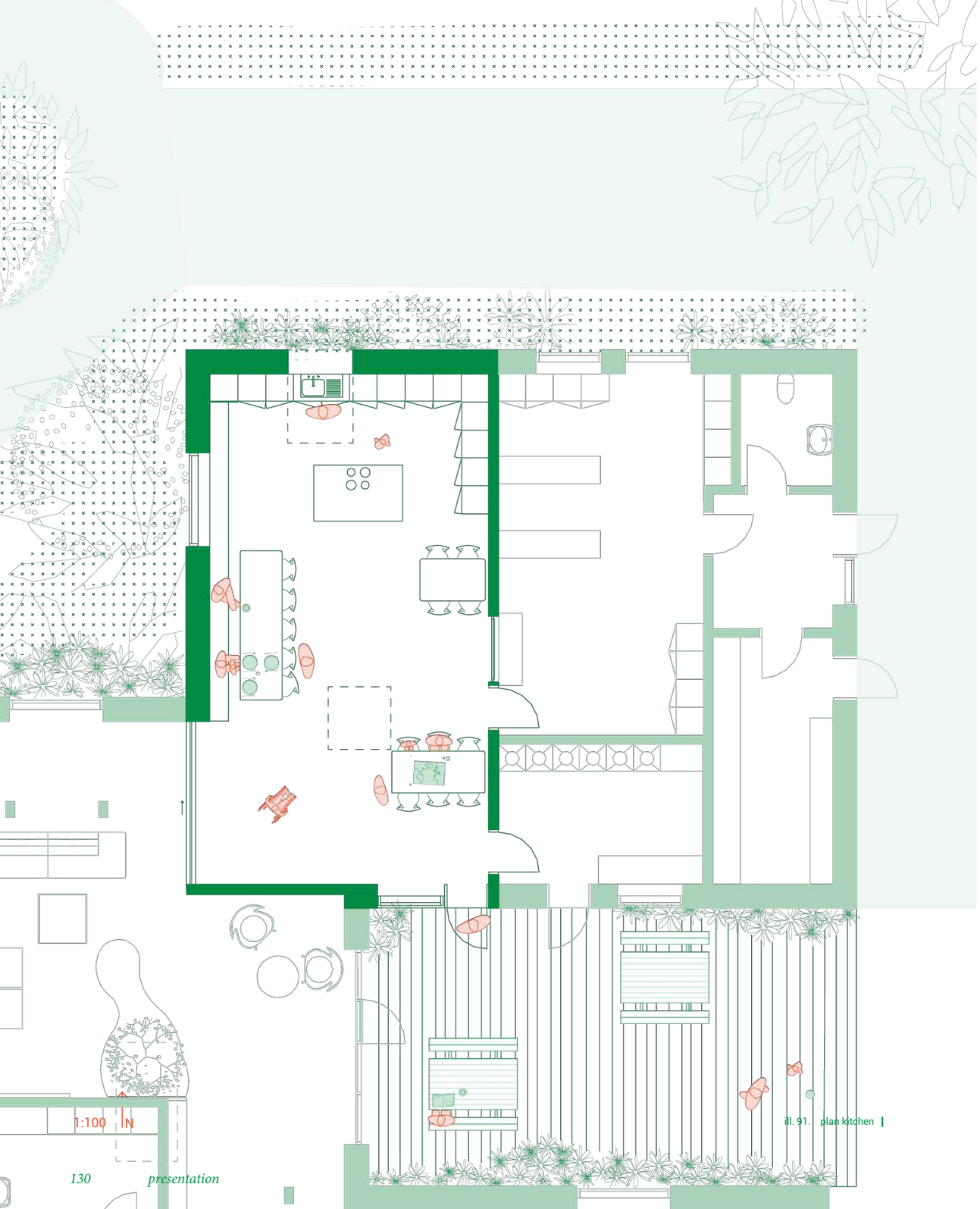
ill. 89. story sketch - wellness room



In the meantime, both Kristian and Trine have moved into the activity room. Since it is a day off, Kristian does not have to do homework and can play videogames. Trine enjoys watching her big brother playing before she heads of to make a painting for her parents.

One of the Hjertehuset's pedagogues comes to check in on both children to make sure they are okay while one of their parents is busy accompanying Theo and the other is taking a moment for themself in the reflection room.

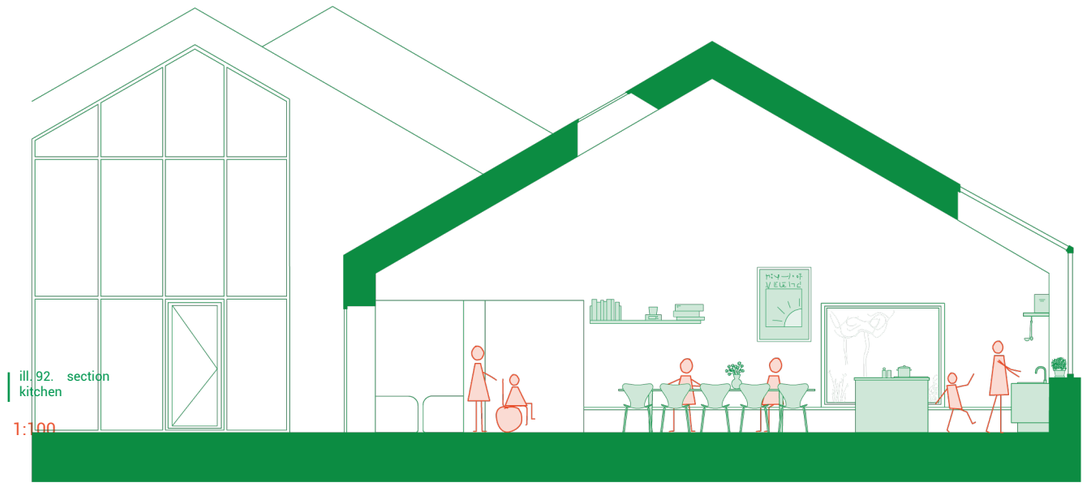
ill. 90. story sketch - activity room



ill. 91. plan kitchen

the kitchen

The kitchen is a function that is very closely related to the Heartroom and plays an important part in the community feeling of the hospice. It is an active and multifunctional place where all user groups come together, drink coffee, play boardgames or cook. Once a day all users have lunch together that is prepared by the children's hospice. All other meals are prepared by the families themselves to keep up the normal everyday habit of cooking and is giving the family autonomy over their life at the hospice. Even though the kitchen is considered open towards the Heartroom, it can be closed off for practical reasons. The volume can be split up in a kitchen and a dining part for the families and staff and a back of house part with functions such as an industrial kitchen and extra kitchen storage. The kitchen for family and dining room are one open space. The connection in between them is made with an integrated bench stretching from dining area up until the kitchen counter. This furniture is offering sitting place but also storage and play. A window in the west in the same height as the integrated bench offers, together with the window in the north, a view towards the entrance. By introducing skylights, the large and high space is lit up. The south of the kitchen connects to the terrace that gives the possibility for having meals or a drink outside and enjoy the natural surroundings of Hjertehuset.



ill. 92. section kitchen

1:100

By the time Theo's treatment is finished it is lunchtime. Most of the families and staff are gathering in the kitchen to have lunch together, that the children's hospice offers.

Besides having lunch together or cooking in the evening, the kitchen is also used to play games, read a book, have a talk...

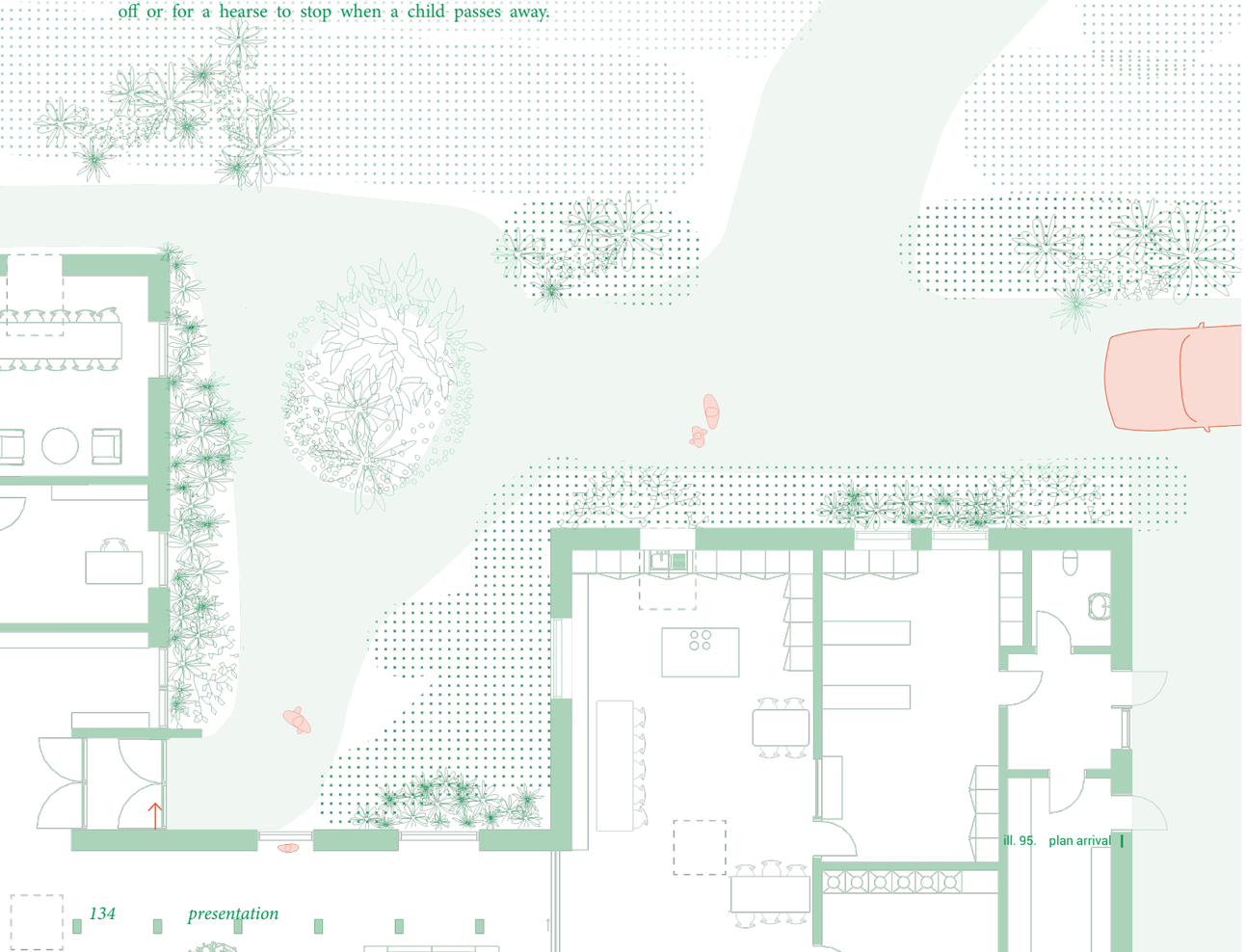
ill. 93. story sketch - kitchen

When lunch is over, the nurses are having a cup of coffee in the sun on the terrace while another child and her parent get outside to play some football.

ill. 94. story sketch - terrace in the east

meeting the building

Hjertehuset is approached from the northeast corner of the site. A pathway guides the user through the natural settings into a pocket of the building created by the different volumes. The entrance acts as the front door of a house, noticeable and welcoming without wayfinding signs, opposing the institutional like entrance. However, a weather porch is included for practical reasons and distinguishes the entrance from a regular family house. The entrance is addressed through a small porch with a pitches roof blending in with the actual building volumes and giving the user a familiar feeling by addressing the pitched roof shape. When approaching the building, hints of the interior are given by windows that are looking out on the entrance area. These windows are made so small children, and children in a wheelchair can easily look through them or sit in them while waiting for their parents or visit to arrive. However, the parking space is a bit away from the building, a driveway makes it possible to reach the entrance by car as a kiss and ride principle. This is necessary for the (not/less mobile) user to be dropped off or for a hearse to stop when a child passes away.



ill. 95. plan arrival

ill. 96. visualisation entrance

In the afternoon the family has visit from their grandma.

ill. 97. story sketch - arrival at the hospice

While playing, Trine saw her grandma arriving and jumped enthusiastically in the windowsill. Impatiently, she is standing and waving at her grandma waiting for her to come inside.

ill. 98. story sketch - waving through the window

meeting the outside

The natural surroundings of the site are preserved as much as possible while still offering the user of Hjertehuset to enjoy time outdoors. Two terraces in east and west, as pockets of nature reaching into the building are the first step of being outdoor and are connected by a path through the low dense nature south of the building. In the west, a playground is introduced close to the activity room and benefits from the sunlight during noon and evening. A repetition of objects as addressed in the interior as integrated curved furniture for play are also used in the playground. A series of object encourage children to discover the environment and actively use their imagination.

The nature on the northern part of the building, which is hosting the more private and intimate functions, has been kept untouched to keep it an inaccessible part of the site, insuring the privacy of the functions in need for it.

1:100 N

ill. 99. plan outside (play) area

ill. 100. story sketch - the playground

After the entire family has greeted grandma, Theo is tired and goes to rest in his room. Both his siblings, Kristian and Trine, enjoy the time with their grandma. They show her around their new home for a while. Trine wants to show her grandma the playground where she can use the slide all by herself. Grandma enjoys looking after her grandchildren while at the same time helping out her son and daughter-in-law. They are having time for catching up on work or relaxing until grandma leaves again or Theo wakes up.

1:300

ill. 101. elevation west

1:300

ill. 102. elevation north

ill. 103. detail elevation north

materiality

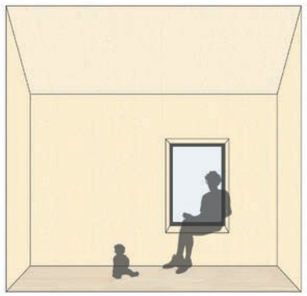
Choosing the materials for Hjertehuset have been through studies of the environmental impact of individual materials, different constructions were compared to achieve the optimal material choice. A range of materials has been studied for each layer from cladding to interior cladding of the exterior wall, followed by the roof, interior walls, and slab.

The detail (ill. 106) is a section of the envelope at the Heartroom, between the open office and kitchen, with the arrival area on the outside. The final building design is mainly cladded in pine boards both on exterior walls and roof, while the interior cladding varies from different rooms, to reach different atmospheres (ill. 105).

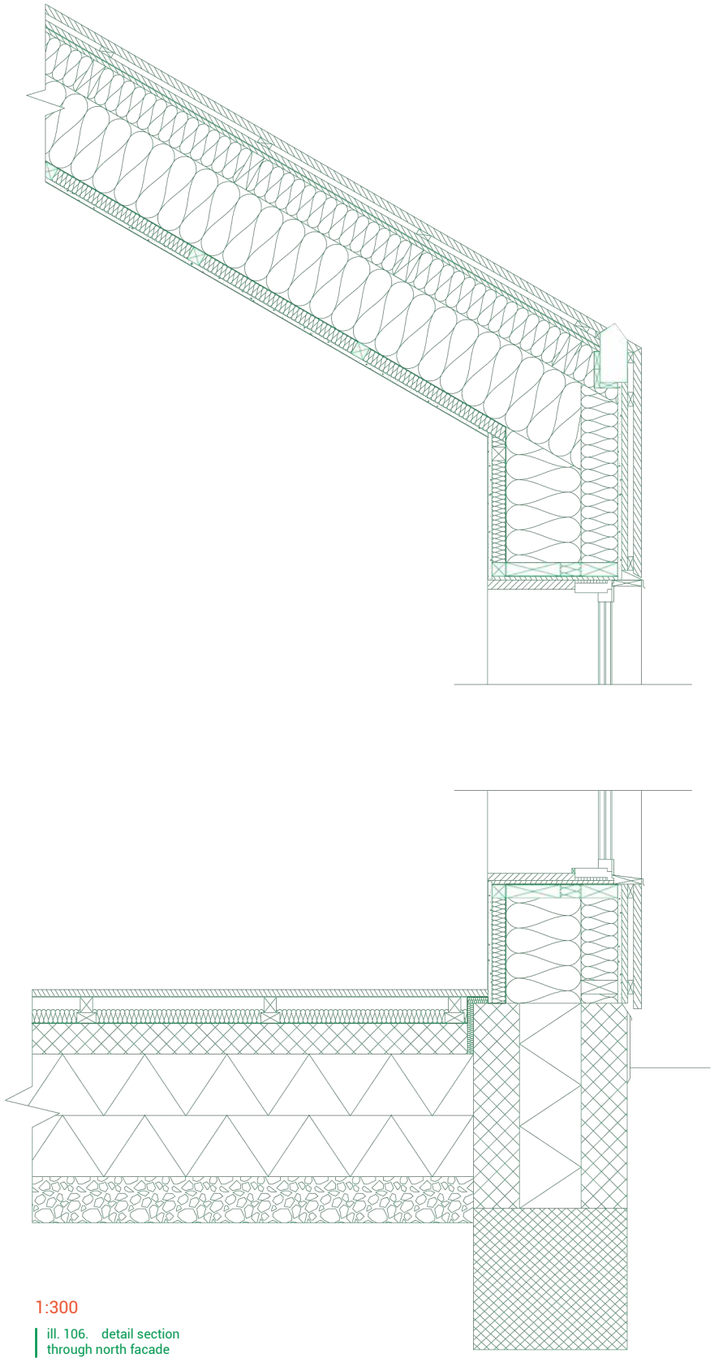
With pine boards as cladding, the façade has a simple expression and respects the nature surroundings. The pine boards are strong and durable since it is impregnated to the core with naturally occurring silicate, that minimise the absorption of water and moisture and thus prevents attacks by rot and fungus. The material should not be painted or oiled to maintain a raw nature expression (Frøslev, n.d.). To finalise the simple expression of the building exterior, the gutter is hidden behind the cladding to avoid too many interruptions in the façade.

In the Heartroom, the interior cladding is white painted gypsum, and visible columns and beams as loadbearing pine structure, which the detail section indicate. In other rooms as kitchen, apartments, office, etc., the interior cladding is plywood (ill. 104), without visible structure.

ill. 104. materiality - wall layers



ill. 105. materiality - indoor cladding



1:300

ill. 106. detail section through north facade

detail section

exterior wall

pine board cladding	26mm
cross rafter	19x45mm
air gap with rafter	19x45mm
gypsum board wind barrier	13mm
sheepwool with rafter	120mm
(pine structure)	350x250mm
sheepwool with rafter	245mm
sugarcane vapour barrier	0,2mm
sheepwool with rafter	45mm
gypsum board	13mm
white paint	1mm

roof

pine board cladding	26 mm
cross rafter	19x45 mm
air gap with rafter	19x45 mm
under membrane	2 mm
gypsum board wind barrier	13 mm
sheepwool with rafter	120 mm
(pine structure)	350x250 mm
sheepwool with rafter	245 mm
sugarcane vapour barrier	0,2 mm
sheepwool with rafter	45 mm
gypsum board	13mm
white paint	1mm

slab

Wooden floor	22 mm
Step sound insulation	3 mm
Air gap with rafter	45x45 mm
Insulation with rafter	40x40 mm
Radon- and vapour barrier	0,2 mm
Concrete	100 mm
EPS insulation	400 mm
capillary	150 mm

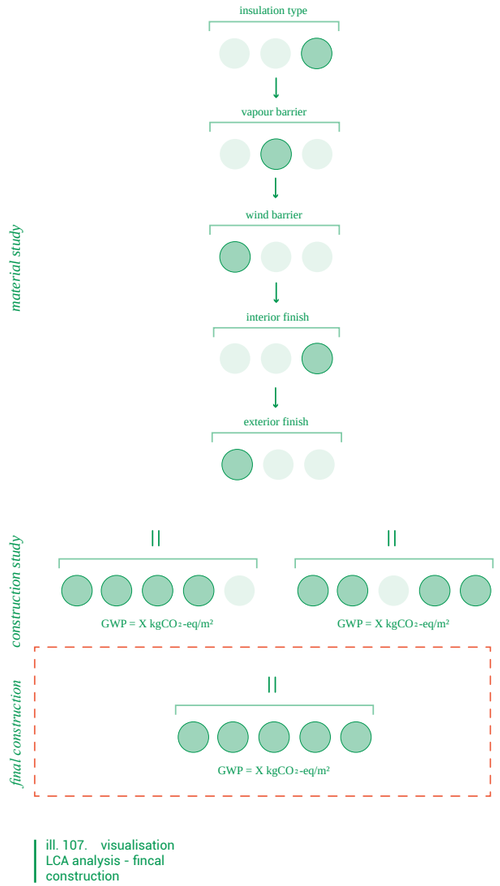
foundation

Lime cement morter	2 mm
Clinker block	120 mm
EPS insulation	276 mm
Clinker block	120 mm
Concrete	516 mm

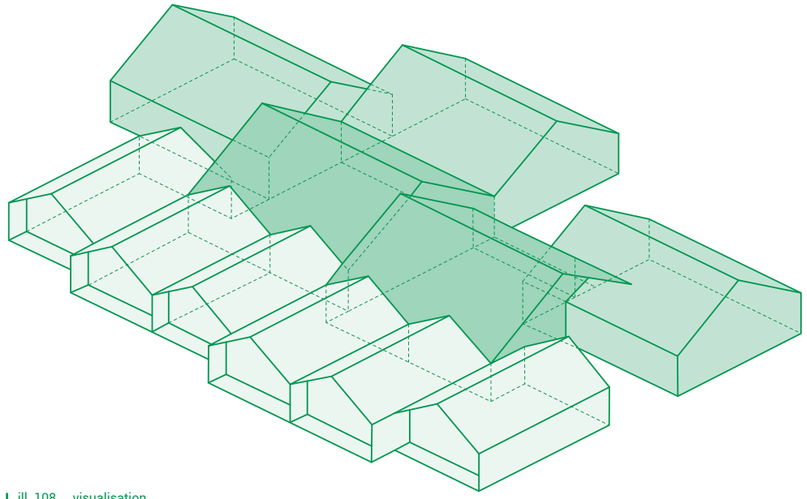
life cycle assessment

The expression of the building is, as mentioned, preferred to be simple and to respect the nature surroundings. From inside, the expression of the materials is varying depending on the function of each room but is mainly with biogenic materials, as it was shown as the type of materials with the lowest influence on the global warming potential.

The final life cycle assessment is made based on the material studies followed by the studies of constructions during the design process. All previous decided materials are taken into account, as well as a few materials with default values is included for mandatory material parts in a building. This is materials as pipes and other for water, heat, ventilation etc.



ill. 107. visualisation
LCA analysis - fincal construction



ill. 108. visualisation
LCA strategy - construction study

underlying assumptions of calculations		
lca method	BR18	
total area	1773	m^2
heated area	1582	m^2
operation consumption, heat	35,7	$kWh/m^2/year$
operation sonsumption, electricity	2,8	$kWh/m^2/year$

the building

One storey building with a basement of 282 m². The roof is pitched, with 2,5 m at the lowest point, while the height is changing. The highest roof point is 7,1 m. The children's hospice is used by maximum 20 people at the time.

overall result

The total global warming potential of the building is 6,89 kg CO_2-eq/m²/year (appendix 13). Compared to the same building with green roof, instead of pine boards, the environmental impact increased with 32 % (appendix 14).

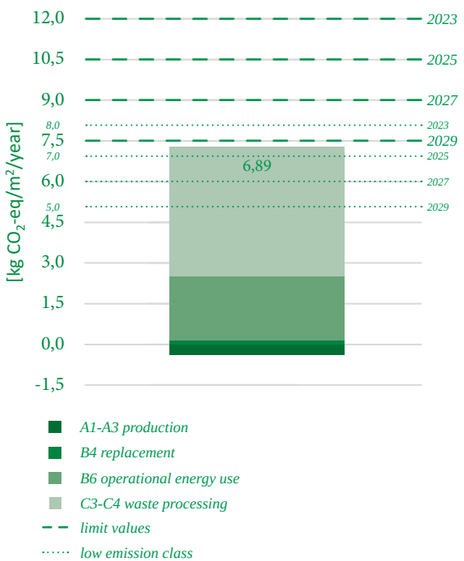
This means that it complies with the goal of reaching the Danish regulations for the voluntary low emission class of 2023. The overall result is made based on both declarations from two different standards, EN15804+A1 and EN15804+A2 values, which means the result of other indicators than GWP cannot be compared or summarised. Furthermore, the results are entered in LCAbyg through declarations that are listed in the reference list of EPD´s.

In relation to the architectural perspective of the materiality goal, the building is cladded with wooden boards both on exterior and roof. This building has a lot of angles, and displacements, and with the same cladding material, the expression becomes more simple. From the inside, the rooms are having the opportunity to use different materials following different functions.

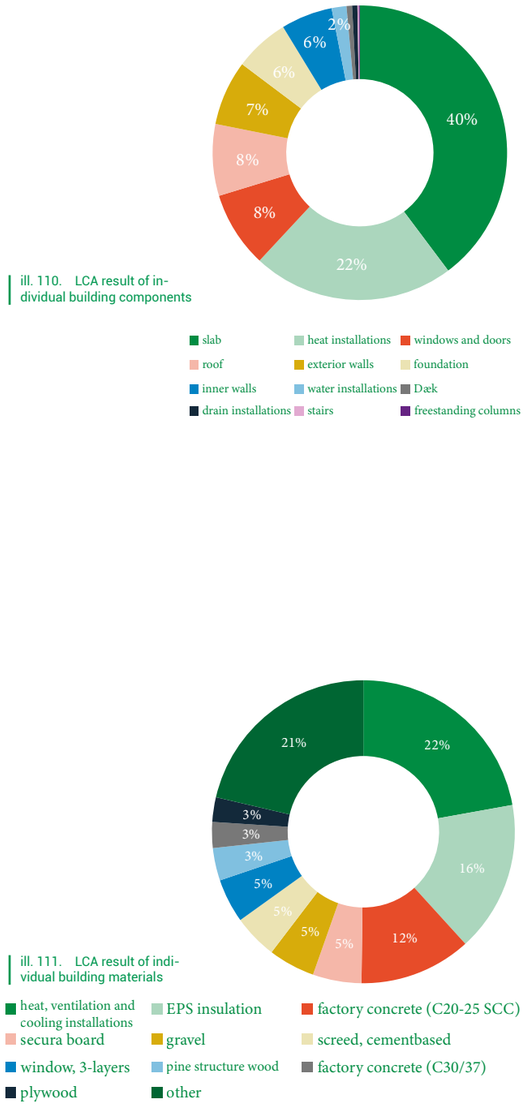
stages

As seen on the scheme, the A1-A3 stage is overall negative because of the amount of biogenic materials, that absorb and stores CO_2 but it releases at the C3-C4 phases. B4 is materials that needs to be replaced throughout the period of 50 years, while the B6 phase is the energy use of the building.

life cycle stages	gwp
A1-A3 production	-0,38
B4 replacement	0,16
B6 operational energy use	2,36
C3-C4 waste processing and disposal	4,76
D recycle potential	-2,75
total	6,89 kg CO_2-eq/m²/year



ill. 109. LCA overall result and relation to regulations in DK



ill. 110. LCA result of individual building components

building components

To show how much influence each component of the building has on the overall result (ill. 110) shows it in percentage. The highest influencing component is the slab at 40 % of the total result, followed by heat at 22 %. The big influence from the slab is caused by the big amount of concrete and EPS insulation, while the building is having a big footprint and only one storey. The materials for heating installations are default values that will always be the same, depending on square metres. In relation to the other components, the default values stand out. This thesis has focused on the exterior wall and roof to lower the emission of these components, which is shown as a low percentage of the total result. This is concluded in relation to the slab, which has not been the focus of reducing. If the total GWP did not reach the goal of 8 kg CO_2-eq/m²/year, the slab would be obvious to study to reduce the impact.

ill. 111. LCA result of individual building materials

building materials

The materials with the highest environmental impacts are heat installations, followed by EPS insulation and concrete from the slab and foundation. The illustrations show how small in percentage the biogenic materials have, as the construction wood and plywood at 3 %, while concrete, gravel, gypsum, etc is over 5 % and 12 %.

The children's hospice has windows of three-layer energy efficient glass and with aluminium frames, to have less maintenance and a longer life span. They are at 5 % of the total result.

The element "other" covers the materials that are having less than 3 % of environmental impact on the total GWP (appendix 13).

energy performance of the building

The main focus regarding technical aspects for the Hjertehuset was to reach a low GWP result, which succeeded. The energy requirements were a minor priority, but the minimum aim was to reach the energy frame of the building regulation 2018 at 41,0 kWh/m² per year (Social- og Boligstyrelsen, 2023a). The children's hospice has a total energy requirement of 33,2 kWh/m² per year, without supplement of active strategies (appendix 15). The contribution is shared between heating and electricity for the building's operation. There is no overheating in the rooms, as the excessive in rooms are at 0,0 kWh/m² per year, which is caused by the ventilation, that is necessary to find an acceptable condition for the families. The value for domestic hot water is a need for the building, and therefore has limiting options for being reduced.

The regulated energy requirement for the children's hospice is reached, but if the frame for low energy (33,0 kWh/m² per year) or Building class 2020 (25,0 kWh/m² per year), which is a voluntary low energy class, was intended, then an additional contribution from solar cells were preferred (Social- og Boligstyrelsen, 2023b, 2018). 60 m² of solar cells reduces the energy requirement to 23,3 kWh/m² per year, which is a reduction at 30 %. The energy requirement meets the low energy demand and the voluntary Building class 2020 with the supplement from solar cells (appendix 16). Solar cells as an active strategy helps reduce the energy requirements to a low energy, but it also changes the design of the children's hospice by placing solar cells on the clean roof. The solar cells should be integrated in the design earlier in the process to be a part of children's hospice, though several roof slopes are orientated towards south and enables space for solar cells in the future for the children's hospice.

kWh/m² per year		
	Regulation	Total energy requirement
Energy frame BR 2018	41,5	33,2
Energy frame low energy	33,0	33,2

kWh/m² per year		
	Regulation	Total energy requirement
Energy frame BR 2018	41,5	23,3
Energy frame low energy	33,0	23,3

epilogue 04

In the epilogue concludes on the research done in the thesis and reflects upon the process and result of it.

conclusion.....152
reflection.....153
bibliography.....154
illustration list.....157

conclusion

The children's hospice, Hjertehuset, arises from the intention of enhancing a living community for (terminally) ill children and their families. A living community, that obtains safety, stability, and relief, through the Heartroom at Hjertehuset. Different zones are serving different needs, hidden alcoves for contemplation and ease, or a creative bookshelf with minor spaces to hide in createplayful moments for children. A couch corner for movie nights and windowsills for withdrawing into the nature. A swing in the ceiling for laughter and long benches to include everyone. The 3-year old child can play around in the different levels of the bookshelves, while the 8-year-old can use the activity room for painting and bead plates. An area for videogames and movies is placed in the activity room for the 15-year old, Hjertehuset is designed to reach every age-group without being associate to a kindergarten.

The Heartroom is for the everyday life, the core, where the essential functions unfold from. The apartments are closely connected to the Heartroom, only separated in volume, to make it accessible for the families, if they desire company. The office and the therapy rooms originate from the corner of the Heartroom and function as the children's hospices necessary functions where the needed treatment and conversations take place for both the ill child and the family.

The children's hospice, Hjertehuset, is built on the thesis' foundation of Healing architecture. The parameters of Nature, that embraces the children's hospice, and the Design for play, that unfolds in different levels for different age groups in the Heartroom, circulation spaces and outside. The materiality sets the scene for the low emission ambition. The children's hospice's total global warming potential is 6,89 kg CO_2-eq/m^2/year, which is below the goal of reaching the 2023 Danish regulations for the voluntary low emission class at 8 kg CO_2-eq/m^2/year. A wooden construction and wooden boards as exterior and roof cladding contribute to the indirect experience of nature and gives a close connection to the wild nature outside the walls of the hospice. The nature is maintained wild to enhance the impact nature has on the mental wellbeing of the children and their families. The change of seasons is unfolded outside the windows and nature is brought into the Heartroom to extend the connection with nature and make it accessible for everyone. This thesis presents Hjertehuset as a living community in nature, where families with (terminally) ill children can find relief in their situation while finding support of other families in a low CO_2 emission building.

reflection

Hjertehuset as a children's hospice is a complex building to elaborate on, as several parameters, theories and studies are utilised to understand the typology and its requirement for the specific user group. The thesis has defined a limitation for the topic to narrow down the investigation, though the thesis's output for a children's hospice with the addressed problem statement still withdraws some reflections. The main reflections points of the project are elaborated on in this section.

phenomenological approach

The proposed design reflects the phenomenological approach through own experience and opinions, which is subjective and rather personal. The approach is chosen as the phenomenology based on the personal experience from the group is easily addressed while discussing the topics. Including opinions from several perspectives is a more quantitative method, though it is difficult to find sources on all the intended atmospheres, site investigations and case studies, that have been made during the thesis. By combining three different opinions into a common language of the intended atmospheres for instance, guides the direction of the thesis. Another aspect of the phenomenological approach is addressing the experience from an image. For instance, the case study of Tsurumi Hospice in Japan is assessed through several pictures on a screen, compared to visiting the project, which might not give the same expression as it would in real life. By only seeing pictures, it is a limited amount of expression that can be communicated and understood. The sensing, the touch, the sound, or experience of being there is missing. Additionally, there are areas, corners, materials, smells, circulation, etc., that are not experienced, but only associated with other experiences. Though the opinion is, that a phenomenological approach can also be addressed through the experience of an image as it can affect one's feelings through colour, or the association the image recalls.

life cycle assessment

According to LCA and the result of the final design purpose, it was not a problem getting under the regulations from 2023 at 12 kg CO_2-eq./m^2/year, followed by the current volunteering low emission class at 8 kg CO_2-eq./m^2/year. Here, the benefits of studying instead of creating a realistic project, are shown to one's full advantage and might have had a huge impact on the result. Unconditionally, economics have not been considered throughout this thesis, which has made it easy to choose materials from how they are phenomenologically experienced as well as how they are performing according to LCA. Not including economics gives a higher flexibility to the thesis than if the investigation of materials would have been limited by a budget. The economical role of designing and building today has a huge impact on the design turning into reality or not. The LCA result of Hjertehuset, without the consideration of a budget, makes it difficult to repeat in other projects. Since the goal for the final LCA result was to reach the Danish regulations, which follow Bygningsreglementet 2018, transport emission has not been a part of the calculations. This is even though it is not possible to avoid the transport in the real world and will realistically therefore only increase the environmental impact. Therefore, transport is something that will only influence the result by adding to the calculations, which in a realistic project case is not possible to avoid.

structure

The structure of the building could have been implemented in the design process earlier to avoid spending too much time on making it fit to an initial design. If the technical focus of this thesis was the structure instead of LCA, a critical point of the structure would be the joints between several pitched roofs of different heights and orientations, which has not been addressed in this thesis. Another perspective of the structural considerations is that it can be included too early in the design process and it then can limit the creativity and freedom of placing volumes, as well as designing those.

indoor environment

Another technical focus that could have been elaborated on further is the indoor environment. Designing a children's hospice, as an addition to the palliative care options in Denmark, makes a healthy environment with an acceptable thermal-, visual-, acoustic-, and atmospheric comfort preferrable. The apartments for the ill children and their families are orientated towards south, which is normally not recommended. The bedroom is preferred in a cooler temperature than the staying areas during the day, as they are often placed towards north or east. The apartments at Hjertehuset would stay warm most of the day, which might affect the comfort of sleeping in there. The orientation of the apartments towards south also affect the Heartroom, as it is blocked of having direct sunlight from south. The Heartroom is a vital function for the concept of Hjertehuset, and therefore should have considered an option of having the attractive south orientation. Different orientations and views in the different functions also have a positive effect, as it makes every room diverse and helps creating the community feeling, as the families will circulate more to experience the varying light, views, and atmospheres.

bibliography

Aalborg Kommune, 2023. Strategiplan Aalborg Renovation 2023 - 2026.

Aalborg Universitetshospital, n.d. Palliativt Team for Børn og Unge, Region Nordjylland [WWW Document]. Aalb. Univ. - Reg. Nord. URL https://aalborguh.rn.dk/afsnit-og-ambulatorier/boerne-og-ungeafdelingen/saerlige-funktioner/palliativt-team-for-boern-og-unge (accessed 2.17.23).

Aarhus Universitet, n.d. Case studie [WWW Document]. Aarhus Univ. URL https://metodeguiden.au.dk/case-studie (accessed 2.22.23a).

Aarhus Universitet, n.d. Interviews [WWW Document]. Aarhus Univ. URL https://metodeguiden.au.dk/interviews (accessed 2.22.23b).

Aarhus Universitet, n.d. Deltagerobservation [WWW Document]. Aarhus Univ. URL https://metodeguiden.au.dk/deltagerobservation (accessed 2.22.23c).

AART, n.d. Strandbakkehuset [WWW Document]. Dansk. URL https://aart.dk/projekter/borne-og-ungehospice (accessed 2.6.23).

Akuneho, J.T., Napoleon, I., 2021. Healing Architecture in Hospital Design. Global Scientific Journals 9.

Architecture 2030, n.d. Why The Building Sector? – Architecture 2030. URL https://architecture2030.org/why-the-building-sector/ (accessed 5.24.23).

bewi.com, n.d. Gram Vapor Barrier | Sugarcane [WWW Document]. BEWI. URL https://bewi.com/products/gram-vapor-barrier-sucarcane/ (accessed 4.13.23).

Bjerg Nørkjær, M., Wraae Jensen, C., 2023. Interview with Bjerg Architecture.

Bolig og planstyrelsen, 2022. Klimakrav (LCA) i bygningsreglementet [WWW Document]. URL https://bpst.dk/da/Byggeri/Baeredygtigt-byggeri/NY-Klimakrav-i-bygningsreglementet (accessed 2.24.23).

Brænder, M., 2022. Metodologi og metode: om forskellen på værktøjer og forståelsesrammer og hvad den betyder i praksis.

briiso.dk, n.d. Bæredygtig isolering.

Broer, R., Simjanovic, J., Toth, Z., 2022. Implementing the Paris agreement and reducing greenhouse gas emissions throughout the life cycle of buildings: European Public Polices, Tools and Market Initiatives. BPIE.

Browning, W., Ryan, C., Clancy, J., 2014. 14 Patterns of Biophilic Design.

Building Centre, n.d. Building better: materials and their impact on wellbeing.

Cembrit.dk, n.d. Cembrit Windstopper er en vindspærrer til lette ydervægge. :: Cembrit [WWW Document]. URL https://www.cembrit.dk/byggeplader/cembrit-windstopper (accessed 5.13.23).

clay-works.com, n.d. Bathrooms [WWW Document]. Clayworks. URL https://clay-works.com/?gallery=bathrooms-lookbook (accessed 5.13.23).

Damsgaard, C., 2022. Hvad er bæredygtighed?

Design Council, 2005. Double Diamond Design Process (Study). London.

Eiler Rasmussen, S., 2012. Om at opleve arkitektur. Archi Tegn.

Eriksen, T., 2016. Sådan foretager man et litteraturstudie [WWW Document]. Scribbr. URL https://www.scribbr.dk/struktur-i-din-afhandling/saadan-foretager-man-et-litteraturstudie/ (accessed 2.22.23).

Et døgn i Strandbakkehuset, 2022.

Et sted at være sammen [WWW Document], n.d. URL https://www.strandbakkehuset.dk/b/et-sted-at-vaere-sammen (accessed 2.23.23).

Eyck, A. van, 2008. Collected articles and other writings 1947-1998, Writings / Aldo van Eyck ; edited by Vincent Ligtelijn and Francis Strauven. SUN, Amsterdam.

Falk, K., Timm, H., 2018. Arkitektur og Lindring (Notat No. 7). Repha.

Familier i sygdommens kløer, 2021. . Fam. Sygdommens Kløer.

Frandsen, A., K., Ryhl, C., Folmer, M.B., Fich, L.B., Øien, T.B., Sørensen, N.L., Mullins, M., 2009. Helende Arkitektur, nr. 29. ed. Denmark.

Frøslev, n.d. Frøslev Sature Træ [WWW Document]. URL http://froeslev.dk/da/vores-trae/Froeslev-Sature/ (accessed 5.13.23).

Growtec.dk, n.d. Sedumtag fra Growtek.dk - Vejen til en grønnere verden [WWW Document]. GrowTek ApS. URL https://growtek.dk/ (accessed 5.13.23).

Health Care Design Magazine, 2004. Hypothesis and Measurement: Essential Steps Defining Evidence-Based Design - HCD Magazine [WWW Document]. HCD Mag. - Archit. Inter. Des. Trends Healthc. Facil. URL https://healthcaredesignmagazine.com/architecture/hypothesis-and-measurement-essential-steps-defining-evidence-based-design/ (accessed 5.24.23).

Helen & Douglas House, 2022. The world's first children's hospice [WWW Document]. Helen Douglas House. URL https://www.helenanddouglas.org.uk/about-us/our-history/ (accessed 2.23.23).

Hertzberger, H., Swaan, A. de, 2009. The schools of Herman Hertzberger / texts by Herman Hertzberger, Abram de Swaan =: Herman Hertzberger: alle scholen / met teksten van Herman Hertzberger, Abram de Swaan. 010 Publishers, Rotterdam.

Højer, L., 2023. Strandbakkehuset.

Hospice Forum Danmark, n.d. Børnehospice [WWW Document]. Hosp. Forum. URL https://www.hospiceforum.dk/B%C3%B8rnehospice.2572.aspx

Hospice Vendsyssel, 2023. Statistik Hospice Vendsyssel 2022.

isolena, n.d. sheep's wool insulation [WWW Document]. URL https://www.isolena.com/en/insulation.html#fire-protection (accessed 5.12.23).

Jencks, C., 2015. The architecture of hope: Maggie's cancer caring centres. Lincoln, London.

Kahn, P.H., Severson, R.L., Ruckert, J.H., 2009. The human relation with nature and technological nature. Peer Rev. J. 37–42.

Kanafani, K., 2022. LCA 1 - A&D (MSc02 ARC) AID II-C: Life Cycle Assessment and Materiality 2022.

Kellert, S.R., Calabrese, E.F., 2015. The Practice of Biophilic Design 26.

Knuds historie - Lukashuset børne- og ungehospice., 2017.

Knudstrup, M.-A., 2004. Integrated Design Process in PBL.

Larsen, A., 2022. Hospice - Patienthåndbogen på sundhed.dk [WWW Document]. URL https://www.sundhed.dk/borger/patienthaandbogen/sociale-ydelser/sociale-ydelser/sygdom/hospice/ (accessed 1.6.22).

LCA Centre, n.d. Hvad er LCA – lca-center.dk [WWW Document]. URL https://lca-center.dk/hvad-er-lca/ (accessed 5.24.23).

Maggie's centre, n.d. Maggie's Architecture and Landscape Brief.

Maggie's Centre, n.d. Our approach [WWW Document]. Maggies Cent. URL http://www.maggies.org/about-us/how-maggies-works/our-approach/ (accessed 5.24.23).

Mazuch, R., 2017. Salutogenic and Biophilic Design as Therapeutic Approaches to Sustainable Architecture.

Møller Andersen, B., n Munch-Andersen, J., By og Byg, 2001. Halmballer og muslinger som isoleringsmaterialer.

Nissen, A., 2009. Program for Det Gode Hospice i Danmark (Program No. 2). Realdania.

Nørr, C., Yde Højrup, T., 2017. Et sted at være sammen.

Our story [WWW Document], n.d. . Maggies Cent. URL http://www.maggies.org/about-us/how-maggies-works/our-story/ (accessed 2.2.23).

Poulsen, W., Christiansen, H., 2023. Hospice Vendsyssel.

Rehpa, 2021. Kortlægning af den specialiserede palliative indsats i Danmark (Spørgeskemaundersøgelse).

Rockwool, n.d. Brandsikkerhed [WWW Document]. URL https://www.rockwool.com/dk/raadgivning-og-inspiration/brandsikkerhed/isoleringsmaterialer-og-brand/ (accessed 5.12.23).

Ronald McDonald Hus, 2022. . Ronald McDonald BørneFond. URL https://rmbornefond.dk/husene/generelt/om-ronald-mcdonald-hus/ (accessed 2.3.23).

Sandberg, A.B., 2011. Här får döende barn lindrande vård [WWW Document]. Dagen. URL https://web.archive.org/web/20110716111622/http://www.dagen.se/dagen/article.aspx?id=224722 (accessed 2.23.23).

Sankt Lukas stiftelsen, n.d. Lukashuset [WWW Document]. St. Lukas Stiftelsen. URL https://sanktlukas.dk/lukashuset/ (accessed 2.6.23).

Social- og Boligstyrelsen, 2023a. Energiforbrug og klimapåvirkning [WWW Document]. Bygningsreglementet. URL https://bygningsreglementet.dk/Tekniske-bestemmelser/11/Krav (accessed 5.20.23).

Social- og Boligstyrelsen, 2023b. BR18 [WWW Document]. Bygningsreglementet. URL https://bygningsreglementet.dk/Ovrige-bestemmelser/25/Krav/473_484 (accessed 5.20.23).

Social- og Boligstyrelsen, 2018. BR18 [WWW Document]. Bygningsreglementet. URL https://bygningsreglementet.dk/Historisk/BR18_Version1/Ovrige-bestemmelser/25/Krav/473_484 (accessed 5.20.23).

St Christophers, 2020. Dame Cicely Saunders [WWW Document]. St Christophers. URL https://www.stchristophers.org.uk/about/dame-cicelysaunders/ (accessed 2.24.23).

Strandbakkehuset, 2020. Tidslinje for Strandbakkehuset [WWW Document]. Strandbakkehuset. URL https://www.strandbakkehuset.dk/om-os/arkiv/tidslinje-2019-2020 (accessed 2.6.23).

Sundhedsstyrelsen, 2016. The Danish Healthcare System.

Trygfondens Familiehus er [WWW Document], n.d. . Trygfondens Fam. URL https://trygfondensfamiliehus.dk/flyt-ind-i-familiehuset/saadan-faar-i-et-ophold/ (accessed 2.6.23).

TSURUMI Children's Hospice, n.d. TSURUMI Hospice.

TSURUMI Children's Hospice / TAISEI DESIGN Planners Architects & Engineers [WWW Document], 2021. . ArchDaily. URL https://www.archdaily.com/972238/tsurumi-childrens-hospice-taisei-design-planners-architects-and-engineers (accessed 4.6.23).

Ulrich, R.S., 1984. View through a window may influence recovery from surgery. Sience Vol. 224, 420–421.

Velux, n.d. Daylight calculations and measurements.

Verderber, S., Refuerzo, B.J., 2006. Innovations in Hospice Architecture. Taylor and Francis Group.

illustration list

Ill. 1: Own picture
Ill. 2-6: own illustrations
Ill. 7-8: own pictures
Ill. 9-28: own illustrations
Ill. 29: own pictures
Ill. 30-42: own illustrations
Ill. 43-45: own picture, unless:
Construction wood/spruce: Architextures 2023, Pine, viewed 17 May 2023, https://architextures.org/textures/719
Clay shingles: https://komproment.dk/produkt/pantheon-earth/nordic-red/

KOMPROMENT

Pine: Architextures 2023, Ash, viewed 17 May 2023, https://architextures.org/textures/730
Lamellas: Architextures 2023, Larch Stack, viewed 17 May 2023, https://architextures.org/textures/245
Tiles: Randers Tegl A/S n.d., https://www.randerstegl.dk/dk/tagsten/produkt/rt823-hoejslev-skandina via?PID=54177
Wooden plank boards: Architextures 2023, Douglas Fir Staggered, viewed 17 May 2023 https://architextures.org/textures/281
Ill. 46-111: own illustrations

Appendix: own pictures and illustrations

appendix 05

In the appendix, additional and more detailed information is given to elaborate on certain analysis or calculations presented in the report.

01 interview with Winnie and Helle - Hospice Vendsyssel.....160
02 pictures – Vendsyssel.....162
03 interview with Lisbeth Højer - Strandbakkehuset.....163
04 pictures Strandbakkehuset.....168
05 interview with Bjerg Arkitektur.....169
06 competition.....170
07 LCA – process.....172
08 structural analysis.....174
09 24h average temperature analysis.....178
10 month average temperature analysis.....184
11 daylight analysis – process.....186
12 detailed drawing.....188
13 LCA results - datasheet LCAbyg.....192
14 LCA results - green roof.....193
15 energy requirements.....194
16 energy requirements - with solar cells.....198

01 *interview with Winnie and Helle - Hospice Vensyssel*

interview conducted on the 14th of february 2023 at Hospice Vensyssel.

interviewee Winnie
Helle

interviewers Laura Obel Pinstrup
Emma Louise Jensen
Amber Slabbinck

Laura: Hvilke funktioner er der behov for på et Hospice? - Vi snakkede med lederen ved Strandbakkehuset om at de delte nogle funktioner med voksen hospice, som for eksempel et produktionskøkken eller kontorfaciliteter, et pedelværksted. Så hvilke funktioner har i for at kunne drive stedet?
Helle: Tænker du i forhold til de voksne eller børn som pårørende
Emma: Bare sådan generelt. Som for eksempel igen ved Djursland, hvor der er en garage for pedellerne, et industrikøkken og også et køkken familierne selv kunne bruge. Er det noget i også har?
Winnie: Jeg vil ikke kalde det er industrikøkken, men vi har vores eget køkken hvor køkkenfolket laver mad, men der er ikke et køkken som sådan. Ovre i spisestuen er der et komfur, så hvis patienten gerne vil koge et eller andet så kan de gøre det, men det er ikke bygget op særskilt.
Emma: Så alle måltider bliver faktisk forberedt til patienterne her?
Helle: Jeg tror også behovet er anderledes når det er børn, hvor det er en familie der skal fungere, hvor man skal fastholde de familiære rammer og daglige gøremål. Det er også en familie det drejer sig om her, med voksen i fokus.
Winnie: Der var en gang en patient som helt vildt gerne ville lave mad selv og så tager man dem med i køkkenet, så det er ikke sådan at man bliver afskåret fra det. Køkkenpersonalet går jo stuegang hver dag og fortæller hvad vi skal have at spise, om der er noget du har lyst til, eller ikke kan lide, er der noget du kunne tænke dig af småmåltider. Det bliver skræddersyet i noget omfang til dem.
Laura: Hvad for nogle rum har i ud over patientstuer. Nu så vi lige den fælles stue. Hvad har i ellers?
Helle: Vi har foyeren når I kommer ind, og så har vi en fælles opholdsstue, men vi går en tur. Og så har vi faktisk et børne rum, men som er under forvandling, men det kommer i til at se. Så har vi et wellnessrum, men der er personalet med nede, der er et stort spabad og massagebriks og sådan noget. Ellers har vi det der hedder et reflektionsrum, hvor der er massagestol, som både patient, pårørende og personale må bruge, og der er en motionscykel og der er sådan lidt redskaber man kan bruge. Så har vi forskellige rum hvor man kan trække sig og have samtale. Så har vi et bibliotek herovre, hvor der er spil, videofilm og bøger. Og så har vi vores kaffestue eller konferencerum som det hedder.
Winnie: Men pedellen har også et værksted og der er også en kælder med hjælpemidler, kontorer rundt omkring og vaskerum med lille vaskemaskine som de pårørende gerne må bruge og en stor industrivaskemaskine også.
Emma: Har i nogle lokaler som kun er for personalet, som patienter og pårørende ikke må bevæge sig ind i?
Helle: Nej
Laura: Så I holder også pause med pårørende eksempelvis?
Winnie: Det gør vi i dag i hvert fald. Vi holder vores formiddagspause, den holder vi uden patienter, men de andre måltider gør vi.
Emma: Er det bevidst for at være meget sammen, er der en tanke bag, eller er det bare sådan det er?
Winnie: Der er ingen tvivl om at det er noget der ligger tilbage fra førhen at det her er et hjem, og det er vigtigt med middags spisesituation at man er sammen om det og det er der ingen tvivl om at det er også godt, men der er også et personale der har brug for pause. Som det er i dag, tror jeg ikke på at det er om et år. Det kan godt være man så har en spisevagt, for der skal være nogen sammen med patienterne og de pårørende. Det kan så godt være det er mig der har spisevagten i dag, og så at det er Helle der har spisevagten i morgen. Man kan jo snakke om mange ting i spisestuen, men man sidder måske ikke lige og siger "åhh, jeg trænger simpelthen til en pause", man har en form og du er stadig professionel når du spiser med dem.
Helle: Jeg har været hernede i snart to år, og jeg synes egentligt ikke at det var svært for mig at sidde og spise sammen med patienter og pårørende, men det var svært for mig at finde ud af hvad kan jeg tillade mig at snakke om. Kan jeg for eksempel tillade mig at snakke om at jeg snart skal på ferie og at jeg glæder mig til det. Jeg er lige blevet mormor, og det er dejligt, men kan jeg være bekendt at sidde og dele ud af sin glæde?. Men det gør vi jo, og det er fordi det er vores dagligdag, det deler vi med dem, for den holder jo ikke op med at fungere fordi at der er nogen der skal dø. Men det er det som vi ikke kan snakke om at det kan være svært at være derinde (ved en døende), eller hvor er det sørgeligt, eller at man er træt i dag, det gør vi ikke, men vi taler om vores dagligdag, og det synes jeg var svært at finde min rolle i lige til at starte med.
Winnie: Men det er den pæne side, du sidder for eksempel heller ikke at taler om at manden han har var dæleme dytme irriterende i går. Det kan man måske også have brug for at lufte ud, men det gør man ikke.
Emma: Ja, så man er stadig på arbejde, selv i sin pause?
Winnie: Ja, og det er der stor opmærksomhed omkring
Laura: Når i siger den pæne side af det, er det så med henhold på at skabe fokus på livet?
Winnie: Nej det er det ikke, men vi sidder ikke og udstiller dernede at manden han var en klovn i går. Det kan man måske også sige med et glimt i øjet, men det er jo nok mere det at man er blevet mormor, det er nemmere, men det kunne være man egentligt er fyldt mere op ad det andet, og at man egentligt gerne vil drøfte det med sin kollega, fordi man har tætte kollegialer og relationer som man også kan bruge til andet end det faglige.
Emma: Hvad det at snakke om hvad man lige har oplevet med at patient for eksempel, har man behov for dette?
Winnie: Meget stort behov, men der er jo en vagtstue der hvor man sidder og dokumenterer, der er plads til at vende alle de her ting
Helle: og så har vi faktisk supervision, vi har hold der kører om efteråret og et hold der kører om foråret med seks seancer hvor vi er en gruppe på 6-7 stykker, hvor man byder på at man gerne vil være med i år. Der er ikke noget specielt vi siger det skal vi snakke om nu og her, der er vi på enkeltvis og bliver spurgt "hvad har du der fylder?" og det kan være alt muligt, det kan være en patient situation, det kan være noget generelt man har brug for at få drøftet, det kan være en følelse man har fået i forbindelse med at en kollega har været ked af noget, det kan være alt muligt. Og det hjælper jo langt hen ad vejen, men det kan ikke altid gøre det alene, for der er jo mange hårde skæbner.
Laura: Den her bygning er jo forholdsvis ny
Winnie: Den er fra 2013
Laura: Har der været nogle tanker om, nu så vi der var udsigt, hvordan rummene og værelser om skal være ud mod udsigten
Winnie: Jeg tror der er nogle kloge arkitekter der står bag det her, samtlige 9 stuer ligger med udsigt, og I (sygeplejerskerne) fortæller jo også at det er noget af det når i tager i mod nye patienter, at det bemærker man, det er det første de ser.

Helle: Alle værelserne vender øst, og patienterne, der er faktisk nogen af den når vi siger godnat om aftenen der siger at vi ikke må rulle gardinerne for, da de gerne vil se morgensolen og ligge og kigge ned over havnen og vi må endeligt ikke lukke udsigten ude. Så det betyder meget
Emma: Mærker i til boligområderne omkring og vejen herude foran, eller er her roligt med naturen omkring også?
Helle: Jo, jeg synes ikke vi oplever det (støj fra vejen). Sommetider når vi har morgenkonference ser vi hundeluftere på stien, og dem ser vi jo ikke. Og trafikken herude, oplever vi aldrig.
Laura: Vi har også arbejdet en stor del med at naturen skal være en del af det børnehospice vi skal designe. Hvor stor en betydning tænker i at det har, for at man slapper af? Det havde en stor betydning for Strandbakkehuset, hvor man kunne kigge på træer for eksempel med livet der foregik der. Hvad bemærker i?
Helle: Det tror jeg også helt sikker at det gør. Vi fodrer jo råvildt, det gør vores pedel. Det er dagligt der er er rådyr der står og spiser, lige ved fordre(..ikke tydeligt), og hver stue, ved hver terrasse, der er et stort fuglehus, et flot fuglehus, så de bliver også fordret. Vi lægger stor vægt på det, der kommer også fasaner. Så det er noget vi gør aktivt for at der skal være liv omkring os.
Winnie: Der er også lavet en lille køresti herovre i den lille skov, så man kan køre en lille tur med en kørestol, lige ved siden af huset.
Helle: Lige så snart der begynder at blive lidt varmere, begynder vi at plante de første forårsblomster i krukker på hver terrasse. Hvis ikke rådyrene spiser dem. Det gjorde de sidste år, der havde de plantet sådan nogle store flotte kurve med hornvioler, eller dem som ligner stedmor men som godt kan tåle lidt nattefrost, de var bare hapset næste dag. Så plantede vi nogle nye.
Laura: Har i nogle særlige faciliteter for pårørende, et sted de kan gå hen, og særligt hvis der er børn med, eller er de tilknyttet stuen?
Winnie: De må færdes frit i huset, det er nemmere når i kommer ud og kigge. Men på min korte tid (et par år), så vil jeg sige at når man er på hospice som pårørende, så er man her jo for at være sammen med den døende, så det er der man er, det meste af tiden. Vi har to pårørende rum hvis man trænger til at trække sig. Det ligner et hotelværelse med en dobbeltseng og et fjernsyn, så kan man gå derind. Man må også gerne gå ned i gyngestolen og sidde at læse. Men vi har ikke et pårørende rum på den måde.
Helle: Men vi har ude på gangen, der har vi nogle nicher, ude foran stue 1 og 2 for eksempel, som er et sted hvor man kan trække sig, men man er jo egentligt stadig ude på gangen, men det er sådan et lidt skærmet område man kan sætte sig. Tæt på, men alligevel lige..
Emma: Er der nogle pårørende der, ikke bor her, men overnatter her?
Helle: Altså de pårørende får et tilbud om at være her hele tiden, og være her til det sidste, og det er der ingen regel for. Der er jo et pårørende rum, som hvis det er ledigt, kan de låne det. Der er en sovesofa man kan slå ud til en dobbeltseng. Er det ægtefæller eller andet der har brug for at ligge tæt, så tilbyder vi at køre en plejeseng op, så de kan ligge sammen. Så mulighederne er der. Vi har sommetider også lagt en madras ind på gulvet hvis det er fx to voksne og to børn. Jeg synes faktisk at vi er fleksible. Der er næsten ikke noget der ikke kan lade sig gøre her.
Emma: Hvor langt er et typisk ophold for patienterne her?
Helle: Gennemsnits liggetiden her er 16,4 dag. Der er nogen der dør her samme dag som de kommer, og der er nogen der ligger her i 6 uger. Det kan udvikle sig også, der er nogen der kommer her på et symptomlindrende ophold, som også skal hjem igen, men pludseligt bliver dårlige og kommer til at dø her. Så er der også nogen som kommer her til livets afslutning, men som så bliver gode på den pallierende behandling vi kan tilbyde her, og så kommer de faktisk hjem i en periode. Det er faktisk 30% der kommer hjem igen.
Emma: Nogen som man egentligt troede ville dø mens de var her, eller hvordan?
Winnie: Nej ikke nødvendigvis, man kan ligesom blive visiteret til livets afslutning, eller til symptomlindrende ophold, og så kan man også til aflastning af rehabilitering. Det er ikke ret tit, yderst sjældent. Det er en af de to andre begreber man arbejder med. Så nogen er også forventet at vi kan gøre noget godt i en periode, og så kommer de hjem for en god periode. Der er også nogen som så kommer tilbage og dør her.
Laura: Da vi var på Strandbakkehuset, der fik vi at vide at de havde en filosofi de kørte med Liv, Leg og Lindring, og vi havde inden vi kom derhen fortalt andre studiekammerater at vi skulle besøge et hospice, og der blev man lidt mødt med at det er et meget tungt emne. De så det ikke som et tungt emne på Strandbakkehuset, der var mere fokus på livet. Har I også sådan en filosofi der bliver kørt, eller hvad gør i for at fjerne det tunge emne?
Winnie: Har I været inde og læse om hospicefilosofien? - for den er jo gældende for alle hospice i hele Danmark. Det handler jo om at leve til det sidste.
Helle: Og at styrke livet. Og at man lever til at man dør. Så det der med at sige nogle gange at det der med at sige det kan ikke betale sig. Jo, det kan det godt. Og hvis du gerne vil have frikadeller i dag, så kan det godt betale sig, selvom du skal dø i morgen. For du lever jo nu. Så det handler om at styrke livet mens du er her.
Emma: Har i nogle

02 pictures - Vendsyssel

entrance

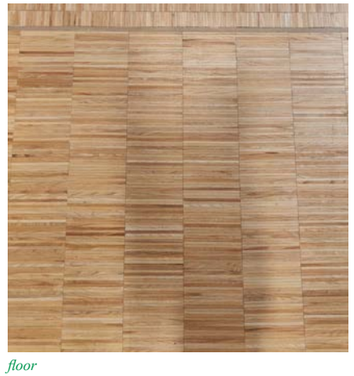
dining room / kitchen

sitting area

medicine room

wellness room

deer feeding station



floor

03 interview with Lisbeth Højer - Strandbakkehuset

This interview was conducted by groups 09, 11, and 19 consisting of Simon Bak Albrechtsen, Emma Louise Jensen, Laura Obel Pinstrup, André Bjørnmose Dupont, and Nisanur Akkaya on 8 February 2023 with Lisbeth Refshauge Højer, which is department manager at Strandbakke-huset. The interview will be used in the same way by all groups and referred to as "Højer, 2023".

Lisbeth: Jeg hedder Lisbeth Højer og jeg er afdelingsleder her i Strandbakkehuset. Jeg er sygeplejerske og er leder for det personale der er i Strandbakkehuset. Vi er en del af en fællesorganisation med voksen hospice Djursland som ligger lige ved siden af. Vi har en fælles hospiceleder. Jeg har 13 sygeplejersker tilknyttet, jeg har en pædagog, en fysioterapeut, socialrådgiver, psykolog, præst og en musikterapeut også har vi forskellige samarbejdspartner som kommer i huset legehelte, hospitalsklovne og mange frivillige som har forskellige indsatser. Man kan sige at det er et hus der skal kunne bære mange aktiviteter.

André: Hvordan bruger i jeres fællesrum og hvilke får i lavet?

Lisbeth: Alrummet er et fælleskøkken, så vi har ikke tekøkkener i værelserne og det har vi fravalgt fordi vi gerne vil have at familierne skal mødes i alrummet. Og der er en helt særlig dynamik mellem familierne som vi kan mærke når vi kun for eksempel kun har én familie. Så mangler der et samspil. Så det er også helt klart en stor del af huset at de har hinanden. Så man kan sige at køkkenet skal bære eller rumme at flere familier kan lave mad der. De har deres eget køleskab og fryserplads og en skuffe til viktualier ting også er de ellers indrettet som et familiehus ordningskøkken, hvor de kan have deres ting og sager. Det varme mad får vi fra vores industrikøkken i hospice Djursland, og så laver familierne selv de andre måltider. Så man kan sige at vi har taget det ene måltid men egentlig har tanken fra starten været at de skulle selv lave alle måltider men vi fandt ud af at det var simpelthen for meget for dem. Så vi har prøvet at hjælpe lidt ved at lave et måltid. Og så sidder man og spiser i alrummet og det gør vi (personalet) også. En del af hospice filosofien er at man er sammen, personale, patient og pårørende. Så det skal rummet også kunne bære. Vi drifter 4 pladser. Vi har 6 pladser men vi har kun 4 patienter, så vi har lidt ekstra plads. Og så kan vi mærke at huset er på arbejde, fordi det er ikke kun bare en patient og en bruger. Det er 2 forældre og flere søskende og der er liv og glade dage. Der er også nogen der hjælper med fordi vi måske har nogen patienter der er i respirator, så det skal kunne rumme meget også huset for de forskellige funktioner omkring barnet.

Emma: Nu hvor du siger at i som personale også sidder med familierne, så I har ikke et privat rum?

Lisbeth: Nej. Det nærmeste I kan komme, er det rum I sidder i (lille møderum). Egentlig var det her rum bygget som et terapirum, men vi fandt ret hurtigt ud af under Corona at vi havde brug for et sted hvor vi kunne sidde sammen og lukke døren. Som I kunne se tidligere, så har vi en åben kontor og det har vi for at vise denne tilgængelighed og nærværsfølelse vi gerne vil give familierne, så de kan føle sig tæt på os og komme til os. Men det har også en bagside fordi vi har også brug for at kunne gå ind og lukke døren og snakke sammen. Så det bruger vi det her rum til, men det er ikke her vi kommer for at holde pause væk fra patienterne. Så vi har ikke et personalerum og det har de heller ikke ved Hospice Djursland. Ellers har vi fællesrum, som er hjerterummet. Det er det her rum huset er bygget rundt omkring. Man træder ind og man kan se niveauet i huset. Tanken med arkitekturen har været at bygningen skulle hænge sammen med hospice Djursland men på samme tid skille sig lidt ud. Man har valgt nogen af de samme materialer, men bygningen har sit eget udtryk og det er vi tilfreds med. På samme tid var grunden rigtig lille, så det var ikke nemt at bygge på, så det har også været en udfordring som vi synes de har løst rigtig godt. Og tanken om at man ikke går ned i kælderen og at alle bor i lige åbne rum.

Nisa: Og I har ikke nogen udfordringer med at bygningen er på to etager i forhold til børn?

Lisbeth: Nej. Jeg har godt nok nogen sygeplejersker, der har dårlige nerver over at børnene kan falde ned på trappen, men børn lærer at anvende disse rum. Jeg har helt ro i maven. Men selvfølgelig kan de falde og slå sig, men det kan de overalt. Der er gitter rundt, så der er sikkert.

Nisa: Der bliver ikke anbefalet at bygge hospicer i mere end en etage. Der er jo patienter der er sengelagt, så hvordan er transportering af dem?

Lisbeth: Der er en elevator. Det er et plan ved hospice Djursland og selvfølgelig er det en fordel at have det i et plan, men det var der ikke plads til her. Så det kommer an på situationen og hvad man har af muligheder. Og vi er egentligt rigtig glad for at det er samlet og det giver nogle andre muligheder, det her med at det er mere kompakt og der er ikke så meget gangarealer. Vi har kig til alle og det synes jeg egentlig at fungerer godt. Men selvfølgelig er det en udfordring, man skal med en elevator når man er i kørestol eller sengelagt, men det fungerer fint.

Emma: Er de fleste af jeres patienter i kørestol eller sengelagt, eller er der også nogen som kan bevæge rundt selv?

Lisbeth: Der er også nogen der kan bevæge sig rundt selv, det er lidt forskelligt. Vi har også babyer, så de kan være på barnevogn. Men dem der er sengeliggende, er på stuen, fordi de ikke magter det her med elevator.

Laura: Hvornår kommer man til et børne hospice?

Lisbeth: Det gør man når man har en livstruende sygdom, som man forventer barnet dør af det. Eller livsbegrænsende sygdom som er i en tilstand der er handicappet eller en kronisk lidelse, syndrom som du har et anderledes livsvilkår end andre. Så kan man komme her og gå igennem en restituerings periode. Og vi kan hjælpe med at give dem ny energi. For eksempel hvis der nu bliver et langt sygdomsophold på sygehusene og som måske ikke helt kan overskue. Så kan man blive henvist her til og få lindrende behandling, hvor forældrene vil kalde det for aflastning. Men altså vi arbejder med lindring så man kan sige at det skal have et eller andet lindrende perspektiv. Men det kan også være nogen som bare hænger i et tyndt tråd der hjemme og nogle forældre der er bare udslidte. Og de forældre der ikke kan overskue at have de raske børn sammen med de sygebørn og blive samlet som en familie. Ikke nødvendigvis i forbindelse med et dødsfald men kan også være fordi det er hårdt at være en familie med et sygt barn. Så det vil sige at vi har en fordeling på 80% og 20%, hvor de 20% er døende.

André: Så i har også børn der kommer hjem igen?

Lisbeth: Lige præcis.

Laura: Hvordan adskiller det sig for familier at opholde sig på hospice, kontra eksempelvis familiehuset Ronald Mcdonald huset i København?

Lisbeth: Vi skiller os rigtig meget. Familiehuse har ikke sundhedsansvarligt personale ansat. De kører på frivillige så de kan slet ikke sammenlignes. Men man kan sige rent arkitektonisk kan jeg forstå spørgsmålet, fordi der er nogen ting hvor vi minder om hinanden. Jeg er også med i et netværksgruppe med de folk der sidder der, for der er nogle ting i forhold til arbejde med frivillige og pårørende, familierne osv. Men har et tværfagligt team ansat, hvor vi laver et aktivt indsat og det gør man ikke på et familiehus. Der er det udelukkende frivillige, hvor her man er indlagt som en patient med familier. Vi har dokumentationspligt, så der hører vi under sygehusloven

og det gør de ikke.

Simon: Får i flere henvisninger end der er plads til?

Lisbeth: Det har vi haft i starten af året, men Strandbakkehuset er rigtig nyt. Vi startede i december 2020. Vi er kun nummer 2 af sin slags i Danmark så vores samarbejdspartnere er ikke vandt til at bruge os. Som alting andet er al begyndelse svært, så de skal lære at bruge os. Det er en lang indkøringsperiode og der har corona bestemt ikke hjulpet. Så vi har ikke haft venteliste. Der har været et par uge hvor vi ikke kunne få nogen ind og skulle være på venteliste, men så kunne vi tage dem ind senere. Vi har lige haft fuldt hus, nu har vi så 3 familier.

André: Hvor lang tid er man indlagt?

Lisbeth: Mellem 2 uger og 5 måneder, så det er meget forskelligt. Vi har lindrende ophold hvor man typisk kommer fra hjemmet eller sygehuset og vil have et lindrende ophold og tage hjem igen. Det er typisk de der 2-3 uger. Men det giver heller ikke mening at være her i kortere tid. Meget af det vi laver er relations arbejde og man kan ikke nå at få dannet relationer på en uge og få gjort en indsats og sende dem hjem igen. Så dem der tænker på at komme her som et ferieophold giver ingen mening. Vi er her for at vi kan lave en indsats og fordi det er en hel familie der flytter ind, skal de bruge en hel uges tid på at falde på plads. Så begynder vi at lære hinanden at kende også kan vi lave indsatser. Så der går cirka 3 uger. Så det er typisk dem med et livsafsluttende forløb med lindrende indsats eller nogen som er mere usikker om hvordan deres situation er bliver her typisk længere. Så dem der kommer for at blive løftet kort, er dem der har kort ophold.

André: Vores opgavebeskrivelse ligger op til at vi skal designe en hospice børnehave, hvor man kan aflevere barnet i dagtimerne. Er der behov for det i et dansk kontekst eller har man brug for sovepladser?

Lisbeth: Jeg ved i voksen regi, der arbejder man med et dagtilbud, hvor man kan få en aflastning fra sygdommen eller lindrende behandling. Det skal ikke ses som et spa-hotel ophold, men som en pause fra hverdagens smerte og sygdom både for patienten og for de pårørende. Jeg ved dog, at det er svært at flytte patienter – det er hårdt at flytte dem. Det tager en del energi at vænne sig til nye steder og finde ro i en flytning, derfor gør man det heller ikke så ofte eller på daglig basis. Men jeg har svært ved at se funktionen i det og den ydelse det må give fremfor et hospice med overnattende mulighed.

Simon: Det er formentlig tiltænkt fra opgavebeskrivelsen at fungere ligesom en daginstitution for børn til at kunne være i dagtimerne og så komme hjem om aftenen eller besøge hospicet, når der var brug for det.

Lisbeth: Jeg har lidt svært ved at se at det fungerer for et børnehospice. Jeg tror ikke, ham der har lavet opgavebeskrivelsen har været fagligt engageret i faget. Man efterlader jo ikke sine alvorligt syge børn et sted i en institution, det har jeg svært ved at se for mig. Logistisk ville det ikke give mening. Der er en del logistik, ved jeg, der skal indtænkes for familierne, derfor virker det også atypisk, hvis man havde en daginstitution, hvor man satte sit syge barn af og hentede det igen senere på dagen.

Emma: Det er også en ret fleksibel beskrivelse, som man godt kan afvige fra eller ændre.

André: Kommer man til hospitalet og får behandling, mens man er her?

Lisbeth: Det kan man godt. Der er nogle, der går til løbende kontroller, fordi vi er jo ikke specialister i de lidelser, de kommer med, altså vi har ikke en overvægt af kræftpatienter for det første, vi har rigtig mange indenfor det neurologiske områder, altså hvor de er ramt med handicap for cerebral parese, en eller anden form for hjerneskade, som gør at de har nogle nedsatte funktioner. Så det er faktisk overvægten af vores patienter.

André: Er der mange hospitalsbesøg i løbet af en uges tid?

Lisbeth: Nej, for det kan de ikke holde til. Det svinger meget. Dem vi har nu, de er måske inde (på hospitalet) engang i måneden eller 1,5 måned og blive justeret. Det er så én, som har været her i længere tid. Han har været inde i januar og skal igen her om et par uger, og skal have reguleret det her med respirator. Så kan vi have nogle, som går til kontrol ved deres speciallæge, som så samarbejder med vores læge, vi har også en læge i huset 2 dage om ugen. Så man kan sige, vi er specialisterne på den lindrende indsats, og så er der de andre, som arbejder specifikt, det er igen afhængigt af om det er et barn, der skal leve videre, og der er nogle indsatser på behandlingen. Det kan også være justering af kramper, vi har rigtig mange børn med kramper. Der er mange, som har en neurologisk lidelse, som har en eller anden kram som påvirker dem, som også skal justeres løbende. Det er meget forskelligt fra forløb til forløb, vi har ikke nogen standardforløb her.

André: Hvad vil du mene, er de mest optimale rammer at placere et hospice i? Er det ude i naturen, isoleret og i ro, eller tættere på et hospital, eller et helt tredje eksempel?

Lisbeth: Jeg ville helt klart foretrække en beliggenhed ude, hvor der er natur omkring. Har I læst beskrivelsen af Det gode Hospice? Den beskriver også det med placeringen, og det betyder noget. Der findes jo forskellige hospicer i Danmark, og nogle ligger jo inde i byen, men typisk naturskønt med udsigt over sø, eller et eller andet, for det betyder bare noget. Også det her med at man kommer ind et sted og kan mærke, at nogle har gjort sig umage, hvor man kan sige, at vores pendant, Lukashuset, som ligger i Hellerup, det er jo et gammelt plejehjem, der er også en dejlig have og sådan, men det ligger ud til store veje og kun 4 minutter til Rigshospitalet. Så det bærer jo præg af det som det ligger i. Jeg kan kun sige, at dem som kommer her, er rigtig glade for at det er her, at de har skoven lige nedenfor, havet tæt på, om sommeren kan man godt lige nå til stranden og bade med søskende, altså det betyder noget. Men det er ikke det samme, som at det ikke kan fungere inde i en by. Jeg tror bare at rolige omgivelser, og det at man kan falde til ro. Det der er virkningsfuldt med vores hus, både den måde det er bygget på, og den stemning, vi skaber i det her hus, det er den ro, som familierne de mærker. Man kan sige, at nogen de beskriver det, som at de kommer lige fra en krigszone, når de kommer inde fra sygehuset af, og det er jo ikke særligt flatterende, men det er jo vilkårene på et sygehus, det skal køre på en anden måde, det skal være effektivt, hvor man kan sige, at der kan vi noget andet, og der er altså nogle familier, der virkelig får skulderne ned af at komme i et hus sådan her, og komme ind og mærke, at her er dejligt. Måske kunne i også have det sådan, når I kom ind af døren her.

Alle: Ja, her var roligt.

Lisbeth: Ja, man kan godt mærke, at det gør et eller andet ved os, den måde vi er til stede på, og det gør det også ved vores personale, vi skal også repræsentere det, så det er også vigtigt, at vi har det godt, hvor vi er. Jeg savner for eksempel overhovedet ikke portørerne, der fiser frem og tilbage på gangen, som de gjorde på mit gamle arbejde. Vi kan noget andet, også fordi vi skal løfte en anden opgave selvfølgelig. Så det betyder noget, at man er et sted, der er nemt til natur og man forener det i tilstedeværelsen i livet, det tror jeg har en kæmpe betydning.

Emma: Nu har vi også læst nogle historier fra familier, der har boet, ikke nødvendigvis lige her, men også i bl.a. Lukashuset og familiehusene. Det er ret vildt at læse, hvordan nogle børn faktisk selv har været glade for at komme på besøg igen efter et forløb. Det viser også, at selv for dem, har det været et behageligt sted at være.

Lisbeth: De fleste kommer glade tilbage (smiler). Vi samler også familierne engang om året, til noget vi kalder en Strandbakkedag, hvor vi inviterer til lidt festival, en hyggelig dag, sådan en børnefestival, hvor de kan komme og gense os, og hinanden, og huset, og bare lige mødes og kan gå rundt og mindes nogle ting. For nogle er det jo meget stærkt at komme tilbage, fordi det skaber nogle minder om nogen der ikke er her mere, og andre de har deres børn med stadigvæk, så det er meget forskelligt. Der skal jo også være et sted, hvor der er plads til den her berørthed, fordi den møder vi hvert eneste dag.

Laura: Hvor ofte er der behov for at besøge et hospital herfra?

Lisbeth: Det er meget forskelligt. Nogen gør det slet ikke, og andre er i sådan et forløb, hvor de skal tjekkes efter på forskellige ledder og kanter. Der er også nogen, der bliver så dårlige, at de skal indlægges, fordi de netop ikke er døende, men skal hjælpes. Altså når man har et handicap, i lungerne, luftvejene eller i hele taget at ens immunforsvar er nedsat, så får man også nemmere infektioner, og så er det nogen gange, at man skal ind og behandles og reguleres i et eller andet, fordi vi kan meget her, men vi har ikke læger hele tiden, så man kan sige, hvis der er en kritisk tilstand, og et barn som man i øvrigt skal genoplive, hvis der sker et eller andet, så skal det jo på sygehuset, såfremt at vi ikke kan håndtere det her. Vi har ikke et akut hold, vi kan ringe til, og så genopliver vi barnet. Der er det lidt ligesom på hjemlige vilkår. Huset her repræsenterer hjemligheden, og derfor har vi heller ikke alt det her akutsystem sat op.

Emma: Så I kan godt nogle gange have behov for, at der kommer en ambulance, der skal hastes på hospitalet.

Lisbeth: Ja. Og det vil jo være det samme, som hvis man blev hentet i eget hjem

Simon: Hvordan er forholdene så til det? Vi har nemlig været ved at kigge på et kort, så bruger de Ringvejen for at komme herud i forhold til transport? Vi har nemlig været ved at kigge på lokation, og de er ved at bygge det supersygehus i Aalborg, så for vores gruppe handlede det om, at vi ikke fik for lang afstand, men stadig fik de naturskønne omgivelser.

Lisbeth: Jeg vil sige, vi ligger jo en lille halv time fra AUH. Det tænker jeg, det er meget passende. Det er til at overskue og stadig lidt på afstand, og der er heller ikke længere herud, at vores samarbejdspartner også kan finde os.

Laura: Jeg tænkte lige på, siger man lejligheder eller værelser til børnene og deres familier?

Lisbeth: Ja, det går vi ikke så meget op i.

Laura: Hvad er der behov for, at der skal være tilknyttet de her værelser?

Lisbeth: Det skal jeg også nok vise jer, men der skal være en patient stue, der skal være stor nok til at der kan køres hospitalssenge ind og ud. Der er nødt til at være en hospitalsseng, så vi har et godt arbejdsmiljø, vi har en loftlift, vi har ilt og sug. Det skal der være på værelserne, men som I vil se, hvis I har været på sygehusene og set en patientstue, så har vi gjort alt for at gemme det ad vejen, så vi kan finde det frem, når vi skal, men det er diskret pakket væk.

Emma: Så når I har udstyret fremme, så står det også bare? Det er ikke fordi der er noget specielt designet til at gemme noget væk, mens det er i brug?

Lisbeth: Nej

Emma: Det er der måske heller ikke behov for?

Lisbeth: Nej, det synes jeg ikke, for det er klart, når vi har nogen, hvor vi for eksempel skal suge et barn, suge noget snot op i luftvejene, så skal det være tilgængeligt, så skal det stå fremme. Der har vi ikke noget specieludviklet, men som I vil se, så har vi nogen af de pæneste hospitalssenge på markedet, fordi vi har mulighed for det, og fordi vi går op I at det ser ordentligt ud. Man kan sige, der findes alle muligheder på markedet, så man kan sagtens vælge noget, der matcher vores stil i en eller anden udstrækning. Og det er ikke arkitekterne, der har valgt det, men det er os selv.

Simon: Men de har så nogen standardmål, vi kan finde?

Lisbeth: Ja, det tænker jeg. Men det er klart døre og sådan noget skal være designet til at kunne slås op, så man kan komme igennem med hospitalssengen og sådan noget. Badeværelserne skal være handicapvenlige.

Emma: De har eget badeværelse?

Lisbeth: Ja. Og her har vi valgt, at man så har en patientstue og en familiestue i tilknytning til hinanden, så man faktisk har et rum, hvor patienten er, hvor vi ligesom også har arbejdsrum, og så har familien en privat stue, og det er også i respekt for familiens integritet at de kan gå derind og lukke døren og have et privat rum, hvor vi kun går ind, hvis vi bliver inviteret, og det fungerer faktisk rigtig godt. Man kan altid bruge mere plads, men sådan er det. Det er også igen balancen, for vi har også nogen familier, som kun består af mor og barn, eller mor, far og barn, så er det også træls, hvis man har sådan en hel balsal, så der skal et eller andet sted findes en balance, hvor folk ikke bliver helt væk.

Emma: Alle de her værelser, de er ens?

Lisbeth: Ja, og så har vi også 2 gæsteværelser, som vi disponerer rundt til bedsteforældre eller store søskende eller hvis mor og far er skilt, så kan de få hver deres værelse, eller hvis det er en stor familie, som har brug for lidt mere plads, så vi har lidt ekstra at give af. Som jeg sagde, så fordi vi fik donationsmidler til det, så valgte man den gang og bygge 6 stuer, selvom vi kun har drift til 4. Så det vil sige, vi har egentlig 6 stuer, så der har vi også lidt en buffer.

Emma: Så I må gerne tage dem i brug, hvis nu det er en stor familie?

Lisbeth: Ja, vi disponerer bare selv over pladsen. Vi har jo nogle ekstra rum, selvom vi egentlig ikke har patienter til 6, og vi tager ikke 6 patienter ind.

Laura: Hvor mange overnattende er der krav på, I må have her?

Lisbeth: Det ved jeg faktisk ikke. Det ved jeg ikke, om der er noget maks på.

Laura: Det var mere i forhold til brand, om I skulle overholde noget der.

Lisbeth: Der er alle mulige regulativer omkring brand vi skal overholde, men jeg ved ikke lige, om der som sådan er et antal på.

Laura: Medbringer man selv madrasser i forhold til søskende?

Lisbeth: Der har vi i huset. Men altså for eksempel anbefaler jeg, at man tager en weekendseng med til små søskende, fordi det har vi ikke. Og det har også noget med hygiejne at gøre. De kan være svære at gøre ordentligt rene. Så er det bedre, at de tager deres eget med. Der er også noget i det med hjemligheden. Man må også gerne tage sit eget sengetøj med, igen der er nogen, som synes det er rarest at bare ligge i sit eget. Fordi selvom at vi selvfølgelig tilstræber at det ikke skal være en institution, så er der jo også nogle ting i forhold til hygiejne og sådan som vi skal overholde.

Laura: Vi læste at der er forskel fra andre hospicer, hvordan de håndterer hvis der sker et dødsfald, hvordan man så forlader bygningen, om det bliver mødt ud af hovedindgangen, eller om der er en baggang. Det er forskelligt, hvordan det håndteres.

Lisbeth: Vi har kun en indgang og udgang, så det giver helt sig selv, men uanset hvad så vil jeg aldrig sende døden ud af bagvejen. Hvis ikke vi kan se døden i øjnene, så ved jeg da ikke, hvor vi var henne. Så man kan jo sige, at vi repræsenterer jo nogen som er vant til at tale om døden og skal kunne være i det, og selvfølgelig skal det ud af fordøren. Og man kan sige, vi foreslår altid familien om de vil have en udsyngning eller et eller andet og så stiller vi et skilt på skranken: 'I dag tænder vi lys for lille et eller andet, eller store et eller andet' Og så er der et lys, og så kan de andre familier også spørge ind til det der, fordi vi har selvfølgelig tavshedspligt, men de får jo et bånd til hinanden, de familier vi har i huset. Men det her med at vise en respekt for at når der så kommer en kiste køre – altså vi har ikke mange dødsfald her, men når der så gør, så stopper man lige op, og viser sin respekt omkring det, men vi er ikke flere i det her hus end at vi deltager jo, os der er her, når det er. Og man kan sige på Hospice Djursland, hvor de nærmest har dødsfald dagligt, så når der kommer en kiste med følge, så stopper man bare lige op, man suser ikke bare lige forbi, man stiller sig lige i respekt, indtil det er kørt forbi, så det er også med at have en kultur, og det er det vi prøver at lære vores personale op til, at det er altså noget vi anerkender er der, og vi ser det sammen og er i det sammen.

Laura: Det er mere, at vi havde læst fra andre hospicer, at det er meget forskelligt indretningsmæssigt, hvordan man vil håndtere det.

Lisbeth: Men jeg tror der er nogle hospicer, der måske også har et kapel, og så kan man sige, så er det typisk der man stiller en kiste, men man kan sige, der bruger vi stuerne og så køler vi dem ned, vi har regulering på temperaturen, men vi har ikke oplevet at de har dem stående her længe, altså familien vil gerne videre, når først dødsfaldet er, altså når familien har været her, så vil de gerne videre umiddelbart.

Emma: Det var et interview, der var blevet lavet, hvor det var en sygeplejerske, der selv beskrev det som at kisten blev taget ud samme vej som skrald, altså det var en meget voldsom kontrast, hvor hun ville ønske, at de også kom ud af den indgang, man også kom ind ad.

Lisbeth: Ja, det kan jeg godt forstå, det er lige præcis, derfor jeg siger, at det skal ikke ud af bagvejen, vi anerkender fuldstændigt, at der er et menneske her, og det har vi respekt for, og det er ikke noget vi gemmer væk. Slet ikke her hos os. På et hospice skal vi jo kunne være i det også. Jeg kan fortælle jer, da hospice Djursland blev bygget i 2007, der var der klager fra naboerne over at de flagede på halv hele tiden, naboerne kunne simpelthen ikke bære det. Så der var vores Hospicesleder nødt til at gå i dialog med naboerne om at det er jo et vilkår. Vi skal alle sammen dø en dag. Men der var der simpelthen nogen som synes det var stødende, hvor man kan sige, at jeg synes, det er stødende man ikke kan få lov til at flage når man mister en. Hvordan vender vi den lige rundt. Altså man kan sige, selvfølgelig skal vi have lov til at flage på halv, men der er også de familier, som er her, som jo ikke har et barn, der er lige på vej til at dø, de synes jo også det er – altså det kan godt være konfronterende at møde sådan en flagstang, hvor flaget er på halv. Så jeg kan sagtens følge den der med, at når man ikke lige går i det hver dag, så den der 'hold da op, hvad er nu det' og når man er her hver dag, så vænner man sig også til det. Dem der byggede huset, alle håndværkerne, de skulle simpelthen også lige vænne sig til det. Der var en helt særlig stemning blandt dem også, fordi det var et særligt sted. Så det påvirker os jo, men det skal vi så bare tale om. Der skal vi ikke bare gemme det væk.

Emma: Jeg tror også tit, at det er det, folk har svært ved at tale om. Nu snakkede vi om i bilen, at bare vi fortæller, at vi skriver speciale om børnehospice, der er nogen der møder det med; 'puha et tungt emne' og så er der andre; 'waow, hvor spændende, interessant'. Det er meget forskelligt, hvordan reaktionen er.

Lisbeth: Jeg har heller ikke fået en passende grimasse endnu, selvom jeg har været i det her i snart 3 år, til hvordan jeg skal reagere på det blik jeg får, når de hører, hvor jeg arbejder. Altså folk de er sådan helt: Altså jeg er ikke ked af det, du behøver heller ikke være ked af det. Altså det her med, hvordan man egentligt responderer på, at det faktisk er et behov. At det er en nødvendighed at vi skal være her, fordi det faktisk er et behov. Altså vi har heldigvis mere liv her end vi har død. Og derfor er vores vision også Liv, Leg og Lindring. Fordi det er altså livet, vi går op i. Og så anerkender vi at døden kommer, når den kommer. Vores Regionsformand sagde, det var meget modigt, vi havde Liv til at stå først i vores vision. Men det siger jo lidt om, hvor lidt han ved om det her felt. Men det er spændende, at I også får sådan en opgave her, synes jeg. Vi ønsker også kun at kaste lys på, at der findes sådan noget som det her, og at det kan bruges til forskellige formål.

Emma: Det er interessant at dykke ned i. Det er jo sådan en lidt afsides verden, man ikke hører så tit om.

Lisbeth: Man kan sige, det er jo selvfølgelig et specielt hus der her, fordi vi er det første nybyggede børnehospice i Danmark, men ellers så har de jo flere i Tyskland, England og sådan nogle steder.

Simon: Som også er dedikeret kun til børn?

Lisbeth: Ja, de har også et i Stockholm, men jeg tror mange ligger i relation til voksenhospice, så hvordan de lige integrerer det er lidt forskelligt.

André: Ved du egentlig, hvordan det generelt er på de danske hospice? Er der også børn på dem, som ikke er designeret børnehospice?

Lisbeth: Altså det håber jeg ikke. Men man kan sige, Lukashuset er 7 år nu, det er 5 år ældre end os, så man kan sige, at før det så har der ikke været en mulighed for at sende børn på andet end et voksenhospice. Jeg tror så oftest, at man ikke har sendt børn på Hospice, så tror jeg måske, at der har været mange unge, som er blevet indlagt på et voksenhospice, og jeg har også hørt om, at der har været nogen børn, der har været på voksenhospice, også efter vi er kommet til, og det stikker ondt i mit hjerte, fordi jeg synes vi tilbyder noget, som de ikke kan tilbyde. Og den mulighed vi har om at støtte op om hele familien, det fokus har de simpelthen ikke på et voksenhospice, det kan de ikke have. Og mine sygeplejersker de er jo dedikeret til at passe børn og det er bare noget andet. Børn er ikke små voksne, og det er derfor vi har brug for børnehospice. Det er også derfor der er børneomdelinger, ellers gav det jo heller ikke mening. Jeg ved også, der er noget der hedder logistik for en familie, og når man bor i Hjørring, så er der bare super langt til Djursland, og af en eller anden grund, så er der meget længere fra Hjørring til Djursland, end omvendt, altså der er et eller andet med jer nordjyder, nu ved jeg ikke om I alle er derfra, jeg er selv gift med en vendelbo. Men der er lidt angstbestemt, for vi har haft rigtig mange fra Fyn, og der er jo også langt ned, så der er noget med, at det er farligt at krydse Limfjorden. Tænk, hvis ikke man kommer tilbage. Det er i hvert fald meget interessant at betragte i min stol, at vi faktisk ikke har haft nogle børn fra Nordjylland. Vi har haft en enkelt, som var her meget, meget kort. Så det har vi dog haft, men det var en lidt speciel situation også. Jeg forstår godt, at det er en logistisk udfordring for familier, for nogen gange så er det også kun den ene forældre, der har kørt fri til at passe barnet. Så der er selvfølgelig noget logistik i det. Men jeg synes man negligerer lidt, at vi faktisk løfter en særlig opgave, som man ikke på samme måde kan tilbyde på et voksenhospice, eller som et dagteam.

Emma: Hvordan i forhold til at I ligger i forbindelse til et voksen hospice, har i nogle fordele ved det eller ville i godt kunne ligge separat?

Lisbeth: Vi har en stor drift fordel. Det er et meget lille sted at drive rent økonomisk. Så det er helt klart en stordrifts fordel. Vi kan også gøre nogle ting i fællesskab, vi har også nogle funktioner, der går på tværs, vores musikterapeuter, vores psykolog går på tværs. Og det kan man sagtens, for det giver mening. Det vil være et meget, meget lille sted at drive selv. Vi har fælles hospiceleder, fælles pedel, fælles køkken, fælles rengøringservice, så der er nogle ting der.

Laura: Hvordan i forhold til aldersforskellen på børn, er der nogle forskellige behov, faciliteter eller aktiviteter?

Lisbeth: Jamen det er der, og vi prøver ligesom at vores hus, ikke bare ligner en børnehave, når man kommer ind, samtidig skal der være plads til børn, så vi gør meget ud af at finde legesager frem til børn i den aldersgruppe, vi nu har indlagt og så pakker vi det lidt væk, altså vi behøver ikke at have kravlegård fremme, hvis vi kun har børn over 6 år. Så det der med hele tiden at tilpasse det, det kræver en masse opbevaringsplads, så en stor kælder er der behov for, og det er jo ikke det mest interessante vel og det er dyrt at bygge, men opbevaringsplads det er altid lige super, for det kræver mange hjælpemidler.

Laura: Nu når det er et nybyggeri henvendt til et børnehospice, og du har været her i 3 år, er der så noget der kunne være gjort anderledes, eller ikke fungere nær så godt som, der måske var tiltænkt?

Lisbeth: Altså jeg ville nok retænke det åbne kontor, og det er lige så meget at vi arbejder med et projekt, eller har gjort, de første 2 år vi har været i gang, med et projekt der hedder 'Omsorg i Balance', hvor det her med at man også skal kunne trække sig og få ro som medarbejder for egentlig også at kunne gå ud og give noget til familierne. Altså tanken om at man er tilgængelig og man er nærværen, den er jo fin, men man har simpelthen også bare brug for at kunne trække sig. Så den vil jeg nok gøre på en anden måde i dag.

André: Vil det så være, at man skulle lave et lukket, lukket kontor, eller egentlig bare give faciliteten til at kunne trække sig tilbage foruden man har det åbne kontor?

Lisbeth: Jamen det kunne være en blanding. Man kan jo også lave meget med glasvægge, men det er jo fuldstændig åbent og selvom der er de her trælameller i loftet og lyden egentlig er god, så er der bare meget lydt. Nu var der roligt, da I kom, men når vi har 3-4 søskende, der hopper og danser rundt og spiller bold, så sidder man bare og tænker (angiver irritation/frustration). Og man skal koncentrere sig, og man kan så sige, nu har vi lavet en ekstra arbejdsplads heroppe (i mødelokalet) for at man ligesom kan trække sig væk, men det gør de ikke, personalet. Det er lidt ligesom derhjemme, alle samles i køkkenet, og man vil være der. Så det vil jeg i hvert fald tænke ind.

Emma: Så man kan forestille sig, hvis I havde en glasvæg dernede, hvor man kan se i er der og tilgængelige på den front, men i er stadig lukkede og i et lydtæt rum.

Lisbeth: Ja, hvis man kunne lukke i hvert fald, når man har brug for det. Altså nu vi har hospitalsklovnene på besøg, så er der altså også virkelig gang i den, så der har vi også måtte anvise en eller anden adfærd, der var lidt mere hensigtsmæssig i forhold til at vi vil kunne få arbejdsro. Fordi det er godt givet ud til at man faktisk også har energi til at være nærværende, når man så skal være det. Men jeg synes ikke som sådan, at vi savner et personalerum, så går vi jo herop (i mødelokalet). Så har vi også indrettet et af gæsteværelserne til at man kan sidde og hvile, når man har 12 timers vagter, så der skal være sådan nogle rum, så man kan trække sig lidt i. Men vi bruger vores rum meget fleksibelt. Og fordi det er sådan et lille sted, så kan man sagtens bruge rummene til flere forskellige ting, så det vil jeg også anbefale at I tænker med at man kan bruge det fleksibelt, netop fordi der også er forskellige grupper og behov løbende.

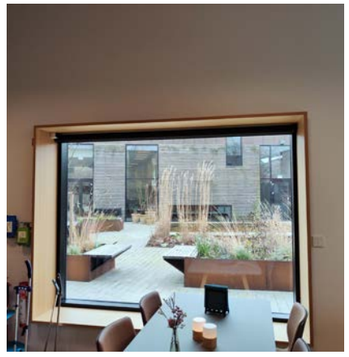
Emma: Er det kun jer sygeplejerske, der er her i døgndrift?

Lisbeth: Ja det er det. Der er 2 sygeplejersker på vagt hele tiden.

04 pictures - Strandbakkehuset



Heartroom


kitchen

activity room



sensing room

wellness room

05 interview with Bjerg Arkitektur

interview conducted on the 16th of february 2023 through an online meeting.

interviewee Maria Bjerg Nørkjær and Carsten Wraae Jensen
interviewers Laura Obel Pinstrup
Emma Louise Jensen
Amber Slabbinck

The research that has been done in the early phases of this project included two interviews. These are cited in several places throughout the report. The full interviews are transcribed on the next pages. Because both were held in Danish, the transcription is also in Danish.

Interview Bjerg Arkitektur
Marie and Carsten, both architects from Bjerg Arkitektur where interviewed by the authors of this thesis through an online interview. Tis interview was used to gain knowledge about designing for children and sustainable design. Since there was no recording of this interview the key points that were talked about have been described below to give the reader an idea about what has been discussed.

Design for children: the architect addressed that the indoor environment is very important for children. The light conditions, acoustics and air quality should be carefully taken into consideration. The main rooms for children to be in would preferably be towards the south. This way they can experience the change of day and season. Materials should be practical and easy to clean and the designer should take into consideration that materials and surfaces will be 'worn' and thus change over time in appearance and maybe quality. It is also important to address more private spaces for children in a bigger space. They too need space and calmth to retreat themselves from others.

Other topics that were addressed as important when designing for children were wayfinding, multifunctional and integrated furniture, avoiding cold floors, but also smaller details as making glass partitions in a door low enough so also small children can look through it. Minor examples works as well in a building for children as implementing glass in the doors to give an overview of the other side and not placing sockets on the lower part of the wall

Sustainable design
Bjerg Arkitektur is a firm that invests a lot of time into making their designs future proof and thus as sustainable as possible. They always reach the low energy building class by ensuring a tight climate screen. Next to that they make sure of reaching good life cycle assessment numbers by choosing the right materials but also by looking at the energy use of the building.

bØrnehuset

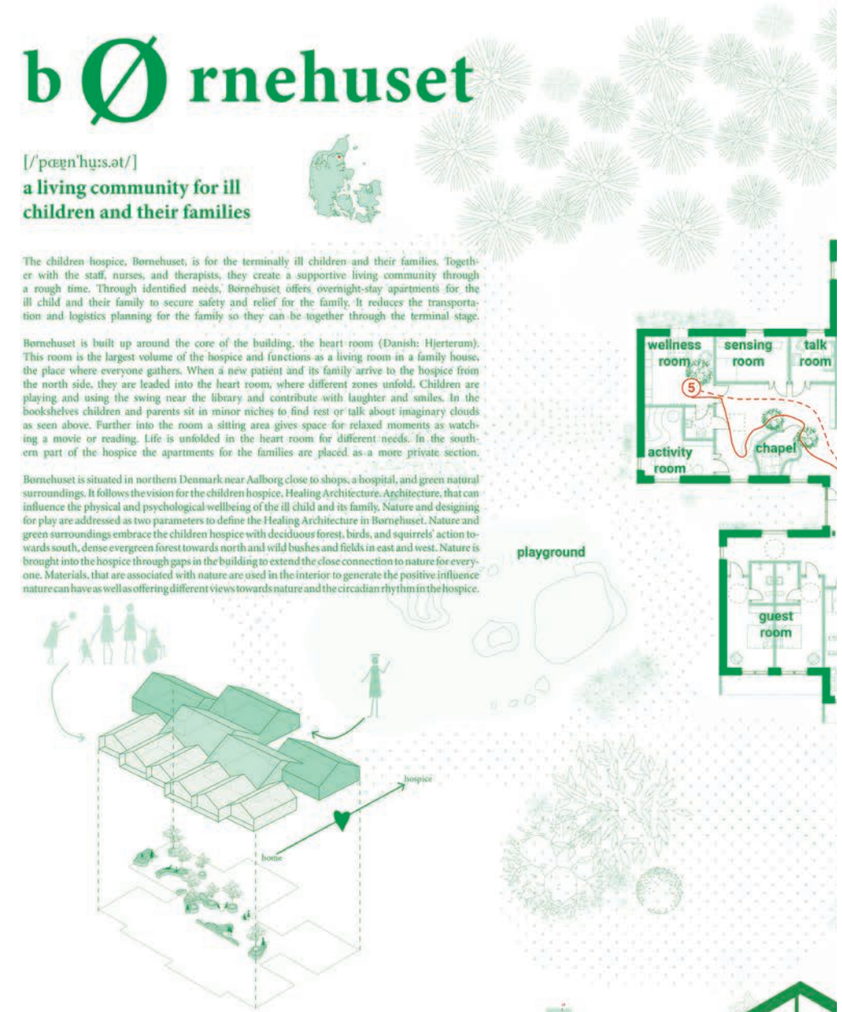
[/ˈpœɐ̯nˈhuːs.ət/]

a living community for ill children and their families

The children hospice, Børnehuset, is for the terminally ill children and their families. Together with the staff, nurses, and therapists, they create a supportive living community through a rough time. Through identified needs, Børnehuset offers overnight-stay apartments for the ill child and their family to secure safety and relief for the family. It reduces the transportation and logistics planning for the family so they can be together through the terminal stage.

Børnehuset is built up around the core of the building, the heart room (Danish: Hjerterum). This room is the largest volume of the hospice and functions as a living room in a family house, the place where everyone gathers. When a new patient and its family arrive to the hospice from the north side, they are leaded into the heart room, where different zones unfold. Children are playing and using the swing near the library and contribute with laughter and smiles. In the bookshelves children and parents sit in minor niches to find rest or talk about imaginary clouds as seen above. Further into the room a sitting area gives space for relaxed moments as watching a movie or reading. Life is unfolded in the heart room for different needs. In the southern part of the hospice the apartments for the families are placed as a more private section.

Børnehuset is situated in northern Denmark near Aalborg close to shops, a hospital, and green natural surroundings. It follows the vision for the children hospice, Healing Architecture. Architecture, that can influence the physical and psychological wellbeing of the ill child and its family. Nature and designing for play are addressed as two parameters to define the Healing Architecture in Børnehuset. Nature and green surroundings embrace the children hospice with deciduous forest, birds, and squirrels' action towards south, dense evergreen forest towards north and wild bushes and fields in east and west. Nature is brought into the hospice through gaps in the building to extend the close connection to nature for everyone. Materials, that are associated with nature are used in the interior to generate the positive influence nature can have as well as offering different views towards nature and the circadian rhythm in the hospice.

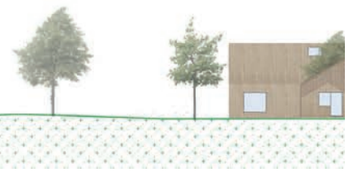


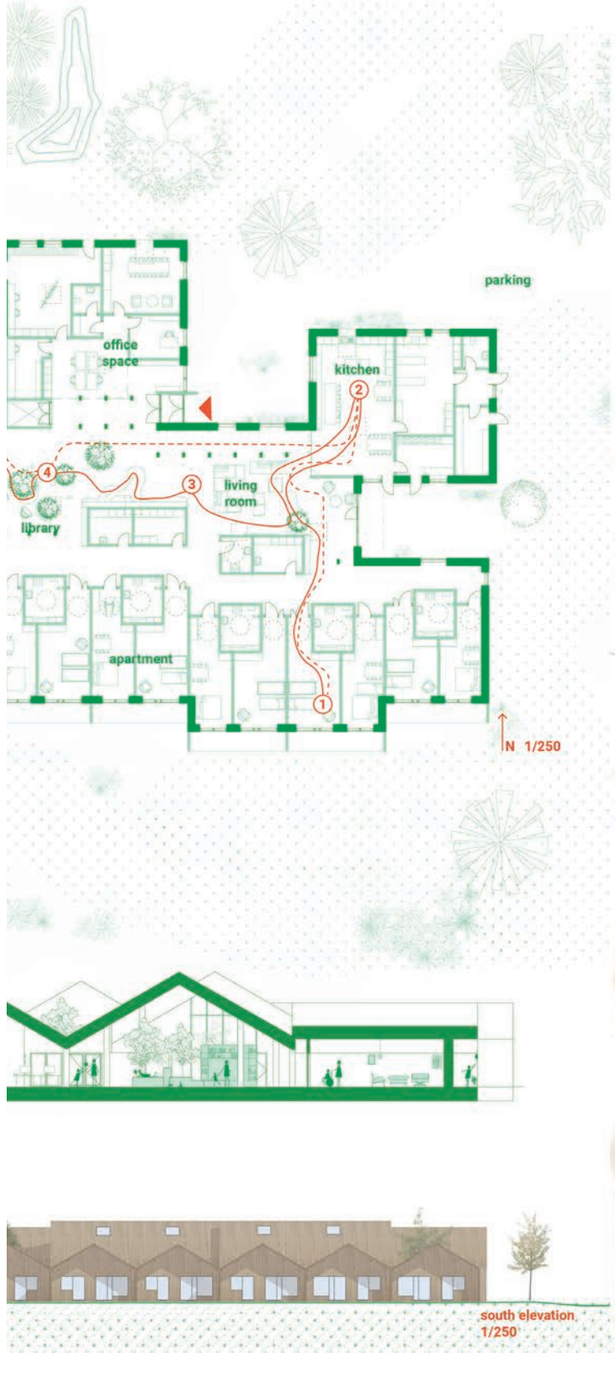
The children's hospice is designed with inspiration of a community feeling, that appears when living close together with your neighbours or sharing the same experiences. The roof volumes are familiar for Danish families and brings a homely feeling. The shape divides the different functions inside the hospice and makes the building readable. Three different volume sizes indicate the function and hierarchy of circulation at the hospice. The small volumes function as individual homes for the family and their ill child. The medium volumes functions as the therapy section, the office area and the kitchen area that is closely connected to the heart room. The large volume is the heart room as the core and glue of the hospice. Each room is placed according to a specific view to nature.

The layout of Børnehuset makes the circulation simple. Playful spaces are integrated to make the path more exciting for children. It is developed from the heart room to the activity room to create imaginary spaces and niches for different ages and needs. The adult may prefer a more direct circulation at Børnehuset, but they are in close contact with the children. The ill child has the option to be included along with the family and experience the joy in the playful areas.

sustainability

Since the building industry is accountable for about 40% of the global CO2 emissions, this project aims to reach for a low as possible global warming potential. With a wooden construction, wooden cladding and other nature associated materials, the building reach an emission of 9,07 kg CO2-eq/m2/year. This result fits the requirements of Denmark which is 10,5 kg CO2-eq/m2/year until 2027.





01. retreat

The patient room takes up half of the family apartment, which is under the same volume. It gives a sense of individuality and offers a moment of retreat from the community. Family room and patient room have separated entries; one for the normal, homely entrance, the other one for all the medical related actions.

02. community

The kitchen is closely connected to the heart room and an important element for the community feeling. It functions as the area for getting coffee, talks or the daily meals everyone will attend to.

03.hjerterum

The heart room is the core of the community. The space where parents can gather and talk, where children can run or play with toys, and the space where the ill child can join in, in every activity. The volume allows different zones and atmospheres for different needs.

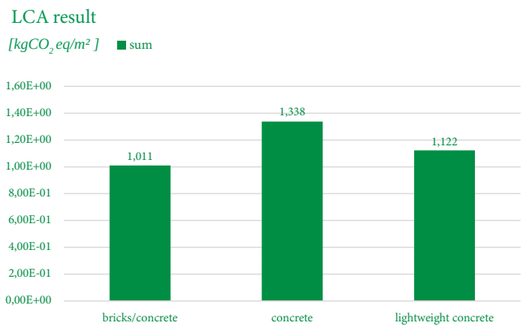
04. activity

The library is a flexible, active, and important space for the main user as the child. It is a niche with trees to change the atmosphere. Curved furniture and swings between the trees make it playful and a creative corner in the heart room.

05. treatment

Different treatment functions are considered vital when talking about terminally ill children. Børnehuset offers a sensing room, a chapel, an activity room, and a wellness room. Each of them has different atmospheres according to the child and parent's needs.

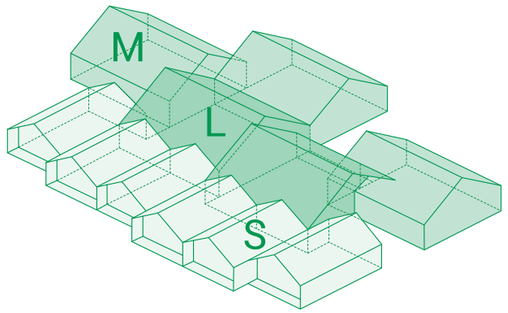
07 LCA
- process



heavy wall construction

From previous material studies, the heavy construction materials where having higher global warming potential than the light constructions. The heavy constructions are studied with bricks combined with concrete, pure concrete, and lightweight concrete. They are having in average 150% bigger environmental impact, than the light constructions.

08 structural analysis

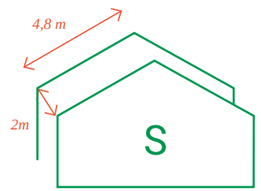


The structural performance of the building and dimensions of the structural elements have been investigated through Robot analysis supported by hand calculations.

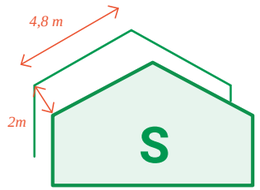
The frames
The different volume sizes are analysed independently. For every volumen, the performance of the frames are looked at with different distances from eachother.

The loads will vary per different iteration and therefore result in different dimensions for the structural elements. The deformation will ba assesed according to the rule of thumb for deformation :

max deformation = L/500



max deformation = L/500
beam = 4800 / 500 = 9,6 mm
column = 2900 / 500 = 5,8 mm

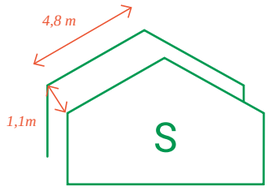


Area = 2 m . 4,8 m = 9,6 m²

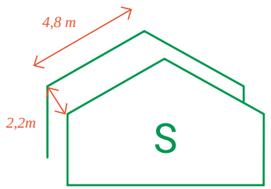
roof
= 0,9 kNm² . area (m²)
= X kN/m² per member

Snow load
= 0,8 kNm² . area (m²)
= X kN/m² per member

Wind load
= W = qp . Cpe10
(qp = 1 kN/m², Cpe10 = pressure coefficient)



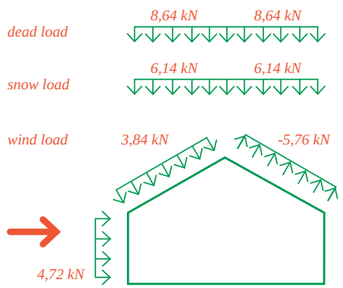
max deformation = L/500
beam = 4800 / 500 = 9,6 mm
column = 2900 / 500 = 5,8 mm



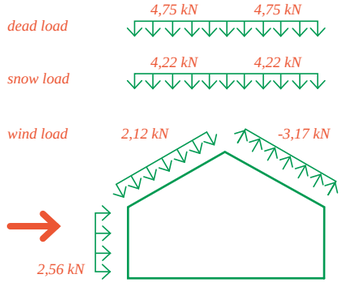
max deformation = L/500
beam = 4800 / 500 = 9,6 mm
column = 2900 / 500 = 5,8 mm

Loads on the structure
The different loads on the structure are calculated by hand and after put in in Robot to make the deformation analysis.

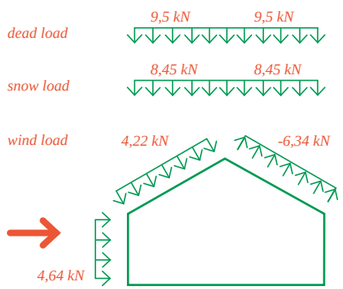
Loads taken into consideration are:
Self weight roof = 0,9 kN/m²
(heavy roof to calculate most critical situation)
Snow loads = 0,8 kN/m²
Wind loads = W = qp . Cpe10
(qp = 1 kN/m², Cpe10 = pressure coefficient)



beam			column	
b x h	deformation = max 9,6 mm		b x h	deformation = max 5,8 mm
5 x 20	39 mm	+	5 x 20	1,1 mm
10 x 25	10 mm	+	10 x 25	3 mm
15 x 25	7 mm	+	10 x 25	2 mm
15 x 30	4 mm	+	10 x 25	2 mm
25 x 30	3 mm	+	10 x 25	1 mm
15 x 25	7 mm	+	15 x 25	2 mm



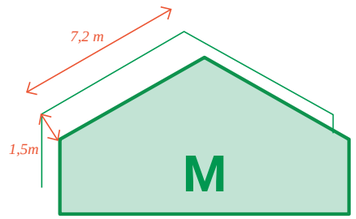
beam			column	
b x h	deformation = max 9,6 mm		b x h	deformation = max 5,8 mm
15 x 25	4 mm	+	15 x 25	1 mm
10 x 25	5 mm	+	10 x 25	2 mm
10 x 20	11 mm	+	10 x 20	3 mm



beam			column	
b x h	deformation = max 9,6 mm		b x h	deformation = max 5,8 mm
15 x 25	7 mm	+	15 x 25	2 mm
10 x 25	11mm	+	10 x 25	3 mm
10 x 20	21 mm	+	10 x 20	6 mm

Robot results
In Robot different section dimensions are investigated to see which ones perform the most optimal. Important to take into consideration is that the beam and column need to be the same size as they will be one frame where the column supports the beam.

As the beam always has larger dimension than the column since it is a larger span, the column will be over dimensioned according to the size of the beam.



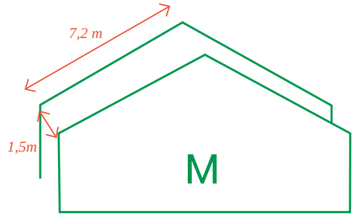
Area = 1,5 m . 7,2 m = 10,8 m²

---

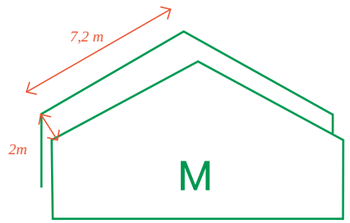
roof
= 0,9 kNm² . area (m²)
= X kN/m² per member

Snow load
= 0,8 kNm² . area (m²)
= X kN/m² per member

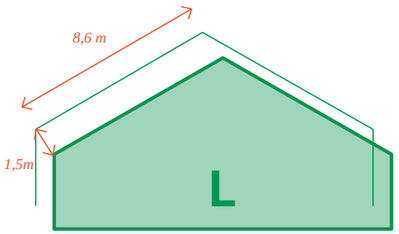
Wind load
= W = qp . Cpe10
(qp = 1 kN/m², Cpe10 = pressure coefficient)



max deformation = L/500
beam = 7200 / 500 = 14,4 mm
column = 3100 / 500 = 6,2 mm



max deformation = L/500
beam = 7200 / 500 = 14,4 mm
column = 3100 / 500 = 6,2 mm



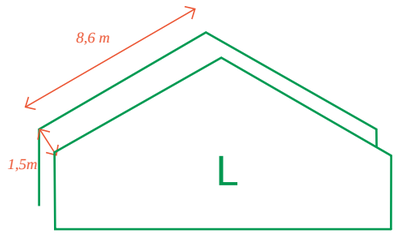
Area = 1,5 m . 8,6 m = 12,9 m²

---

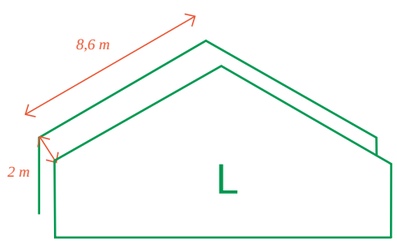
roof
= 0,9 kNm² . area (m²)
= X kN/m² per member

Snow load
= 0,8 kNm² . area (m²)
= X kN/m² per member

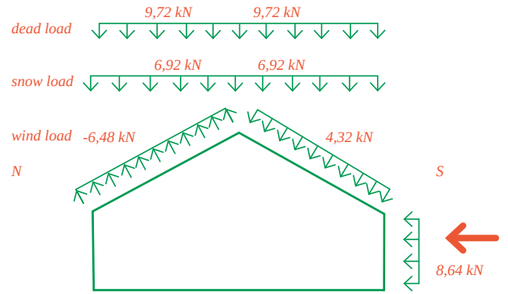
Wind load
= W = qp . Cpe10
(qp = 1 kN/m², Cpe10 = pressure coefficient)



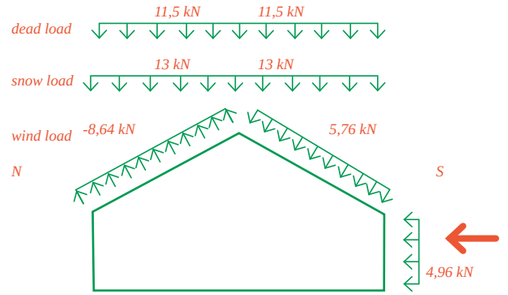
max deformation = L/500
beam = 8600 / 500 = 17,2 mm
column = 4500 / 500 = 9 mm



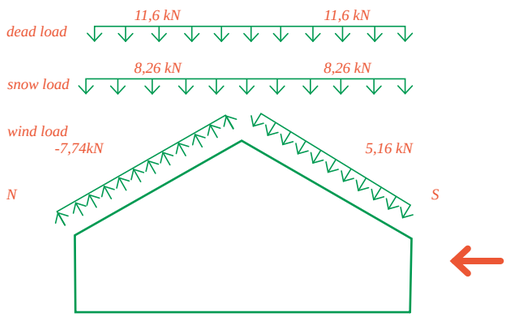
max deformation = L/500
beam = 8600 / 500 = 17,2 mm
column = 4500 / 500 = 9 mm



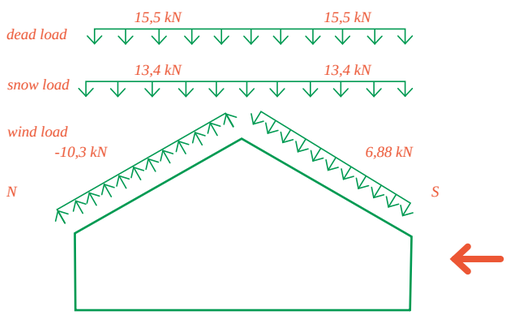
beam			column	
b x h	deformation = max 14,4 mm		b x h	deformation = max 6,2 mm
5 x 20	245 mm	+	5 x 20	14 mm
10 x 25	48 mm	+	10 x 25	9 mm
15 x 25	39 mm	+	10 x 20	10 mm
15 x 30	22 mm	+	10 x 25	6 mm
25 x 30	15 mm	+	10 x 25	5 mm
25 x 30	11 mm	+	25 x 30	2 mm



beam			column	
b x h	deformation = max 14,4 mm		b x h	deformation = max 6,2 mm
25 x 30	15 mm	+	25 x 30	3 mm
25 x 35	9 mm	+	25 x 35	2 mm
20 x 35	12 mm	+	20 x 35	2 mm
20 x 30	19 mm	+	20 x 30	3 mm



beam			column	
b x h	deformation = max 17,2 mm		b x h	deformation = max 9 mm
5 x 20	61 mm	+	5 x 20	12 mm
10 x 25	16 mm	+	10 x 25	4 mm
15 x 25	11 mm	+	10 x 20	2 mm
15 x 30	6 mm	+	5 x 20	2 mm
15 x 25	10 mm	+	15 x 25	2 mm
25 x 35	4 mm	+	25 x 35	1 mm



beam			column	
b x h	deformation = max 17,2 mm		b x h	deformation = max 9 mm
25 x 30	15 mm	+	25 x 30	3 mm
20 x 35	12 mm	+	20 x 35	2 mm
20 x 30	19 mm	+	20 x 30	3 mm

09 24h average temperature analysis

Calculation of 24-hour average temperature in 1 apartment

Iteration 1, wide windows

Construction towards outdoor

Surface	A m^2	U W/m^2K	Bu W/K
South wall	5,21	0,11	0,57
West wall	3,91	0,11	0,43
Total	19,73		

Windows towards outdoor

Surface	Number	A m^2	U W/m^2K	Orient degree	Inclination	g-value	f(beta)	f(shade)	f(shadow)	f(glass)
South window	1	9,33	0,5	180	90	0,48	0,90	0,75	0,3	0,90
West window	1	10,24	0,5	180	90	0,48	0,90	0,75	0,3	0,90
Total	2	19,57								

Construction towards ground and surrounding rooms

Surface	A m^2	U W/m^2K	Br W/K	tr degree	Br*tr W
Internal east wall	29,48	0,2	5,90	21	123,82
Internal west wall	26,15	0,2	5,23	21	109,83
Internal north wall	17,90	0,2	3,58	21	75,18
Floor area	49,10	0,2	9,82	7,6	74,63
Total	122,63				

Ventilation

Type	Air change h^{-1}	Room vol. m^3	Air flow m^3/s	Density kg/m^3	Heat kap. J/kgK	Ba W/K
Ventilation	4,00	156,7	0,174	1,2	1006	210,19
Infiltration	0,10		0,004	1,2	1006	5,25
Total	4,1		0,178			215,44

Heat accumulation

Heat accumulation	Therm. cap. W/K pr m^2	Floor area m^2	Ba W/K
Medium light	8	49,11	392,80

Description of Medium light:
A few heavy structures, as concrete slab, wooden floor, wooden construction

Time	People load W	Lightning W	Other W	Sum W
1	226			226
2	226			226
3	226			226
4	226			226
5	226			226
6	226			226
7	226	135	100	461
8	265	135	100	500
9	265	135	100	500
10	133	135	100	368
11	133	135	100	368
12	133	135	100	368
13	133	135	100	368
14	133	135	100	368
15	133	135	100	368
16	133	135	100	368
17	265	135	100	500
18	265	135	100	500
19	226	135	100	461
20	226	135	100	461
21	226			226
22	226			226
23	226			226
24	226			226
Sum	4929	1890	1400	8219
Mean value	205	79	58	342
Max. timevalue	265	135	100	500
Min. timevalue	133	0	0	226

Internal heat loads:
An partments is considered for 4 people, where as the ill child is taken into consideration.

Result:

If the ventilation air has the same temperature as outdoor air

Chosen month: July	t_u = 21°C
24-hour average	t_i = 23,2 °C
Temperature variation	Δt_i = 5,8 °C
Max. Temperature	$t_{i,max}$ = 26,1 °C

Additional:

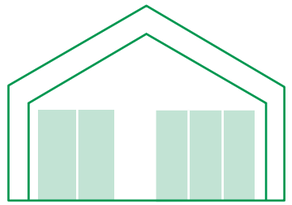
If the ventilation air has the same temperature as the outdoor 24-hour average temperature

24-hour average	t_i = 23,2 °C
Temperature variation	Δt_i = 1,9 °C
Max. Temperature	$t_{i,max}$ = 24,1 °C

24-hour average	t_i = 21,5 °C
Temperature variation	Δt_i = 1,9 °C
Max. Temperature	$t_{i,max}$ = 22,4 °C

Calculation of 24-hour average temperature in 1 apartment

Iteration 2, the same window repetition



Construction towards outdoor

Surface	A m^2	U W/m^2K	Bu W/K
South wall	14,12	0,11	1,55
West wall	3,91	0,11	0,43
Total	18,04		

Windows towards outdoor

Surface	Number	A m^2	U W/m^2K	Orient degree	Inclination	g-value	f(beta)	f(shade)	f(shadow)	f(glass)
South window	1	5,00	0,5	180	90	0,48	0,90	0,75	0,3	0,85
West window	1	5,87	0,5	180	90	0,48	0,90	0,75	0,3	0,85
Total	2	10,87								

Construction towards ground and surrounding rooms

Surface	A m^2	U W/m^2K	Br W/K	tr degree	Br*tr W
Internal east wall	29,48	0,2	5,90	21	123,82
Internal west wall	26,15	0,2	5,23	21	109,83
Internal north wall	17,90	0,2	3,58	21	75,18
Floor area	49,10	0,2	9,82	7,6	74,63
Total	122,63				

Ventilation

Type	Air change h^{-1}	Room vol. m^3	Air flow m^3/s	Density kg/m^3	Heat kap. J/kgK	Ba W/K
Ventilation	4,00	156,7	0,174	1,2	1006	210,19
Infiltration	0,10		0,004	1,2	1006	5,25
Total	4,1		0,178			215,44

Heat accumulation

Heat accumulation	Therm. cap. W/K pr m^2	Floor area m^2	Ba W/K
Medium light	8	49,11	392,80

Description of Medium light:
A few heavy structures, as concrete slab, wooden floor, wooden construction

Time	People load W	Lightning W	Other W	Sum W
1	226			226
2	226			226
3	226			226
4	226			226
5	226			226
6	226			226
7	226	135	100	461
8	265	135	100	500
9	265	135	100	500
10	133	135	100	368
11	133	135	100	368
12	133	135	100	368
13	133	135	100	368
14	133	135	100	368
15	133	135	100	368
16	133	135	100	368
17	265	135	100	500
18	265	135	100	500
19	226	135	100	461
20	226	135	100	461
21	226			226
22	226			226
23	226			226
24	226			226
Sum	4929	1890	1400	8219
Mean value	205	79	58	342
Max. timevalue	265	135	100	500
Min. timevalue	133	0	0	226

Internal heat loads:
An partments is considered for 4 people, where as the ill child is taken into consideration.

Result:

If the ventilation air has the same temperature as outdoor air

Chosen month: July	$t_u = 21°C$
24-hour average	$t_i = 22,6$ °C
Temperature variation	$\Delta t_i = 5,2$ °C
Max. Temperature	$t_{i,max} = 25,1$ °C

Additional:

If the ventilation air has the same temperature as the outdoor 24-hour average temperature

24-hour average	$t_i = 22,6$ °C
Temperature variation	$\Delta t_i = 1,2$ °C
Max. Temperature	$t_{i,max} = 23,2$ °C

24-hour average	$t_i = 20,8$ °C
Temperature variation	$\Delta t_i = 1,2$ °C
Max. Temperature	$t_{i,max} = 21,4$ °C

Calculation of 24-hour average temperature in 1 apartment

Iteration 3, the chosen window combination

Construction towards outdoor

Surface	A m^2	U W/m^2K	Bu W/K
South wall	15,81	0,11	1,74
West wall	3,91	0,11	0,43
Total	19,73		

Windows towards outdoor

Surface	Number	A m^2	U W/m^2K	Orient degree	Inclination	g-value	f(beta)	f(shade)	f(shadow)	f(glass)
South window	1	5,52	0,5	180	90	0,48	0,90	0,75	0,3	0,80
West window	1	3,42	0,5	180	90	0,48	0,90	0,75	0,3	0,80
Total	2	8,94								

Construction towards ground and surrounding rooms

Surface	A m^2	U W/m^2K	Br W/K	tr degree	Br*tr W
Internal east wall	29,48	0,2	5,90	21	123,82
Internal west wall	26,15	0,2	5,23	21	109,83
Internal north wall	17,90	0,2	3,58	21	75,18
Floor area	49,10	0,2	9,82	7,6	74,63
Total	122,63				

Ventilation

Type	Air change h^{-1}	Room vol. m^3	Air flow m^3/s	Density kg/m^3	Heat kap. J/kgK	Ba W/K
Ventilation	4,00	156,7	0,174	1,2	1006	210,19
Infiltration	0,10		0,004	1,2	1006	5,25
Total	4,1		0,178			215,44

Heat accumulation

Heat accumulation	Therm. cap. W/K pr m^2	Floor area m^2	Ba W/K
Medium light	8	49,11	392,80

Description of Medium light:
A few heavy structures, as concrete slab, wooden floor, wooden construction

Time	People load W	Lightning W	Other W	Sum W
1	226			226
2	226			226
3	226			226
4	226			226
5	226			226
6	226			226
7	226	135	100	461
8	265	135	100	500
9	265	135	100	500
10	133	135	100	368
11	133	135	100	368
12	133	135	100	368
13	133	135	100	368
14	133	135	100	368
15	133	135	100	368
16	133	135	100	368
17	265	135	100	500
18	265	135	100	500
19	226	135	100	461
20	226	135	100	461
21	226			226
22	226			226
23	226			226
24	226			226
Sum	4929	1890	1400	8219
Mean value	205	79	58	342
Max. timevalue	265	135	100	500
Min. timevalue	133	0	0	226

Internal heat loads:
An partments is considered for 4 people, where as the ill child is taken into consideration.

Result:

If the ventilation air has the same temperature as outdoor air

Chosen month: July	$t_u = 21°C$
24-hour average	$t_i = 22,4$ °C
Temperature variation	$\Delta t_i = 5,0$ °C
Max. Temperature	$t_{i,max} = 24,9$ °C

Additional:

If the ventilation air has the same temperature as the outdoor 24-hour average temperature

24-hour average	$t_i = 22,4$ °C
Temperature variation	$\Delta t_i = 1,1$ °C
Max. Temperature	$t_{i,max} = 22,9$ °C

24-hour average	$t_i = 20,7$ °C
Temperature variation	$\Delta t_i = 1,1$ °C
Max. Temperature	$t_{i,max} = 21,2$ °C

10 month average temperature analysis

Calculation of month average temperature in 1 apartment

Building data

Room temperature at heating, °C	20
Room temperature at cooling, °C	24
Soil temperature, °C	7,6
Net area, m²	51,25
Gross area, m²	60,25
Heated developed area, m²	51,25
Normal usage time, hours/week	168
Relative use	1,000

Construction towards outdoor

Description	A m²	U W/m²K	Bu W/K
South wall	15,814	0,11	1,739
West wall	3,914	0,11	0,43
Roof	73,4	0,11	7,34
Total			9,51

Floor

A m²	U W/m²K	Br W/K
51,25	0,1	5,125
Specific heat loss, floor		5,125

Windows towards outdoor

Surface	A m²	Orientation	U W/m²K	Bu W/K	g-value	f(beta)	f(shade)	f(shadow)	f(glass)	f(sun)
South window	8,94	S	0,5	4,47	0,48	0,90	0,75	0,5	0,80	0,129

Heat capacity

Heat capacity	80
Time constant	97,0
a	7,1

Description of Medium light:
A few heavy structures, as concrete slab, wooden floor, wooden construction

Ventilation

Ventilation, summer

Usage time, l/s m²	0,60
Off usage time, l/s m²	0,60
Mean ventilationflow m²/s	0,03

Ventilation, winter

Usage time, l/s m²	0,15
Off usage time, l/s m²	0,15
Mean ventilationflow m²/s	0,01

Internal heat loads:
An apartments is considered for 4 people, where as the ill child is taken into consideration.

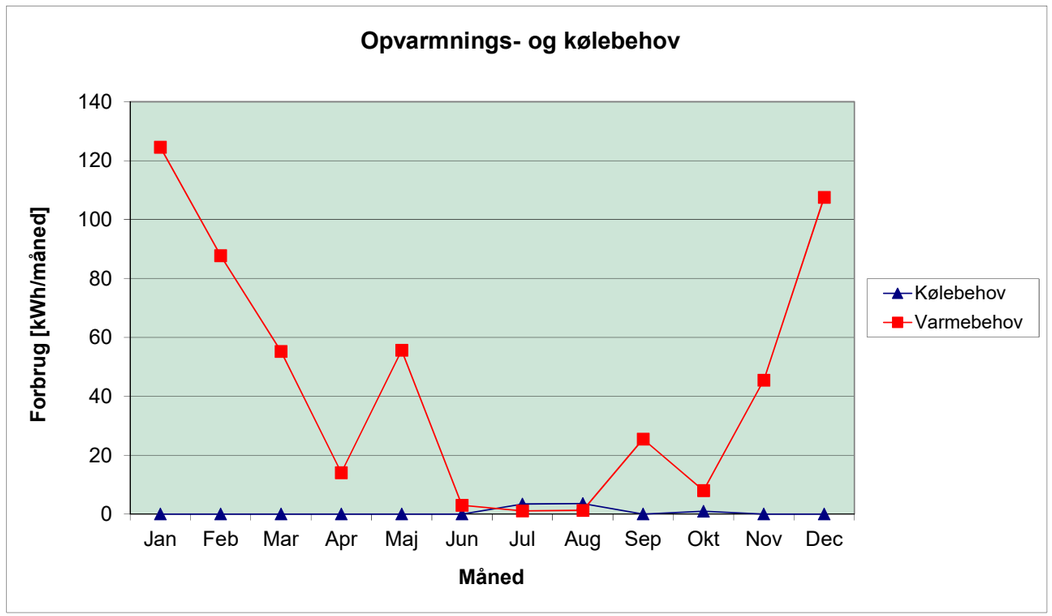
Time	People load W	Lightning W	Other W	Sum W
1	226			226
2	226			226
3	226			226
4	226			226
5	226			226
6	226			226
7	226	135	100	461
8	265	135	100	500
9	265	135	100	500
10	133	135	100	368
11	133	135	100	368
12	133	135	100	368
13	133	135	100	368
14	133	135	100	368
15	133	135	100	368
16	133	135	100	368
17	265	135	100	500
18	265	135	100	500
19	226	135	100	461
20	226	135	100	461
21	226			226
22	226			226
23	226			226
24	226			226
Sum	4929	1890	1400	8219
Mean value	205	79	58	342
Mean value pr m² floor area	4,01	1,54	1,14	6,68

Children's hospice heating and cooling need

Month	Days	Cooling need kWh/month	Heating need kWh/month	Vent. loss W/K	Use factor	Sun rad. kWh	Internal kWh	Heat loss (winter) kWh	Heat loss (summer) kWh
January	31	0	132	9	0,975	40	246	410	495
February	28	0	93	9	0,957	59	222	363	439
March	31	0	60	9	0,911	84	246	360	445
April	30	0	16	9	0,775	105	238	282	363
May	31	0	60	37	0,901	123	246	393	560
June	30	0	3	37	0,626	111	238	222	384
July	31	0	1	37	0,543	111	246	195	363
August	31	0	1	37	0,552	119	246	203	370
September	30	0	28	37	0,838	94	238	307	469
October	31	0	9	9	0,728	70	246	239	321
November	30	0	50	9	0,909	43	238	305	387
December	31	0	114	9	0,970	27	246	379	464
Sum			568			985	2900	3659	5062

Result:

Energy consumption for heating pr m² floorarea, kWh/ m² year	9,4
Energy consumption for cooling pr m² floorarea, kWh/ m² year	0,0
Total energy consumption pr m² floorarea, kWh/ m² year	9,4



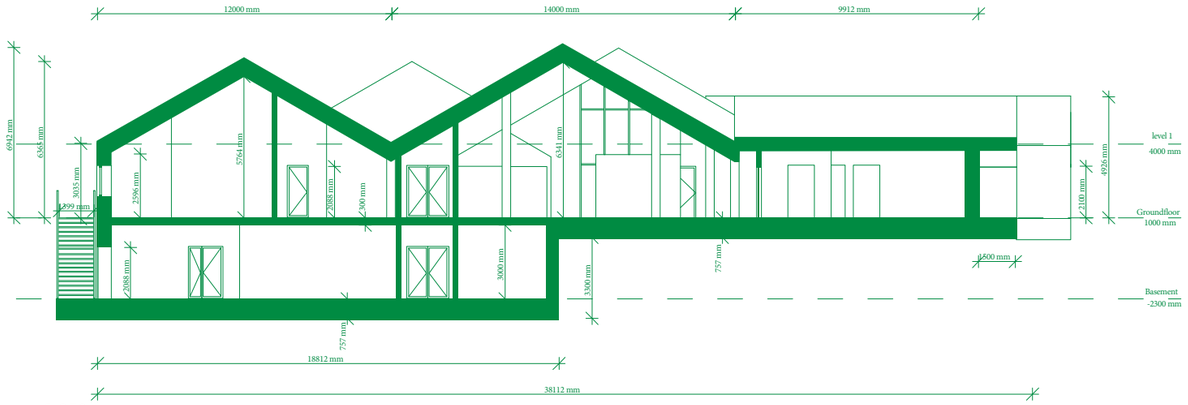
11 daylight analysis - process

_InsightLighting Floor Schedule									
Daylight Factor Whole Building Results: 56,9907073974609,9,97719764709473									
45% of points are between 1,0-3,5% (Building ADF is 1,8%)									
Daylight Factor Sky (unshaded horizontal 100%)									
			9am threshold results						
			within threshold		above threshold		below threshold		
Name	Floor Area Included in Daylighting	Total Floor Area	%	Area	%	Area	%	Area	ADF %
(02)4 Stueplan	1023 m²	1051 m²	45	464 m²	13	137 m²	41	423 m²	1.8

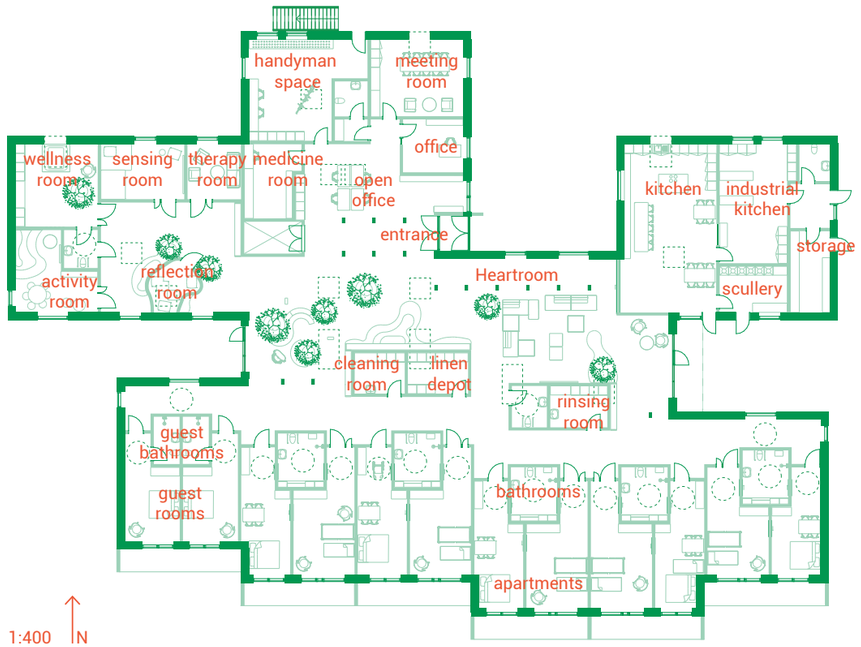
_InsightLighting Room Schedule											
Daylight Factor Whole Building Results: 56,9907073974609,9,97719764709473											
45% of points are between 1,0-3,5% (Building ADF is 1,8%)											
Daylight Factor Sky (unshaded horizontal 100%)											
					DF Sky threshold results						
					within threshold		above threshold		below threshold		
Name	Number	Area	Include In Daylighting	Automated Shades	%	Area	%	Area	%	Area	ADF %
Bathroom	132	Not Placed	Yes	No	0	0 m²	0	0 m²	100	11 m²	0.0
Patient room	133	27 m²	Yes	No	1	0 m²	1	0 m²	1	0 m²	0.0
Toilet	139	Not Placed	Yes	No	0	0 m²	0	0 m²	100	5 m²	0.0
Cleaning	140	Not Placed	Yes	No	0	0 m²	0	0 m²	100	9 m²	0.1
Toilet	142	6 m²	Yes	No	100	6 m²	0	0 m²	0	0 m²	1.8
Linen depot	143	Not Placed	Yes	No	0	0 m²	0	0 m²	100	10 m²	0.0
Storage	144	Not Placed	Yes	No	0	0 m²	0	0 m²	100	14 m²	0.0
Sensing room	150	20 m²	Yes	No	33	7 m²	0	0 m²	67	13 m²	0.9
Wellness room	151	29 m²	Yes	No	56	16 m²	11	3 m²	33	10 m²	2.2
Chapel	154	8 m²	Yes	No	33	3 m²	67	5 m²	0	0 m²	4.1
Talk room	162	13 m²	Yes	No	50	6 m²	0	0 m²	50	6 m²	0.9
Activity room	163	22 m²	Yes	No	14	3 m²	29	6 m²	57	13 m²	1.8
Family room	199	19 m²	Yes	No	40	8 m²	0	0 m²	60	11 m²	0.9
Patient room	200	23 m²	Yes	No	40	9 m²	0	0 m²	60	14 m²	1.0
Scullery	201	13 m²	Yes	No	67	9 m²	0	0 m²	33	4 m²	1.3
Rinsing	202	Not Placed	Yes	No	0	0 m²	0	0 m²	100	10 m²	0.0
Meeting room	203	30 m²	Yes	No	67	20 m²	22	7 m²	11	3 m²	2.7
Medicine room	204	Not Placed	Yes	No	0	0 m²	0	0 m²	100	16 m²	0.0
Guest room	207	21 m²	Yes	No	33	7 m²	0	0 m²	67	14 m²	0.9
Guest room	208	21 m²	Yes	No	33	7 m²	0	0 m²	67	14 m²	0.8
Toilet	209	Not Placed	Yes	No	0	0 m²	0	0 m²	100	5 m²	0.0
Disabled toilet	210	5 m²	Yes	No	0	0 m²	0	0 m²	100	5 m²	0.0
Family room	211	23 m²	Yes	No	25	6 m²	13	3 m²	63	14 m²	1.5
Patient room	212	27 m²	Yes	No	25	7 m²	25	7 m²	50	14 m²	2.9
Bathroom	213	Not Placed	Yes	No	0	0 m²	0	0 m²	100	11 m²	0.0
Bathroom	214	Not Placed	Yes	No	0	0 m²	0	0 m²	100	11 m²	0.0
Patient room	215	27 m²	Yes	No	29	8 m²	0	0 m²	71	19 m²	0.9
Family room	216	24 m²	Yes	No	25	6 m²	0	0 m²	75	18 m²	0.6
Bathroom	218	Not Placed	Yes	No	0	0 m²	0	0 m²	100	11 m²	0.0
Bathroom	221	Not Placed	Yes	No	0	0 m²	0	0 m²	100	11 m²	0.0
Toilet	222	Not Placed	Yes	No	0	0 m²	0	0 m²	100	5 m²	0.0
Kitchen	223	67 m²	Yes	No	72	48 m²	22	15 m²	6	4 m²	2.7
Handyman	224	42 m²	Yes	No	50	21 m²	17	7 m²	33	14 m²	2.0
Toilet	225	Not Placed	Yes	No	0	0 m²	0	0 m²	100	5 m²	0.1
Industrial kitchen	226	36 m²	Yes	No	25	9 m²	0	0 m²	75	27 m²	0.9
Office	227	14 m²	Yes	No	25	3 m²	0	0 m²	75	10 m²	0.8
Patient room	228	27 m²	Yes	No	29	8 m²	0	0 m²	71	19 m²	0.8
Family room	229	23 m²	Yes	No	17	4 m²	0	0 m²	83	19 m²	0.5
Family room	231	23 m²	Yes	No	0	0 m²	20	5 m²	80	19 m²	2.2
Room	232	462 m²	Yes	No	53	244 m²	17	79 m²	30	139 m²	2.1
Room	233	Not Placed	Yes	No	50	4 m²	0	0 m²	50	4 m²	1.2

12 detail drawings

On the following pages more detailed drawings are presented. A groundfloor plan, basement plan, and section are shown with dimensions. Next to this a complete room program with area's is presented.



1:250



Back of house

rooms	units	area [m²]
cleaning room	1	9
linen depot	1	10
medicine room	1	16
scullery	1	13
rinsing room	1	10
industrial kitchen	1	43
storage (ind. kitchen)	1	14
handyman space	1	42
meeting room	1	30
office	1	14
basement	1	242
elevator	1	8
toilet	2	5

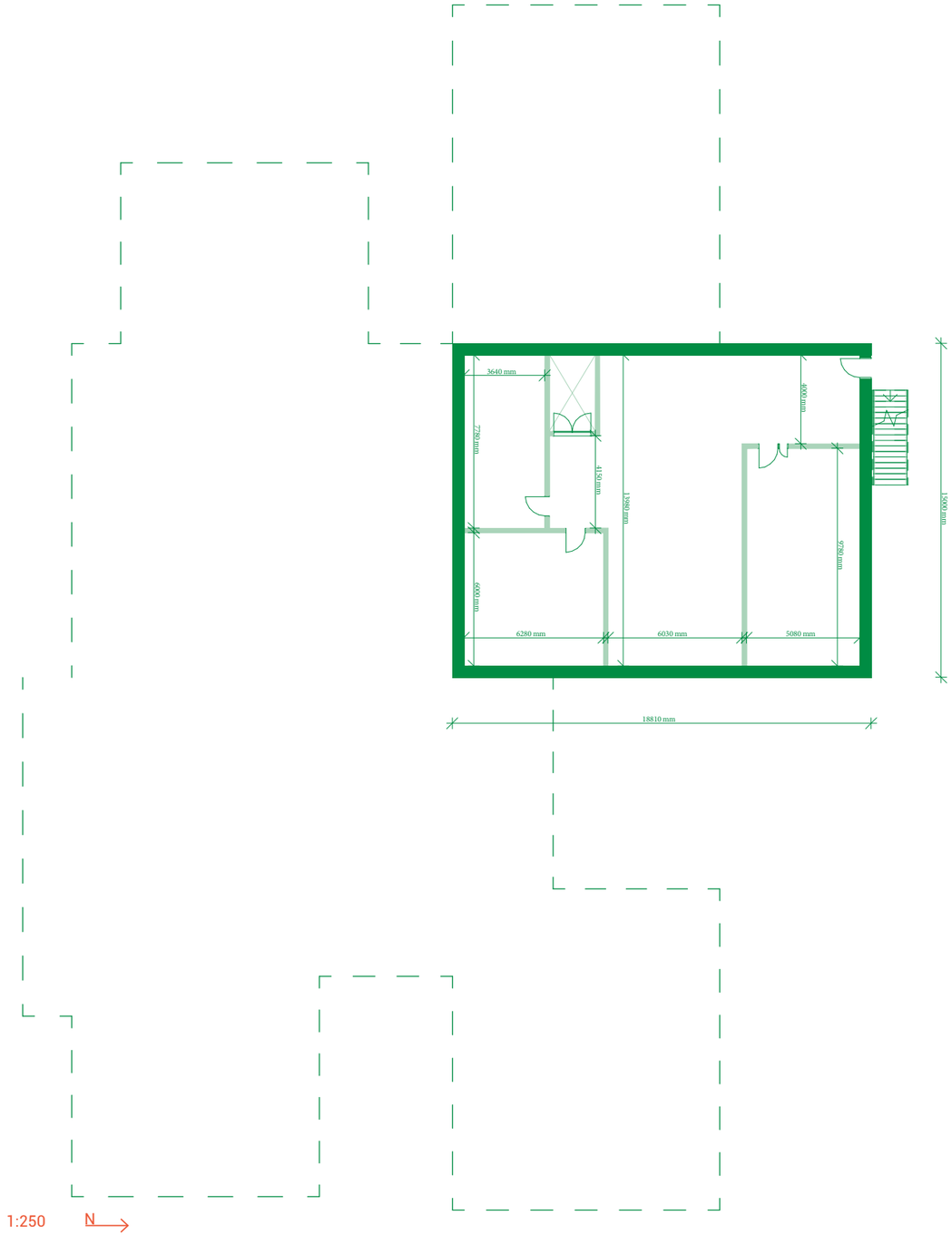
common areas

rooms	units	area [m²]
heart room	1	216
kitchen	1	67
sensing room	1	20
wellness room	1	29
chapel	1	8
talk room	1	13
activity room	1	22
disabled toilet	2	5
circulation therapy	1	56
circulation apartments	1	124
open office	1	53
entrance	1	20

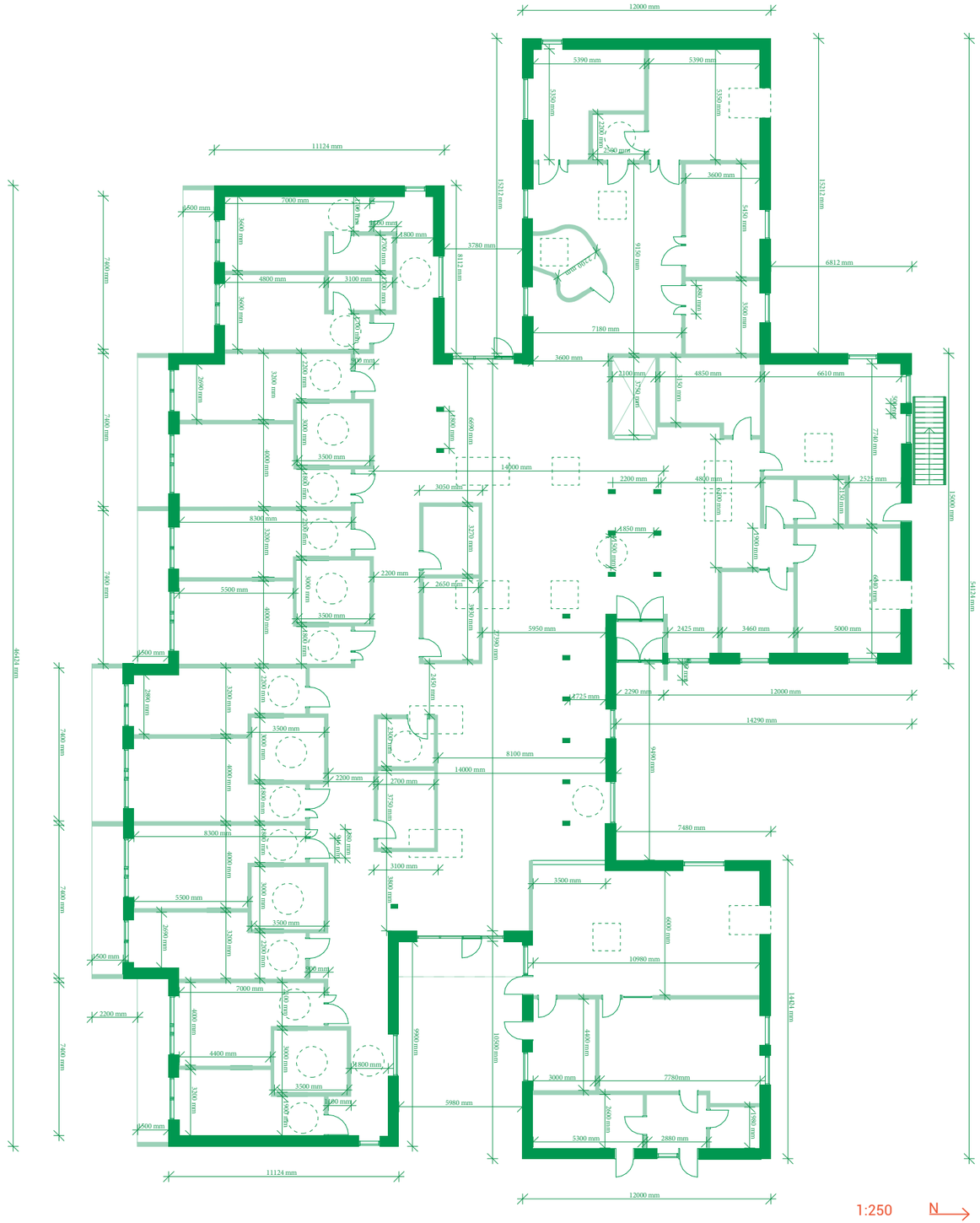
apartment rooms

rooms	units	area [m²]
family room	5	19 - 24
patient room	5	23 - 27
bathroom	5	11
guest room	2	21
guest bathroom	2	5

total		
	without basement	1206 m²
	with basement	1448 m²


3640 mm
4000 mm
7780 mm
4150 mm
13880 mm
15500 mm
9780 mm
6000 mm
6280 mm
6030 mm
5080 mm
18810 mm

1:250 N


12000 mm
5390 mm
5390 mm
5350 mm
5350 mm
2220 mm
2580 mm
11124 mm
15212 mm
3600 mm
5450 mm
7000 mm
600 mm
3600 mm
1190 mm
1200 mm
1800 mm
3780 mm
8812 mm
4800 mm
3100 mm
720 mm
3600 mm
1200 mm
6812 mm
7180 mm
3600 mm
3100 mm
4850 mm
6610 mm
3750 mm
3350 mm
7400 mm
2690 mm
3200 mm
2200 mm
720 mm
3000 mm
6990 mm
4800 mm
3500 mm
14000 mm
2200 mm
4800 mm
2525 mm
3050 mm
1200 mm
1400 mm
2150 mm
8300 mm
3300 mm
720 mm
3270 mm
4850 mm
1200 mm
1900 mm
2200 mm
3000 mm
2650 mm
1900 mm
5500 mm
3500 mm
4000 mm
720 mm
5950 mm
2290 mm
600 mm
2690 mm
3200 mm
2200 mm
4725 mm
2290 mm
12000 mm
14290 mm
3500 mm
3000 mm
2200 mm
4000 mm
1900 mm
8100 mm
14000 mm
2700 mm
3750 mm
9490 mm
7480 mm
8300 mm
1200 mm
1400 mm
3100 mm
3800 mm
5500 mm
3500 mm
3000 mm
3500 mm
2690 mm
3200 mm
2200 mm
600 mm
720 mm
10980 mm
7000 mm
1400 mm
2200 mm
4000 mm
4400 mm
3000 mm
1800 mm
9990 mm
5980 mm
3500 mm
1200 mm
3200 mm
2200 mm
600 mm
11124 mm
12000 mm
14454 mm
4490 mm
10900 mm
3000 mm
7780mm
2690 mm
5300 mm
2880 mm
1900 mm
15300 mm
46452 mm
34152 mm
38112 mm

1:250 N

13 LCA results - datasheet LCAbyg

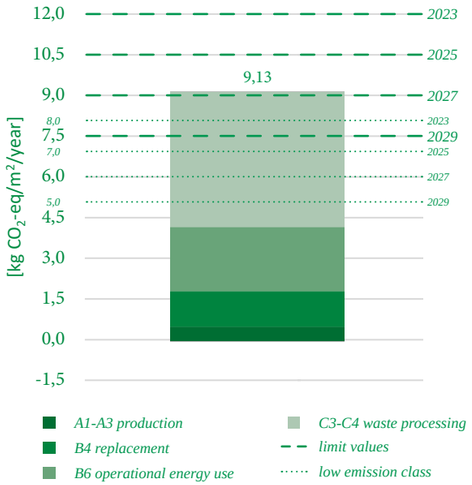
The data sheet summarise the data entered in LCAbyg, and shows the result of the building, in operation, and the building components. The building components are further shown with entered quantity, as well as the appurtenant materials are shown with the entered quantity and the declared unit. Furthermore, it is shown which materials that are having a replacement throughout the considered 50 years. Finally, the GWP sum are shown for each material, followed by the GWP of the stages A1-A3, B4, B6, C3, C4 and D.

components	entered quantity	materials	entered quantity	calculated quantity	replacement	GWP	GWP	GWP	GWP	GWP	GWP	GWP
						sum	A1-A3	B4	B6	C3	C4	D
						kg CO_2-eq.	kg CO_2-eq.	kg CO_2-eq.	kg CO_2-eq.	kg CO_2-eq.	kg CO_2-eq.	kg CO_2-eq.
Sum		Building				6,89E+00	-3,85E-01	1,57E-01	2,36E+00	4,57E+00	1,90E-01	-2,75E+00
		in operation				2,36E+00	0,00E+00	0,00E+00	2,36E+00	0,00E+00	0,00E+00	0,00E+00
		building components				4,53E+00	-3,85E-01	1,57E-01	0,00E+00	4,57E+00	1,90E-01	-2,75E+00
drain installations (default values)	1582,00 m²	drain installations (default values)[3]	1,00 m²/m²	1582,00 m²	0	2,60E-02	2,17E-03	0,00E+00	0,00E+00	2,38E-02	0,00E+00	-1,17E-02
floor	282,18 m²	construction wood, pine	0,05 m³/m²	14,11 m³	0	7,42E-03	-1,05E-01	0,00E+00	0,00E+00	1,13E-01	0,00E+00	-5,74E-02
		plywood	0,02 m³/m²	5,08 m³	0	8,02E-03	-3,34E-02	0,00E+00	0,00E+00	4,14E-02	0,00E+00	-2,18E-02
		mineral wool	0,10 m³/m²	26,81 m³	0	1,22E-02	1,18E-02	0,00E+00	0,00E+00	2,12E-04	1,17E-04	0,00E+00
line foundation	235,45 m	reinforcement	3,75 kg/m	882,93 kg	0	6,62E-03	6,61E-03	0,00E+00	0,00E+00	0,00E+00	6,60E-06	-3,80E-03
		EPS insulation	0,14 m³/m	33,90 m³	0	4,27E-02	2,00E-02	0,00E+00	0,00E+00	0,00E+00	2,27E-02	-1,19E-02
		factory concrete C20/25 SCC	0,15 m³/m	35,32 m³	0	8,79E-02	8,32E-02	0,00E+00	0,00E+00	2,69E-03	1,99E-03	-1,84E-03
		lime cement mortar	1,20 kg/m	0,16 m³	0	6,60E-04	6,14E-04	0,00E+00	0,00E+00	0,00E+00	4,65E-05	0,00E+00
		clinker block	0,18 m³/m	42,38 m³	0	9,14E-02	9,01E-02	0,00E+00	0,00E+00	7,43E-04	5,53E-04	-5,11E-04
		mortar, tile adhensive	0,01 kg/m	2,12 kg	0	8,44E-06	8,06E-06	0,00E+00	0,00E+00	0,00E+00	3,80E-07	-6,63E-08
point foundation	27,00 pc.	reinforcement	32,00 kg/pc.	864,00 kg	0	6,48E-03	6,47E-03	0,00E+00	0,00E+00	0,00E+00	6,46E-06	-3,72E-03
		factory concrete C35/45 SCC	0,40 m³/pc.	10,80 m³	0	3,69E-02	3,55E-02	0,00E+00	0,00E+00	7,74E-04	5,72E-04	-5,29E-04
separation interior walls	326,00 m²	construction wood, pine	0,19 m³/m²	61,94 m³	0	3,43E-02	-4,86E-01	0,00E+00	0,00E+00	5,20E-01	0,00E+00	-2,65E-01
		plywood	4,76 m³/m²	1551,76 m³	0	1,24E-02	-5,14E-02	0,00E+00	0,00E+00	6,37E-02	0,00E+00	-3,35E-02
		Secura gypsum board[1]	0,02 m³/m²	7,82 m³	0	3,31E-02	2,35E	0,00E+00	0,00E+00	8,90E-04	8,67E-03	-3,14E-03
		Sheepwool	0,20 m³/m²	65,20 m³	0	9,69E-04	3,13E-05	0,00E+00	0,00E+00	9,78E-04	9,37E-04	-1,32E-03
standart interior walls	907,00 m²	construction wood, pine	0,10 m³/m²	90,70 m³	0	4,77E-02	-6,76E-01	0,00E+00	0,00E+00	7,24E-01	0,00E+00	-3,69E-01
		plywood	0,02 m³/m²	21,77 m³	0	3,44E-02	-1,43E-01	0,00E+00	0,00E+00	1,77E-01	0,00E+00	-9,33E-02
		Secura gypsum board[1]	4,76 m²/m²	4317,32 m²	0	9,20E-02	6,54E-02	0,00E+00	0,00E+00	2,48E-03	2,41E-02	-8,72E-03
		Sheepwool	0,10 m³/m²	86,17 m³	0	1,35E-03	4,35E-05	0,00E+00	0,00E+00	1,36E-06	1,30E-03	-1,83E-03
freestanding columns	156,00 m	construction wood, pine	0,06 m³/m	9,98 m³	0	5,25E-03	-7,44E-02	0,00E+00	0,00E+00	7,97E-02	0,00E+00	-4,06E-02
ceiling	194,00 m²	clay plaster	0,00 m³/m²	0,58 m³	0	6,12E-04	5,94E-04	0,00E+00	0,00E+00	1,79E-05	0,00E+00	-2,48E-05
overhang lamellas	5,00 m²	pine wood	0,01 m³/m²	0,03 m³	0	8,32E-05	-3,93E-04	0,00E+00	0,00E+00	4,77E-04	0,00E+00	-1,26E-04
roof construction	1584,84 m²	Gram, PE vapour barrier[2]	1,00 m³/m²	1584,84 m³	0	1,59E-02	6,93E-03	0,00E+00	0,00E+00	8,94E-03	0,00E+00	-5,20E-04
		construction wood, pine	0,05 m³/m²	85,42 m³	0	4,50E-02	-6,37E-01	0,00E+00	0,00E+00	6,82E-01	0,00E+00	-3,47E-01
		pine wood	0,02 m³/m²	34,23 m³	0	5,40E-02	-2,25E-01	0,00E+00	0,00E+00	2,79E-01	0,00E+00	-1,47E-01
		Sature, pine[3]	0,03 m³/m²	41,21 m³	0	5,20E-02	-3,40E-01	0,00E+00	0,00E+00	3,92E-01	0,00E+00	-1,97E-01
		Secura gypsum board[1]	2,38 m³/m²	3771,91 m³	0	8,04E-02	5,72E-02	0,00E+00	0,00E+00	2,16E-03	2,11E-02	-7,62E-03
		Sheepwool	0,36 m³/m²	568,88 m³	0	8,90E-03	2,88E-04	0,00E+00	0,00E+00	8,98E-06	8,61E-03	-1,21E-02
		bitumen under membrane	1,00 m³/m²	1584,84 m²	1	9,98E-02	4,30E-02	4,99E-02	0,00E+00	0,00E+00	6,89E-03	0,00E+00
wooden floor	1026,00 m²	screed, cement based	96,00 kg/m²	98496,00 kg	0	2,14E-01	1,98E-01	0,00E+00	0,00E+00	0,00E+00	1,62E-02	0,00E+00
		EPS insulation	0,00 m³/m²	3,08 m³	0	3,87E-03	1,82E-03	0,00E+00	0,00E+00	0,00E+00	2,06E-03	-1,08E-03
		wooden floor	0,91 m³/m²	932,63 m³	0	8,75E-02	-1,54E-01	0,00E+00	0,00E+00	2,41E-01	0,00E+00	-6,51E-02
terrazzo floor	141,00 m²	terazzo floor	1,00 m³/m²	141,00 m³	0	1,45E-02	1,43E-02	0,00E+00	0,00E+00	4,30E-05	1,06E-04	-8,33E-05
slab	1823,00 m²	reinforcement	4,03 kg/m²	7353,98 kg	0	5,52E-02	5,51E-02	0,00E+00	0,00E+00	0,00E+00	5,50E-05	-3,17E-02
		PE vapour barrier	1,00 m³/m²	1823,00 m³	0	1,91E-02	7,98E-03	0,00E+00	0,00E+00	1,11E-02	0,00E+00	-5,49E-03
		EPS insulation	4,00 m³/m²	7292,00 m³	0	7,29E-01	3,30E-01	0,00E+00	0,00E+00	3,99E-01	0,00E+00	-1,67E-01
		factory concrete C20/25 SCC	0,10 m³/m²	182,30 m³	0	4,54E-01	4,30E-01	0,00E+00	0,00E+00	1,39E-02	1,03E-02	-9,47E-03
		gravel, dryed	277,50 kg/m²	505882,50 kg	0	2,25E-01	1,84E-01	0,00E+00	0,00E+00	4,07E-02	0,00E+00	-1,14E-02
basement stair	1,00 pc.	concrete stair	1,90 pc./pc.	1,90 pc.	0	6,81E-03	6,52E-03	0,00E+00	0,00E+00	2,90E-04	0,00E+00	-8,13E-05
water installation (default values)	1682,00 m²	water installation (default values)[3]	1,00 m²/m²	1682,00 m²	0	7,38E-02	5,90E-02	0,00E+00	0,00E+00	1,48E-02	0,00E+00	-3,09E-02
heating, ventilation and cooling installation (default values)	1682,00 m²	heating, ventilation and cooling installation (default values)[3]	1,00 m²/m²	1682,00 m²	0	1,01E+00	8,64E-01	0,00E+00	0,00E+00	1,41E-01	0,00E+00	-4,22E-01
front door	6,30 m²	Front door, alu	1,00 m²/m²	6,30 m²	0	1,20E-02	1,13E-02	0,00E+00	0,00E+00	7,27E-04	8,08E-06	-6,39E-03
indoor doors	58,00 pc.	emulsions paint	0,36 kg/pc.	20,74 kg	0	5,99E-04	5,96E-04	0,00E+00	0,00E+00	0,00E+00	3,41E-06	-2,46E-06
		chipboard	33,00 kg/pc.	2,73 m³	0	1,18E-02	-2,62E-02	0,00E+00	0,00E+00	3,80E-02	0,00E+00	-8,80E-05
		pine wood	10,00 kg/pc.	1,06 m³	0	2,34E-03	-9,07E-03	0,00E+00	0,00E+00	1,14E-02	0,00E+00	-3,02E-03
indoor glass door	2,00 pc.	emulsions paint	0,14 kg/pc.	0,29 kg	1	1,67E-05	8,29E-06	8,34E-06	0,00E+00	0,00E+00	4,75E-08	-6,85E-08
		glass, 3-layer	1,11 m²/pc.	2,22 m²	1	2,98E-03	1,41E-03	1,49E-03	0,00E+00	7,39E-05	1,20E-05	-6,84E-05
		chipboard	11,16 kg/pc.	0,03 m³	1	2,76E-04	-3,05E-04	1,38E-04	0,00E+00	4,43E-04	0,00E+00	-2,05E-06
		pine wood	10,00 kg/pc.	0,04 m³	1	1,61E-04	-3,13E-04	8,07E-05	0,00E+00	3,94E-04	0,00E+00	-2,08E-04
window and glass door	195,442 m²	EPDM-sealing for aluminium profile	11,55 m/m²	0 m	0	2,11E-02	7,16E-03	0,00E+00	0,00E+00	6,99E-03	6,99E-03	-7,55E-03
		glass, 3-layer	1,6 m²/m²	0 m³	1	2,10E-01	9,90E-02	1,05E-01	0,00E+00	5,20E-03	8,42E-04	-4,82E-03
		window mounting, aluminium	1,04 kg/m²	0 pc.	0	9,60E-03	9,60E-03	0,00E+00	0,00E+00	0,00E+00	7,60E-07	-2,97E-03
		window sill, aluminium	1,656 m/m²	0 m	0	2,92E-02	2,80E-02	0,00E+00	0,00E+00	1,23E-03	0,00E+00	-1,69E-02
		window sill, wood	5,74 m/m²	0 m	0	2,26E-02	-2,27E-03	0,00E+00	0,00E+00	2,48E-02	0,00E+00	-9,98E-03
		window frame, aluminium	1,722 m/m²	0 m	0	3,25E-02	3,15E-02	0,00E+00	0,00E+00	1,08E-03	0,00E+00	-1,92E-02
		window frame, wood	5,52 m/m²	0 m	0	2,30E-02	-8,71E-04	0,00E+00	0,00E+00	2,39E-02	0,00E+00	-9,53E-03
basement wall	194,66 m²	reinforcement	12,00 kg/m²	2335,92 kg	0	1,75E-02	1,75E-02	0,00E+00	0,00E+00	0,00E+00	1,75E-05	-1,01E-02
		EPS insulation	0,30 m³/m²	58,40 m³	0	7,17E-02	3,36E-02	0,00E+00	0,00E+00	0,00E+00	3,81E-02	-2,00E-02
		factory concrete C30/37	0,20 m³/m²	38,93 m³	0	1,25E-01	1,20E-01	0,00E+00	0,00E+00	2,87E-03	2,12E-03	-1,96E-03
exterior wall	598,80 m²	Clima Board, gypsum[4]	1,46 m³/m²	874,24 m³	0	2,07E-02	1,55E-02	0,00E+00	0,00E+00	3,13E-04	4,89E-03	-1,74E-03
		Gram, PE vapour barrier[2]	1,00 m³/m²	598,80 m³	0	6,00E-03	2,62E-03	0,00E+00	0,00E+00	3,38E-03	0,00E+00	-1,96E-04
		construction wood, pine	0,06 m³/m²	34,16 m³	0	1,80E-02	-2,55E-01	0,00E+00	0,00E+00	2,73E-01	0,00E+00	-1,39E-01
		plywood	0,01 m³/m²	6,47 m³	0	1,02E-02	-4,25E-02	0,00E+00	0,00E+00	5,27E-02	0,00E+00	-2,77E-02
		Sature, pine[3]	0,03 m³/m²	15,57 m³	0	1,96E-02	-1,28E-01	0,00E+00	0,00E+00	1,48E-01	0,00E+00	-7,46E-02
		Secura gypsum board[1]	2,38 m³/m²	1425,13 m³	0	3,04E-02	2,16E-02	0,00E+00	0,00E+00	8,17E-04	7,97E-03	-2,88E-03
		Sheepwool	0,36 m³/m²	1640,07 m³	0	3,36E-03	1,09E-04	0,00E+00	0,00E+00	3,39E-06	3,25E-03	4,57E-03

1: Knauf A/S n.d., Secura board, knauf.dk, viewed 19 April 2023, https://www.knauf.dk/produkter/lette-byggesystemer/byggeplader/indvendige-byggeplader/secura-board/
2: Bewi 2023., Gram Vapour Barrier / sugarcane, bewi.com, viewed 27 April2023 https://bewi.com/products/gram-vapor-barrier-sucarcane/
3: Frøslev Træ A/S n.d., Sature - naturens gave til byggeriet, froeslev.dk, viewed 26 April 2023, https://froeslev.dk/da/vores-trae/Froeslev-Sature/
4: Knauf A/S n.d., Clima board, knauf.dk, viewed 26 April 2023, https://www.knauf.dk/produkter/lette-byggesystemer/byggeplader/udvendige-byggeplader/clima-board/
5: bygningsreglementet 2023, Bilag 2: tabeller til kapitel 11 – Energiforbrug, tabel 7 – generisk datagrundlag, viewed 24 April 2023, https://bygningsreglementet.dk/Bilag/B2/Bilag_2/Tabel_7#787e83a6-b7d9-4a83-a4be-37574156daef

14 LCA result - green roof

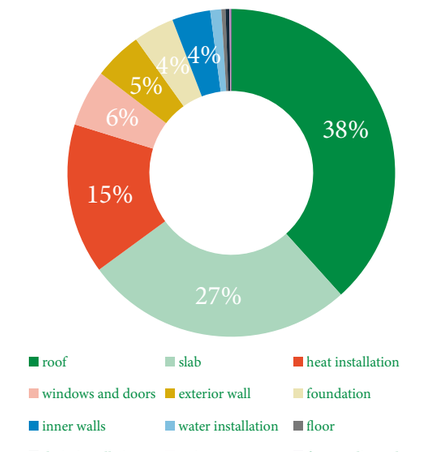
life cycle stages	gwp
A1-A3 production	0,52
B4 replacement	1,30
B6 operational energy use	2,36
C3-C4 waste processing and disposal	4,95
D recycle potential	-2,79
total	9,13 kg CO_2-eq/m²/year



green roof construction

By comparing the same final building with green roof, instead of spruce boards, the environmental impact increased with 32%. It goes from 6,89 to 9,13 kg CO_2-eq/m²/year. With this number it is not possible to reach the goal of the voluntary low emission classification for 2023, only the limit value for 2023 and 2025.

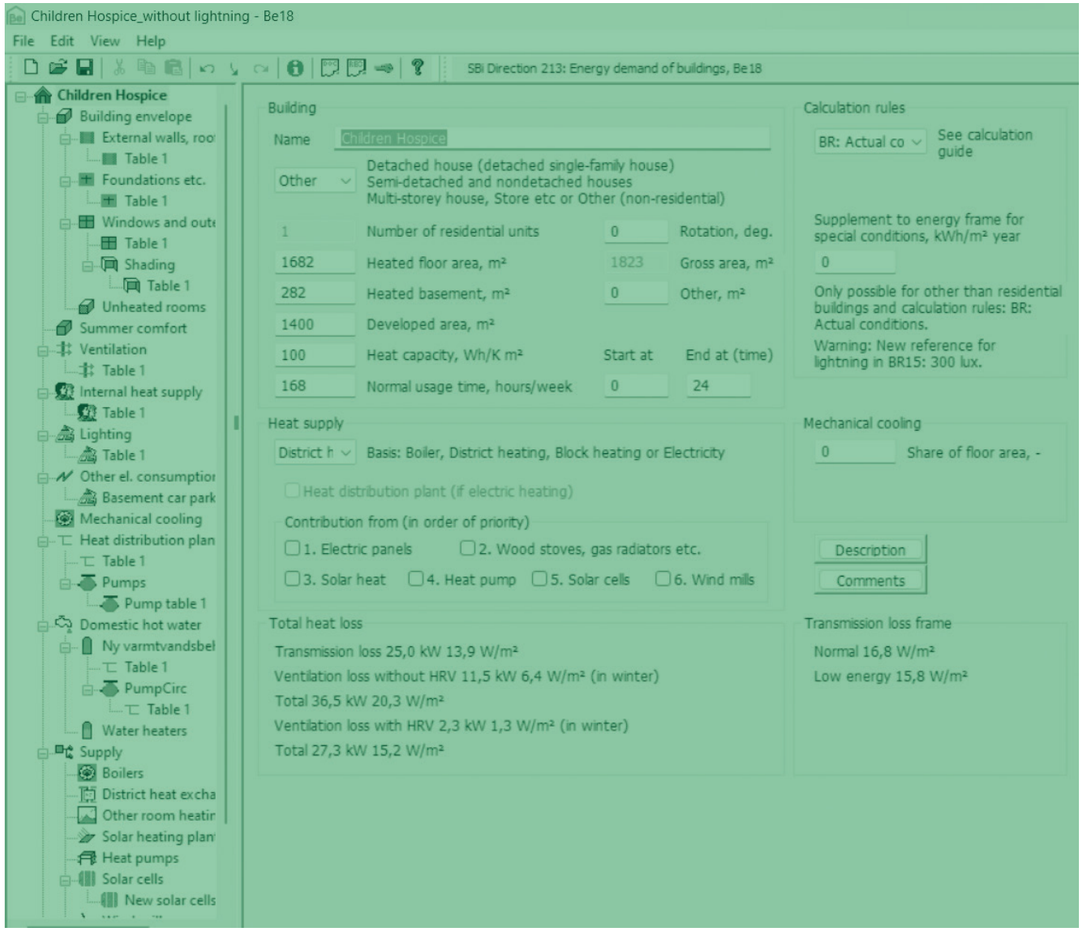
By analysing the components of the result, the slab is not the highest influencing anymore, it is the green roof at 38% of the overall result, which makes the slab at 27% .



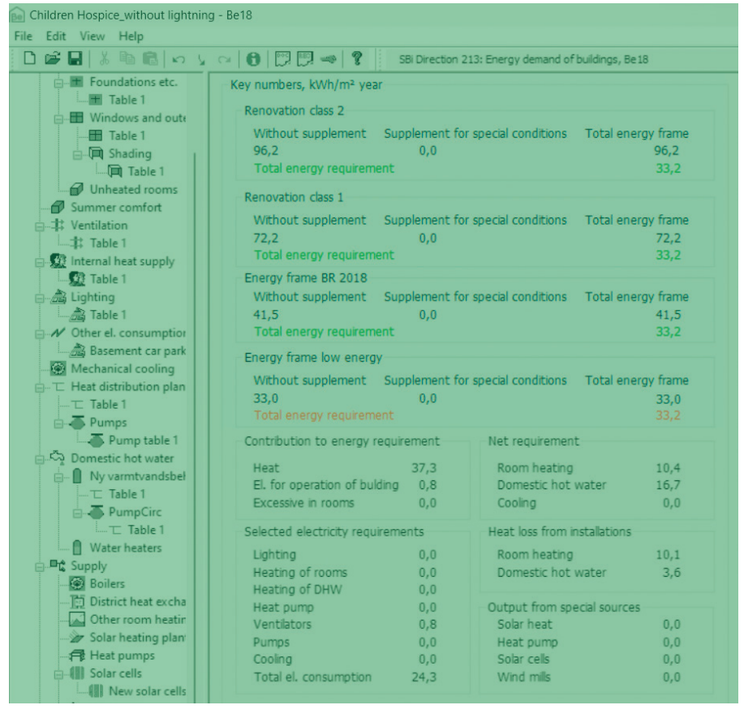
15 energy requirement

The energy requirement of the children's hospice has been documentated in Be18 for reaching the energy frame of BR2018.
The building typology is defined as "other", as the hospice has other functions available, than a regular house. The staff facilities, offices, industrial kitchen counts as non-residential facilities, why the building is defined as "other", while some parametres are chosen in relation to a house typology, as the hospice also functions as a home for the families.

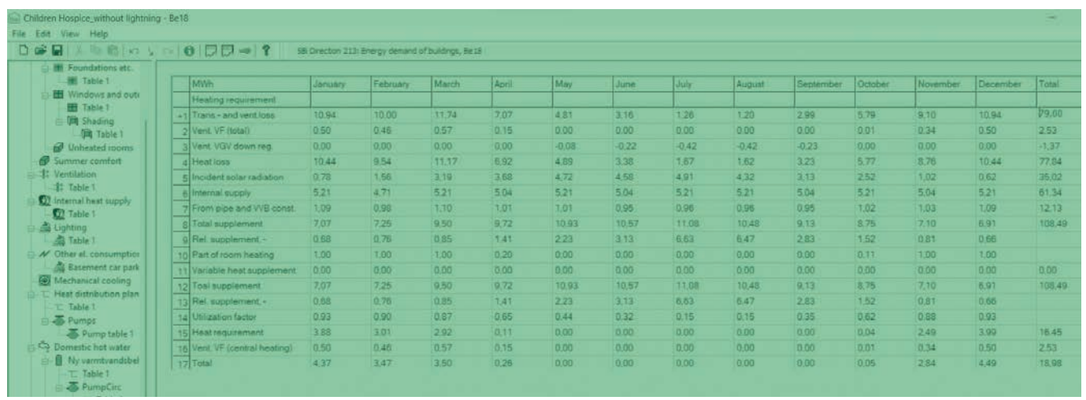
The regulation for buildings that is not a house has a energy requirement at 41,5 kWh/m² per year.
The children's hospice has reached 33,2 kWh/m² per year, without contributions.
For new buildings the renovation classes are uninteresting.



key numbers

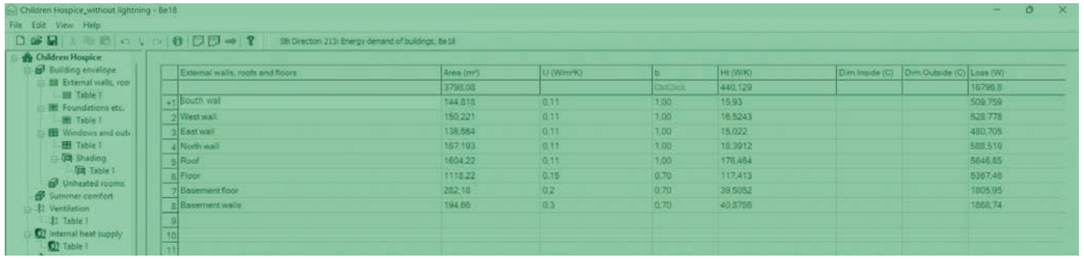


heating requirement



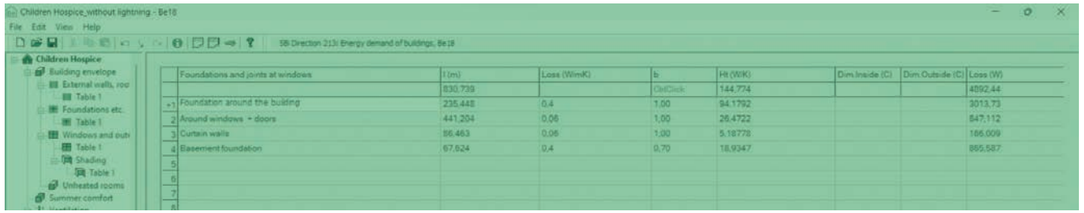
BE18 input

building envelope



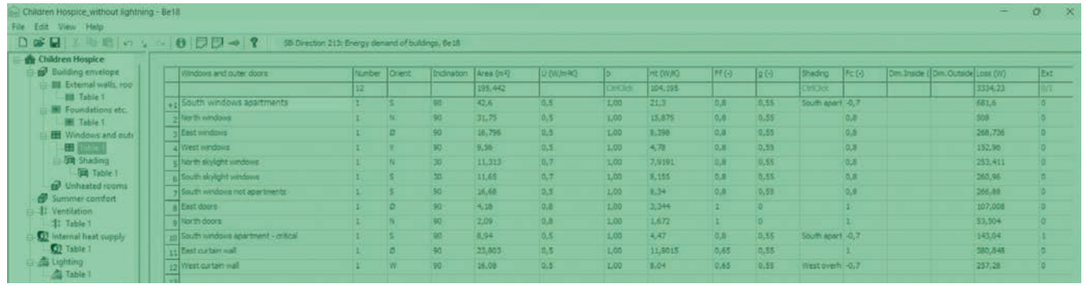
	External walls, roofs and floors	Area (m²)	U (W/m²K)	b	Ht (W/K)	Dim.Inside (C)	Dim.Outside (C)	Loss (W)
		3796,08		DblClick	440,129			18796,8
+1	South wall	144,818	0,11	1,00	15,93			509,759
2	West wall	150,221	0,11	1,00	16,5243			528,778
3	East wall	138,564	0,11	1,00	15,022			480,705
4	North wall	167,193	0,11	1,00	18,3912			588,519
5	Roof	1604,22	0,11	1,00	176,464			5646,85
6	Floor	1118,22	0,15	0,70	117,413			5367,46
7	Basement floor	282,18	0,2	0,70	39,5052			1805,95
8	Basement walls	194,66	0,3	0,70	40,8786			1868,74
9								
10								
11								

foundation etc.



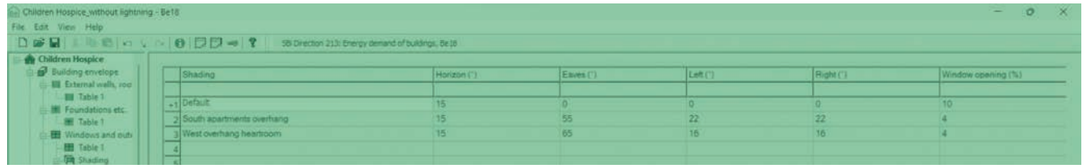
	Foundations and joints at windows	l (m)	Loss (W/mK)	b	Ht (W/K)	Dim.Inside (C)	Dim.Outside (C)	Loss (W)
		830,739		DblClick	144,774			4092,44
+1	Foundation around the building	235,448	0,4	1,00	94,1792			3013,73
2	Around windows + doors	441,204	0,06	1,00	26,4722			847,112
3	Curtain walls	86,463	0,06	1,00	5,18778			166,009
4	Basement foundation	67,624	0,4	0,70	18,9347			865,587
5								
6								
7								
8								

windows / doors



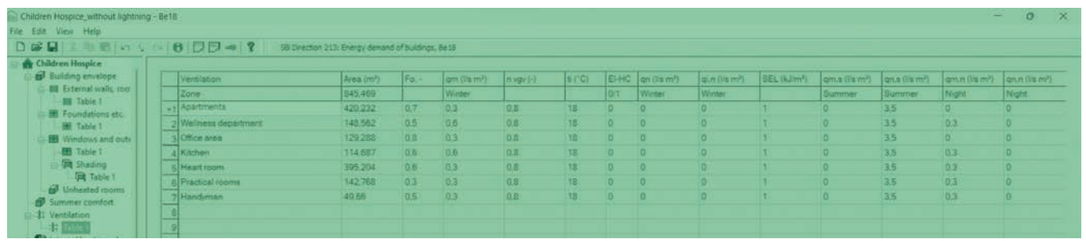
	Windows and outer doors	Number	Orient.	Inclination	Area (m²)	U (W/m²K)	b	Ht (W/K)	Pf (-)	g (-)	Shading	Fc (-)	Dim.Inside (C)	Dim.Outside (C)	Loss (W)	Ext
		12			193,442		DblClick	104,195			DblClick				3334,23	0/1
+1	South windows apartments	1	S	90	42,6	0,5	1,00	21,3	0,8	0,55	South apart	-0,7			681,6	0
2	North windows	1	N	90	31,75	0,5	1,00	15,875	0,8	0,55		0,8			508	0
3	East windows	1	O	90	16,796	0,5	1,00	8,398	0,8	0,55		0,8			268,736	0
4	West windows	1	W	90	9,56	0,5	1,00	4,78	0,8	0,55		0,8			152,96	0
5	North skylight windows	1	N	30	11,313	0,7	1,00	7,9191	0,8	0,55		0,8			253,411	0
6	South skylight windows	1	S	30	11,65	0,7	1,00	8,155	0,8	0,55		0,8			260,96	0
7	South windows not apartments	1	S	90	16,68	0,5	1,00	8,34	0,8	0,55		0,8			266,88	0
8	East doors	1	O	90	4,18	0,8	1,00	3,344	1	0		1			107,008	0
9	North doors	1	N	90	2,09	0,8	1,00	1,672	1	0		1			53,504	0
10	South windows apartment - critical	1	S	90	8,94	0,5	1,00	4,47	0,8	0,55	South apart	-0,7			143,04	1
11	East curtain wall	1	O	90	23,903	0,5	1,00	11,9015	0,65	0,55		1			380,848	0
12	West curtain wall	1	W	90	16,08	0,5	1,00	8,04	0,65	0,55	West overh	-0,7			257,28	0

shadows



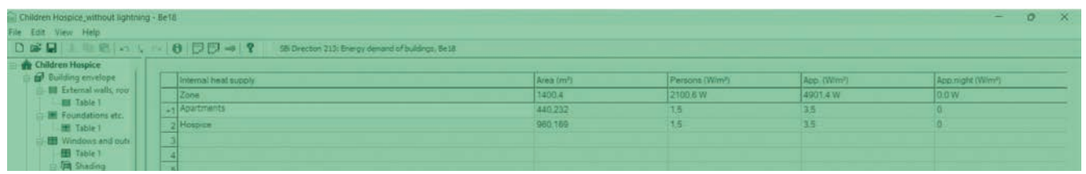
	Shading	Horizon (°)	Esaves (°)	Left (°)	Right (°)	Window opening (%)
+1	Default	15	0	0	0	10
2	South apartments overhang	15	55	22	22	4
3	West overhang heartroom	15	65	16	16	4
4						

ventilation



	Ventilation	Area (m²)	Fo. -	qm (l/s m²)	n vgv (-)	ti (°C)	EI-HC	qn (l/s m²)	qi,n (l/s m²)	SEL (kJ/m³)	qm,s (l/s m²)	qn,s (l/s m²)	qm,n (l/s m²)	qn,n (l/s m²)
	Zone	845,469		Winter			0/1	Winter	Winter		Summer	Summer	Night	Night
+1	Apartments	420,232	0,7	0,3	0,8	18	0	0	0	1	0	3,5	0	0
2	Wellness department	148,562	0,5	0,6	0,8	18	0	0	0	1	0	3,5	0,3	0
3	Office area	129,285	0,8	0,3	0,8	18	0	0	0	1	0	3,5	0	0
4	Kitchen	114,687	0,6	0,6	0,8	18	0	0	0	1	0	3,5	0,3	0
5	Heart room	395,204	0,6	0,3	0,8	18	0	0	0	1	0	3,5	0,3	0
6	Practical rooms	142,768	0,3	0,3	0,8	18	0	0	0	1	0	3,5	0,3	0
7	Handyman	40,66	0,5	0,3	0,8	18	0	0	0	1	0	3,5	0,3	0
8														
9														

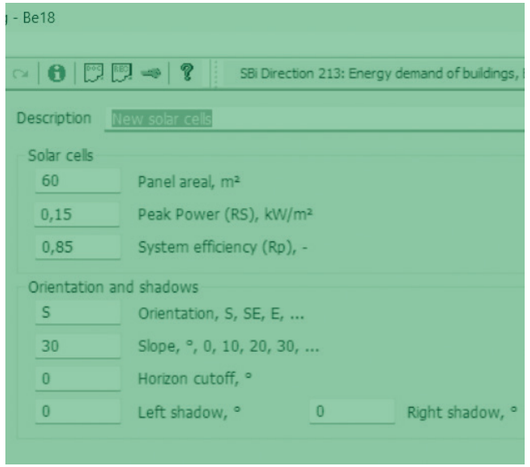
internal loads

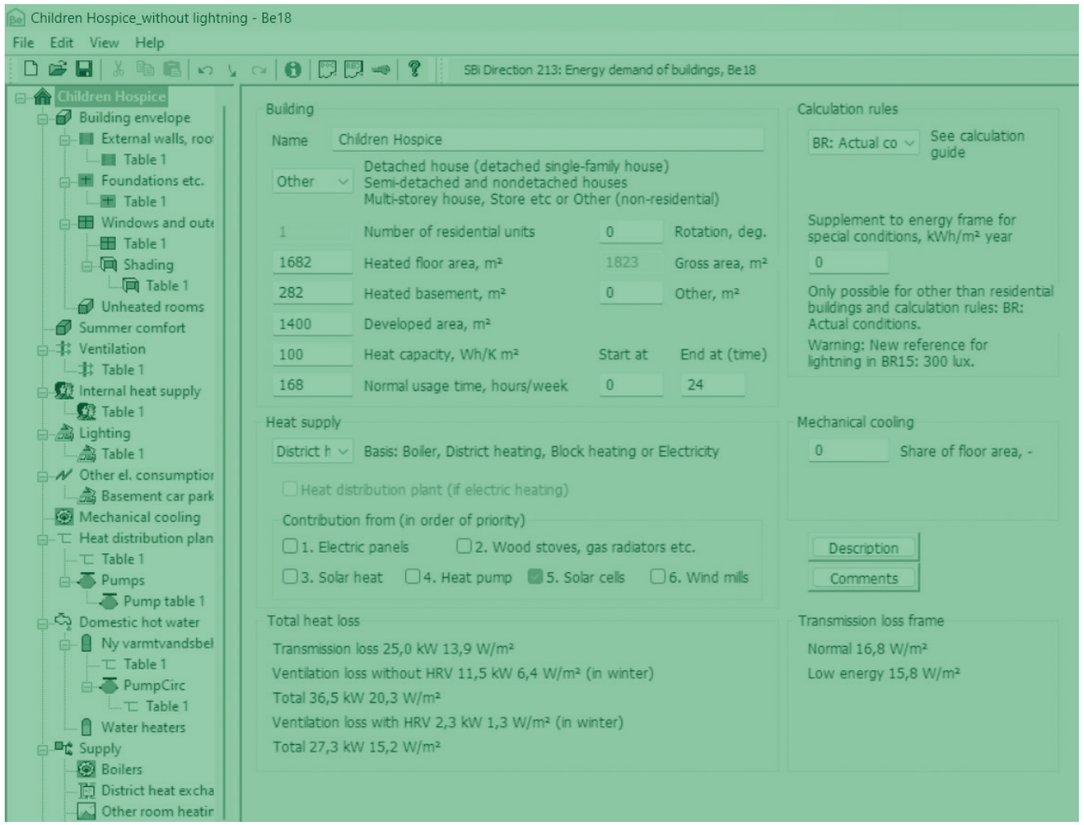


	Internal heat supply	Area (m²)	Persons (W/m²)	App. (W/m²)	App.night (W/m²)
	Zone	1400,4	2100,6 W	4901,4 W	0,0 W
+1	Apartments	440,232	1,5	3,5	0
2	Hospice	960,168	1,5	3,5	0
3					
4					
5					

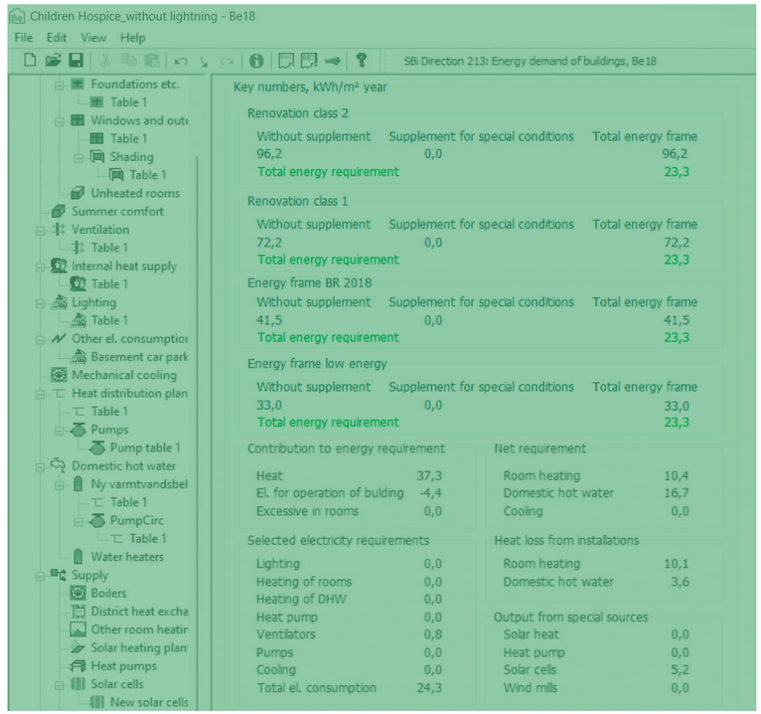
16 energy requirement - with solar cells

The energy requirement of the children's hospice has been documentated in Be18 for reaching the energy frame of low energy by using contributions from solar cells.
The same parametres have been used from appendix x, the changes is the contribution from solar cells.
Solar cells at 60 m² have been added to the energy requirements, which meets the low energy demand at 33,0 kWh/m² per year and the voluntary Building class 2020 at 25,0 kWh/m² per year.
The children's hospice has reached 23,3 kWh/m² per year, with 60 m² solar cells.
Solar cells at 50 m² would also meet the demands, as the energy requirement is at 24,9 kWh/m² per year.





key numbers



heating requirement