LIVING WITH THE SURROUNDING CONDITIONS

Towards a more sustainable way of dwelling in an urban context

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ABSTRACT

Historically, inhabitants have always altered their domestic spaces to adapt to different environmental conditions and to meet personal needs. Especially in rural dwellings, lowtech but very effective and simple ways of adaptations have been and are still in use. These methods stand more than ever diametral to the way we dwell and use our domestic spaces today. All the building elements are getting more complex and need to fulfil several different functions, without any conscious (human) action. The climate is automatically regulated by air conditioning systems, automatic heating and highly efficient windows that provide a view separated from other external climate aspects and weather phenomenas. With the complexity come also more costs, both monetary and environmentally. In the course of the war in Ukraine and the energy crisis in Europe, a vivid discussion about heating and temperature in buildings has taken place.

This thesis project investigates how domestic space can be built and used in correlation to the environment. Through theoretical explorations of climate and comfort aspects as well as a comparison of key references from architectural history, the topic of living with the surrounding conditions is approached from different perspectives. Informed by the research, a new typology of dwelling is established, with different climate zones that directly relate to weather, activity, comfort and user demands. While the principal focus lies on a seasonal living, the flexibility of the created system allows a reconfiguration of space over a lifetime. To implement and test the typology in a physical environment, a case study in Malmö is performed. The project is situated in Norra Sorgenfri in Malmö, one of the latest development areas creating new living quarters on a former industrial site.

Key words: adaptive housing, performative dwelling, lowtech, typology, climate conditions, urban housing

CONTENT

sverigesradio Start Nyheter Poddar & program Direkt Min sida Mer

Amory Lovins, ledande expert på energieffektivisering Foto: Michael Sohn/AP/TT, Marie-Louise Kristola/Sveriges Radio

ENERGIEXPERT

Experten: Svalare hem kan göra Europa oberoende av rysk gas

2:05 min Min sida Dela

Publicerat tisdag 7 juni 2022 kl 21.18

- Att sänka temperaturen med en grad inomhus kan spara 10 miljarder kubikmeter gas per år i Europa, motsvarande drygt 6 procent av den årliga importen från Ryssland, enligt en av världens ledande experter på energieffektivisering, Amory Lovins.
- Såväl beteendeförändringar som olika sätt att effektivisera energianvändningen skulle kunna snabba på Europas arbete att göra sig oberoende av rysk energi.
- Bättre isolering av bostäder, effektivare fordon och smartare design av vanliga komponenter inom industrin. tex hur vanliga rör är designade, skulle kunna göra stor skillnad för att minska världens energianvändning.

Marie-Louise Kristola
marie-louise.kristola@sverigesradio.se

SRF News Sport Meteo Kultur Dok Wissen

03:12

Heizlimite in Wohnungen
Aus 10 vor 10 vom 08.08.2022.

News > Schweiz >

Energiesparen beim Heizen

Runter mit den Raumtemperaturen: Das müssen Sie beachten

Claudia Blangetti
Aktualisiert am Mittwoch, 10.08.2022, 08:22 Uhr

Dieser Artikel wurde 19-mal geteilt.

Was fordern die Politiker? Zwei Drittel des Energiebedarfs in Schweizer Haushalten werden fürs Heizen eingesetzt. Angesichts eines möglichen Engpasses bei Gas und elektrischer Energie ist Sparen angesagt. So fordert der Schwyzer Mitte-Ständerat Othmar Reichmuth in einer Motion unter anderem, dass der Bund Sparmassnahmen wie Heizungskontrollen und das tiefere Einstellen von Thermostaten prüfen soll. Noch weiter geht die SP Schweiz: Sie sieht es als «für den Menschen schmerzlose Massnahme», die Heiztemperatur auf 20 Grad zu deckeln.

1. INTRODUCTION

Our time is characterised by extremes: material shortage, rising energy costs, drastic climate change and the building sector as a main source of CO^2 emission.[1] Housing as a main part of the building industry and an absolute necessity, and is therefore a big part of a sector in need of change. For decades the building costs and with it the profit of the few building companies in Sweden have risen. In parallel, the produced housing has become uniform due to a big standardisation of the process and extensive and detailed regulation. On top of that comes since a few years ago a new 'demand', sustainability. However, it is often more a political and marketing label than questioning the fundamental problem - the way we build and dwell. We as architects therefore need to take responsibility and rethink how we plan and construct buildings today. Even more, the way we think about buildings and the way we inhabit them - we need to find new ways to dwell more sustainably, always with the human perspective in the centre.

1
United Nations Environment Programme (2022) '2022 Global Status Report for Buildings and Construction: Towards a Zero-emission, Efficient and Resilient Buildings and Construction Sector.' Nairobi.

BACKGROUND

Historically, inhabitants have always altered their domestic spaces to adapt to different environmental conditions and to meet personal needs. Especially in rural dwellings, lowtech but very effective and simple ways of adaptations have been and are still in use. Big tiled hearths as the centre of a house, different flaps and shutters to close off the cold air from outside and to redirect the warm air from the fire to the desired spaces. These methods stand more than ever diametral to the way we dwell and use our domestic spaces today. All the building elements are getting more complex and need to fulfil several different functions together, without any conscious (human) action. The climate is automatically regulated by air conditioning systems, automatic heating and highly efficient windows that provide a view separated from other external climate aspects and weather phenomenas. With the complexity come also more costs, both monetary and environmentally.

The sustainability factor of the topic became very much present last year - with the energy crisis and gas shortage, a vivid discussion about heating and temperature in buildings has taken place. Even more so in countries that have a substantial amount of gas heating, the reduction of temperature as a way of saving energy was omnipresent. In these uncertain times, an alternative way to dwell within different temperature zones and more in relation with the environmental context can be a way to rethink our domestic spaces and provide a starting point for a discussion around how we could dwell again in closer connection to the environment.

Left:
Article by Sveriges Radio: Minimising the dependence on russian gas by reducing the room temperature.
Screenshot by the author, © Sveriges Radio, 2022

Right:
Article by Switzerland's radio and television station: Political discussion on a max. room temperature of 20°C to reduce the gas demand.
Screenshot by the author, © SRF, 2022

PURPOSE & AIM

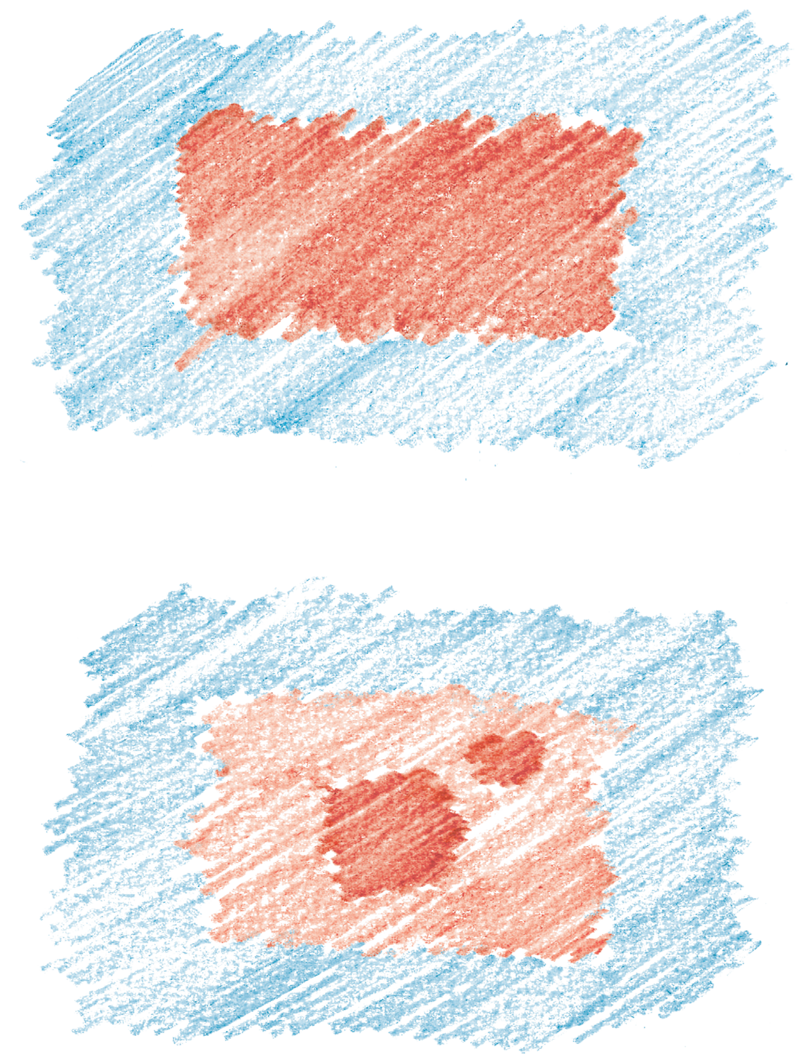
This thesis project aims to investigate how domestic space can be built and used in correlation to the environment. A type of dwelling in harmony with the environment and not against it, living with the seasons and weather rather than in an isolated box, hermetically separated from the context.
The dwellings are envisioned as different climate zones which directly relate to climate, activities, comfort and allow a modification by the inhabitant.

On a larger scale, the project aims to develop a simple structure of a house that allows for change and therefore creating a more sustainable and long term way of constructing. There will not be one solution that fits all but the goal is to start a discussion and another way of thinking about housing in today's context.

APPROACH

The theoretical part of the thesis will analyse three main topics that are relevant for the aim of the project. The two more technical inputs such as firstly the climate conditions of the site and how a building reacts to it and secondly the inhabitant as a major part of the dwelling and what conditions arise for comfort and room conditions from that. Lastly, these topics will be complemented by a historically spatial investigation of how the interaction between inhabitants and their domestic spaces in relation to the environment has developed, with a special focus on the European and Swedish context.

Anchored within the research, a practical case study in the urban context of Malmö is proposed. The case study serves as a testbed for the implementation of a developed typology of seasonal living. Through placing it in a real context, new insights are expected to shape the concept as well as providing an example of how this idea could be applied.



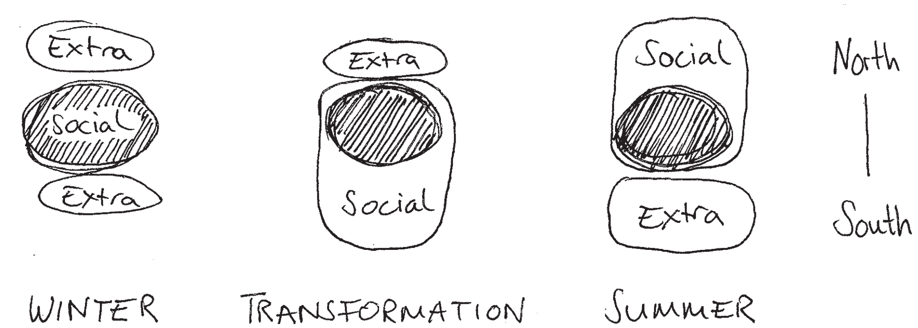
Sketch comparison of a contemporary building (top) with a sharp border between the indoor and outdoor climate versus the basis of this thesis (bottom): A house with different climate zones nested into each other, creating transitions rather than borders.

2. CLIMATE AND THE BUILT ENVIRONMENT

"This functional-biological conception of building as a composition of life processes leads logically to the pure construction."

Everything in life is cyclical. The moon waxes and wanes, the tides ebb and flow, day and night alternate and the seasons change. In pre-modern times, humans lived in complete harmony and dependence with these cycles. Life, work and habits were strongly connected to daylight, the seasons and their rhythms. With technological progress we became more and more independent of these natural factors. Today, we can create comfortable climates almost everywhere on earth, detached from the seasons. In contrast to this, the way we move and act outside our home is still strongly influenced by the seasons. We dress differently, do different activities and even our mood is affected. When we are outdoors, we adjust ourselves to the conditions - why should we stop in front of our doorsteps with that interplay? I see domestic space as a continuation of the outdoors. By living in relation to the seasons and the weather, we become part of the building, an ever changing organism. As Hannes Meyer already in 1928 wrote: "This functional-biological conception of building as a composition of life processes leads logically to the pure construction."[2] A seasonal use of rooms in a dwelling could embrace those cycles and create a deeper understanding without compromising on comfort.

2
Meyer H. (10/1928)
'Bauen', Bauhaus 2 - Zeitschrift für Gestaltung (Vol 4, 1928): pp. 12-13

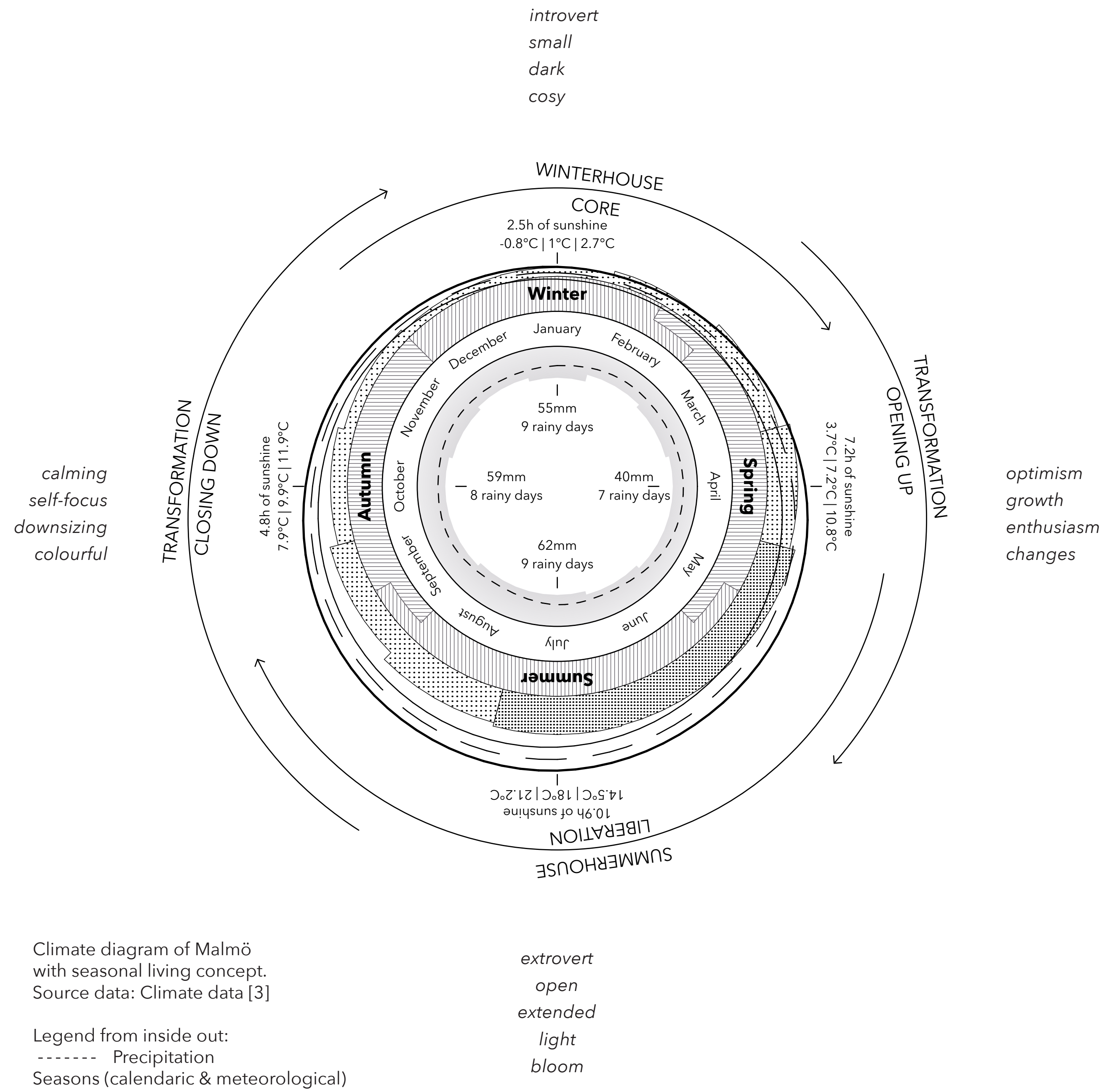


Sketch of different spatial organisations within a dwelling based on the season. A seasonal use of rooms in a dwelling will embrace the changes while determining different social orientations.

CLIMATE CONDITIONS IN MALMÖ

The location of Malmö in the south of Sweden and by the sea results in a relatively continental climate with cold winters and mild summers. Compared to the rest of Sweden, the climate is milder and the average temperature remains above freezing even in winter. Due to its location by the sea and the flat landscape, the wind often blows. Precipitation is generally quite high with minimal variation in days of rain or amount between the months.[3]
Whereas normally summer and winter are the main seasons with spring respectively autumn being a more transitional period, the seasons in Malmö can from a subjective view be more blended. Winter with its relatively mild temperatures and almost no snow nowadays feels not clearly distinctable and more part of autumn. The climate in Malmö can be described as it has 3.5 seasons and longer periods of uncertain and windy weather. Spring and autumn are experienced longer than the calendrical period, with a broad spectrum of weather phenomenon. Summer is warm and temperatures can reach around 30°C whereas the average temperature still remains at around 20°C.
In the future even higher temperatures are expected in winter making this season even shorter and milder.[4]

To deal with the specific climate situation in Malmö, the project aims to directly refer to them. The main idea of different climate zones nested into each other provides the possibility to further extend the warmer periods and minimise the colder temperatures (within the building). Different layers allow you to enjoy the sunlight and warmth even in windy conditions. As mentioned on the previous page, the seasons are always connected with different attributes and atmospheres. To take these factors into account, the unmeasurable values connected to the climate and dwelling are integrated in the climate diagram on the right. The previously introduced concept of seasonal living is integrated to give a temporal factor to the different (main) stages of the dwelling.



3
Climate data (n.d.)
'Klimat Malmö: Temperatur, Klimat graf, Klimat bord och vattentemperatur Malmö' [online], accessed 7.3.2023

4
SMHI (n.d.)
'Klimatförändringen är tydlig redan idag' [online], accessed 9.5.2023

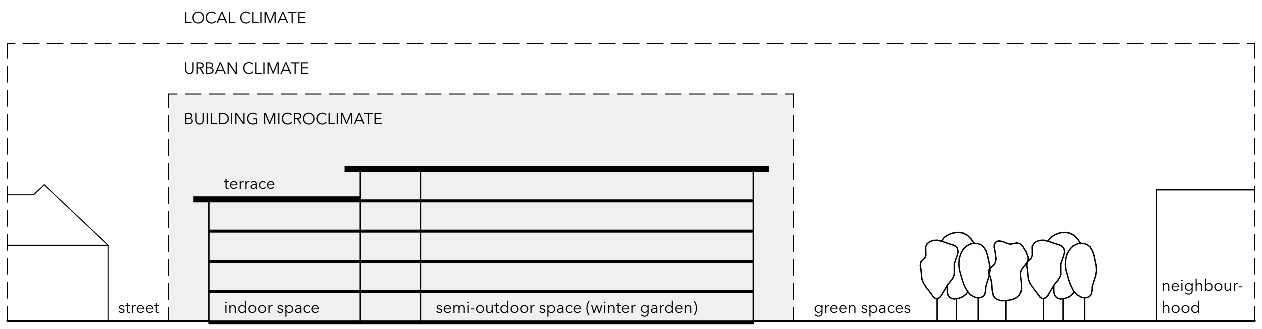
Climate diagram of Malmö with seasonal living concept.
Source data: Climate data [3]

Legend from inside out:
------- Precipitation
Seasons (calendaric & meteorological)
Hours of sunshine
——— Min. temperature
— — Avg. temperature
——— Max. Temperature
Seasonal Living stages
Unmeasurable factors

BUILDINGS AND CLIMATE

When talking about climate in an architectural context, different spheres can be determined. Among building environmental researchers a distinction is commonly made between the local climate, urban climate and building microclimate.[5] Whilst the local climate given, the urban climate and especially the building microclimate can be influenced by architects and planners. With these climate aspects in mind a building can be easily adapted to the climate and influence the microclimate around it.

5
van Ellen L.A., Bridgens B.N., Burford N., Heidrich O. (2021) 'Rhythmic Buildings- a framework for sustainable adaptable architecture', Building and Environment, 203

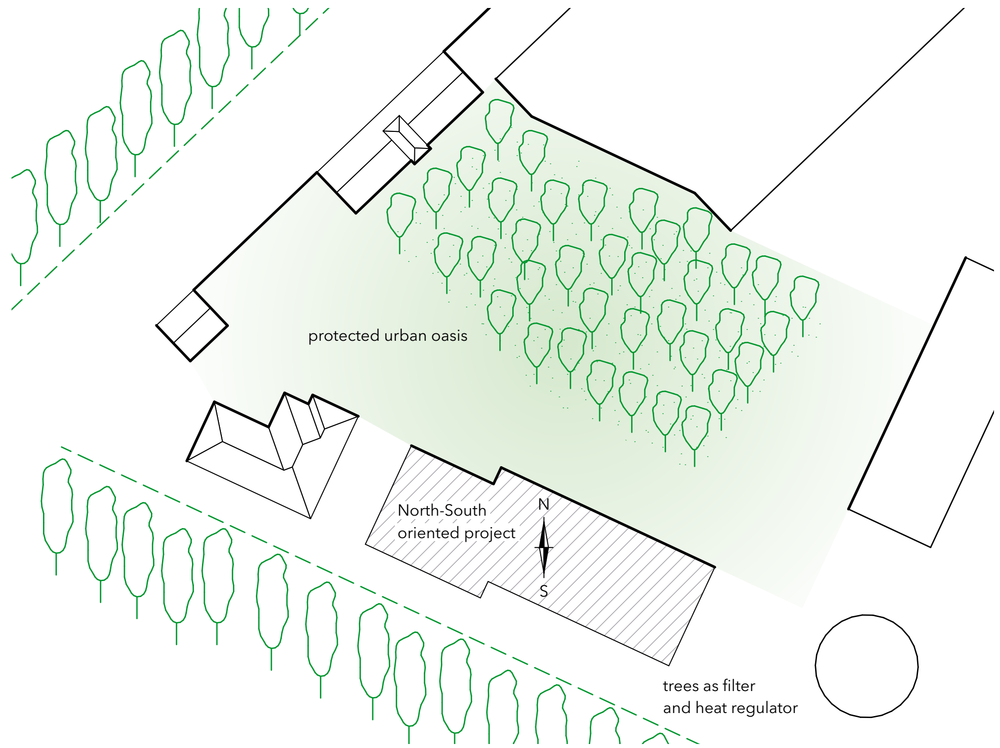


Climate spheres in the built environment, adapted from Ref. 5

CLIMATE AT THE SITE

The chosen site for the case study is located in the area Norra Sorgenfri in Malmö. Situated in the north eastern part of the city, the area is one of the oldest industrial sites of the city. With the city growing and industry gradually moving, the area is currently transformed. The area of the old gas plant, 'Kvarteret Verket', is the optimal situation for this thesis project to implement different climate strategies as shown in the following diagrams.

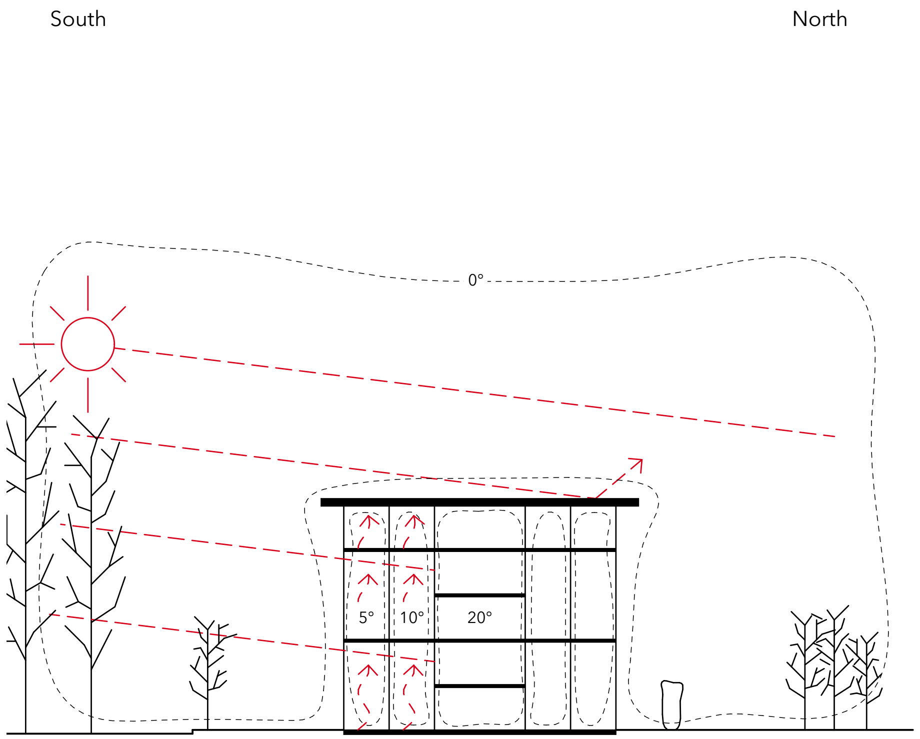
The building is positioned alongside the existing graveyard, which is also a very popular recreational space. Together with the existing buildings on the plot, an urban space is established in between them. This area is protected from wind by the buildings and vegetation. Towards south, the buildings will also be able to shade the space to a certain extent and in addition the urban park with its dense flora will provide shade in summer times. The greenery of the graveyard and the newly introduced urban park are important for a healthy urban climate on the site.



Urban climate of the case study location in Kv. Verket

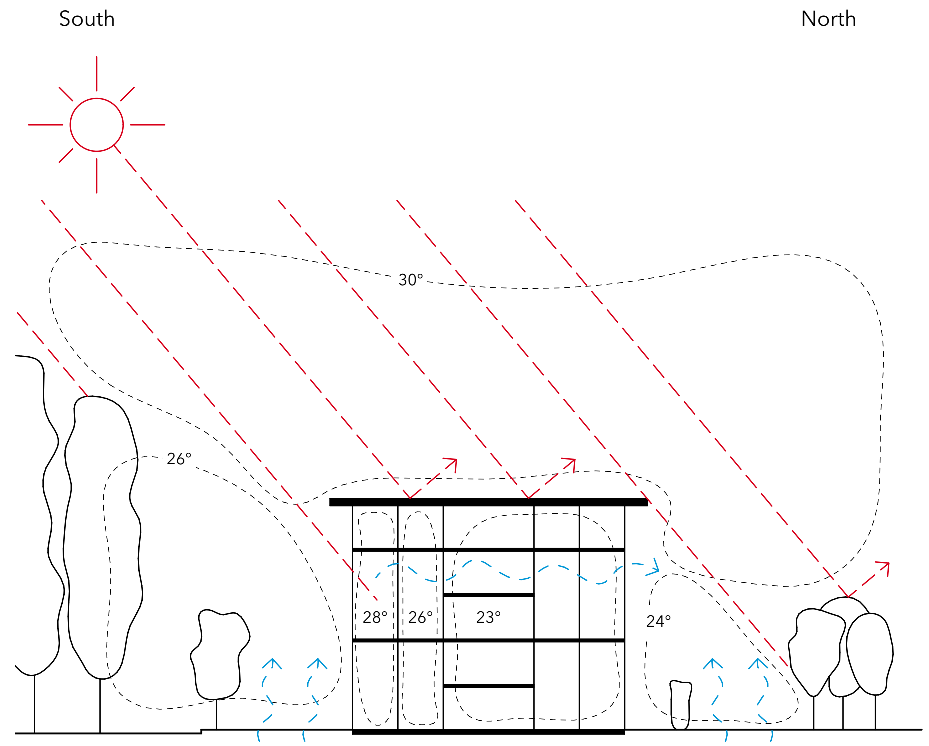
The vegetation is an integral part of the building microclimate as a heat regulator. The very high trees of the graveyard act as a sun filter for the south facing facade of the case study. In winter, the defoliated trees allow the low standing sunlight to come deep into the house but protect the building during summer. Different microclimates around the building are created and help to regulate the temperature.

Within the building, the different layers provide climate buffer zones. In winter, the heat loss is minimised by the two extra layers of rooms while in summer the outer rooms can take up most of the thermal load and an efficient cooling of the house can be achieved by cross ventilation.



Building microclimate in winter of the case study: Sunlight reaches deep in the building and climate buffer zones to minimise the heat loss.

Building microclimate in summer of the case study: Vegetation as sun protection and effective heat regulation.



3. HUMAN ACTIVITY AND COMFORT

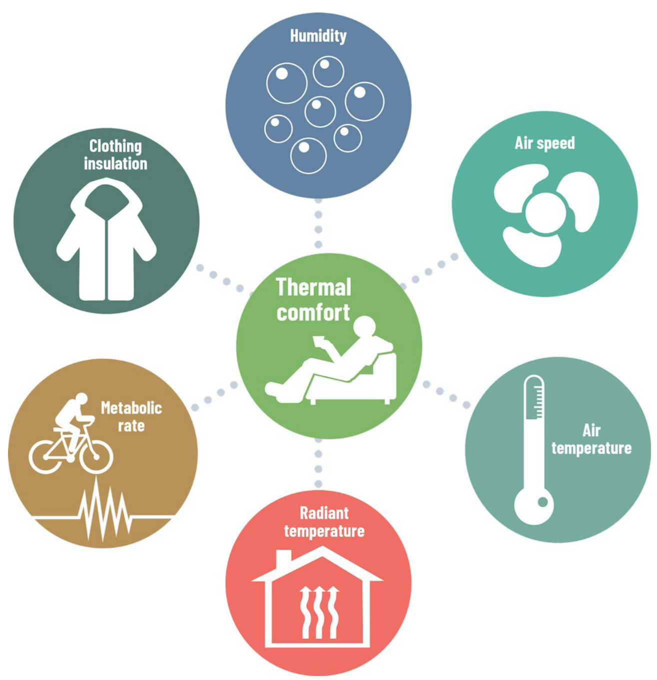
Moving from the outdoor climate into the dwellings and the indoor climate, comfort is quickly the focus. Comfort is somehow tricky to determine and very individual since our metabolic system is an integral part of how comfort is experienced (or not). Since comfort can include various factors that are out of the influence of architecture, I will focus mostly on thermal comfort. In this chapter, the regulatory basis for comfort is analysed and together with the newer concept of adaptive thermal comfort forms the basis for further investigations in the case study.

COMFORT AND ROOM CONDITION

Comfort can be described as a state where the human body (and mind) are relaxed, at ease and free from distress. Every person has a regulation system for body temperature that tries to keep an ideal body temperature of around 37°C. When this temperature falls below or exceeds, the body takes countermeasures such as evaporation to cool down or redistribution of blood to warm essential parts of the body. In regard to indoor thermal comfort, this means that the sensors to experience heat or cold are not stimulated while the body temperature is normal. Furthermore, the heat produced by the body has to be equal to the amount that can be emitted. To assess indoor climate it is important to be aware that it is not only air temperature that influences the thermal comfort but all changes in the heat flow to and from the body. The following six factors are the main influences to thermal comfort:[6]

- Air temperature
- Heat radiation
- Air movement
- Humidity
- Activity level (metabolic rate)
- Insulation (clothing, furniture)

The first four factors can be measured while the last two can be determined by standardised tables. With these factors a comfort equation can be used to determine the thermal comfort of a room.



Main influences to thermal comfort. © Center for Alternative Technology

6 Björck C. (2011) 'Energiboken - Energieffektivisering för småhusägare', Svensk byggnadsvårdsföreningen, Stockholm: pp. 74-79

As in the introduction to this chapter mentioned, comfort is always also a very individual factor that can not always be accurately measured and determined by standards. In 1970 the Danish professor Ole Fanger created the so-called index "Predicted Mean Vote" (PMV). It gives an average value of how satisfied a large group of people would experience a certain indoor climate.[6] This aspect is also reflected in the Boverket's building regulations (2011:6). In the requirements for thermal comfort it is written: "Buildings and their installations must be designed so that thermal comfort adapted to the intended use of the spaces can be obtained under normal operating conditions." (Section 6:42) Furthermore minimum temperatures for different rooms and users are advised as following for domestic spaces:[7]

- Min. 18°C in living and working rooms
- Min. 20°C in hygiene rooms and nursing rooms
- Min. floor temperature 16°C, for hygiene rooms minimum 18°C and for premises for children minimum 20°C. Maximum floor temperature 26°C.
- Temperature difference within the room ≤5K.

The recommended minimum temperatures by Boverket represent quite low temperatures compared to a 2018 conducted study that showed a mean temperature of 22°C in Swedish households.[8] The Swedish public health agency (Folkhälsomyndigheten) suggests a range of 20-23°C as a comfortable indoor temperature while also referring to a 18°C minimum temperature.[9]

ADAPTIVE THERMAL COMFORT

The concept of adaptive thermal comfort is an interesting approach to define thermal comfort. The concept is rooted in the fact that people have a natural tendency to adapt to changing conditions. If a change occurs that produces discomfort, inhabitants react in ways to restore comfort. This response is clearly visible in the way we dress for outdoor conditions: Based on the weather, season and activity we apply different layers to create comfort.

Traditional thermal comfort assessments as described before are focusing almost solely on the indoor environment. Instead of only focusing on the indoor thermal conditions, the outdoor climate as well as the activity of the inhabitant is taken into account. With static fixed numbers such as in the Boverkets requirements, a minimal comfort can be guaranteed but above that, the inhabitant becomes an integral part within the concept of adaptive thermal comfort.

6
Björck C. (2011) 'Energiboken - Energieffektivisering för småhusägare', Svensk byggnadsvårdsföreningen, Stockholm: pp. 74-79

7
Boverket (n.d.), 'Boverkets byggregler - Termiskt klimat', Boverket [online], accessed 7.5.2023

8
Teli D., Langer S., Ekberg L., Dalenbäck,JO. (2019) 'Indoor Temperature Variations in Swedish Households: Implications for Thermal Comfort' in: Johansson D., Bagge H., Wahlström Å. (eds) Cold Climate HVAC 2018. CCC 2018. Springer Proceedings in Energy. Springer, Cham.

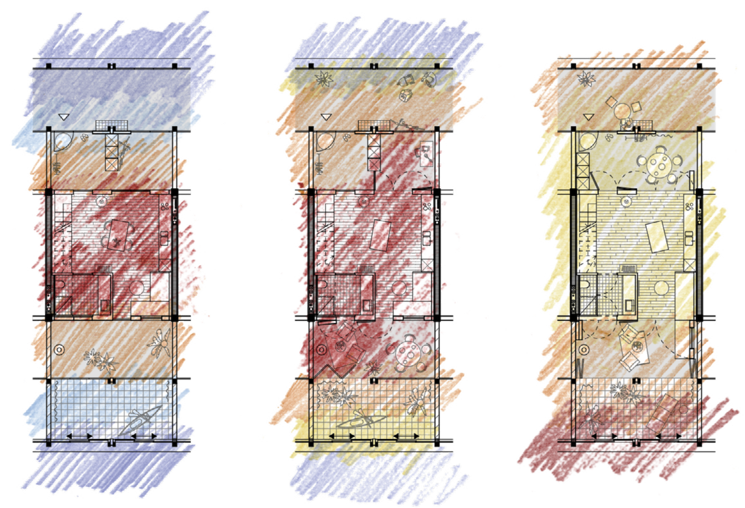
9
Folkhälsomyndigheten (n.d.), 'Tillsynsvägledning om temperatur inomhus' [online], accessed 17.5.2023

10
Nicol J.F. and Humphreys M.A. (2002), 'Adaptive thermal comfort and sustainable thermal standards for buildings', Energy and Buildings, 34(6), pp.563–572

SIGNIFICANCE FOR THE CASE STUDY

The introduction of different climate zones within the case study creates not only a climate buffer to the outside as described in chapter 2 'Climate and the built environment'. Even more it provides a tool for the user to alter with the layered spaces and create thermal comfort. The indoor space is becoming an extension of the outdoor and by different strategies of adaptability a user created comfort can be achieved. By linking comfort temperature to the context in which the inhabitants find themselves, the experience and connection to their domestic space is amplified.

Adaptive thermal comfort as a concept is valuable to build more sustainable, and to include the user actively in the act of creating a comfortable climate. In correlation with the seasons and weather, the guidelines for thermal comfort shift. A flat that can allow changes and provide different zones that react to these external conditions is aimed for.



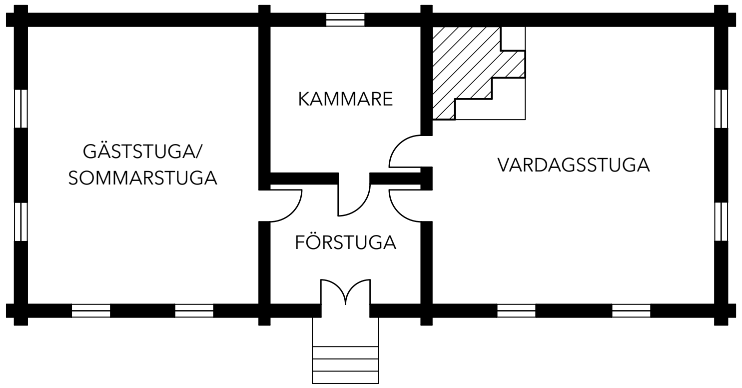
Sketch of the climate zones in relation to the seasons and activity.

4. CLIMATE AND THE DOMESTIC SPACE

Most of today's housing production is based on a partition between the home and the environment. Multiple layers protect us today from the climate in a way that has never been seen before. Extra soundproof windows and several decimeters of insulation keep the context out, it is in fact reduced to an image, something nice to look at. But it has not always been like this and there are again examples that show a different way, a way to dwell together and closer to the environment.

In this selective overview the interaction and changes over time between domestic space and the climate is analysed and compared. The references are a mix of theoretical concepts and built key references.

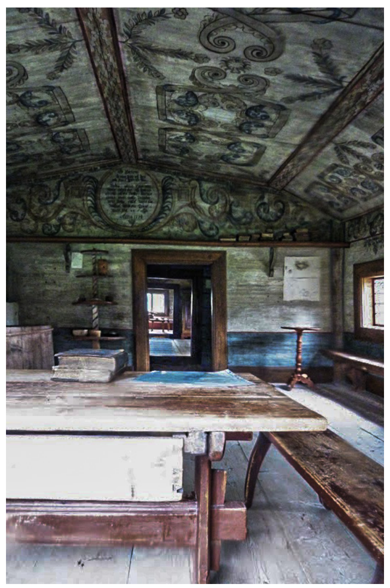
Haus-Rucker-Co:
Oase No.7
© Ortner & Ortner
Baukunst, 1972



Top
Typical floor plan
of a 'Parstuga'.
Drawing by the author

Bottom left
Remsgården in Remmet,
interior of the 'Gäststuga'
with rich wall decoration.
© Esse Hominem, 2014

Bottom right
Parstuga i Nissnissgården
i Gammelstan, interior
of the 'Vardagsstuga'.
© Markus Gottschling, 2020



PARSTUGAN - VERNACULAR ARCHITECTURE

Traditional housing on farms followed a simple structure of rooms. The oldest typology in Sweden is a one room house which is called 'Enkelstuga' in Swedish. In this house, a small parlour with a chamber is sideways extended by the main room 'Stuga'. There, the hearth was at the centre of the house, providing comfort, food and a warm place to sleep. Over time, this basic type of a house was further developed and spaces were added first sideways, then also behind each other and in an additional storey.[11]

'With this seasonal use, the living space of the inhabitants was nearly doubled in summer time while the heated space could be kept small and efficient during winter.'

The 'Parstuga' is such a variation which has a symmetrical plan, with the 'Stuga' (main living room) and the 'Gäststuga' (guest room) on either side of the parlour with the chamber behind it.[12]

The guest room was similar in proportion and size to the main living room but was normally missing a fireplace and was therefore not heated.[13] The often rich decoratively painted walls highlight the representative use of the room. [11]

This guest room was sometimes also referred to as 'Sommarstuga' (summer-room), which points to the seasonal use of the room as a not temperate climate. The farm's inhabitants would move in there in summer or accommodate guests. In winter, the room was often only used for storage purposes.[14]

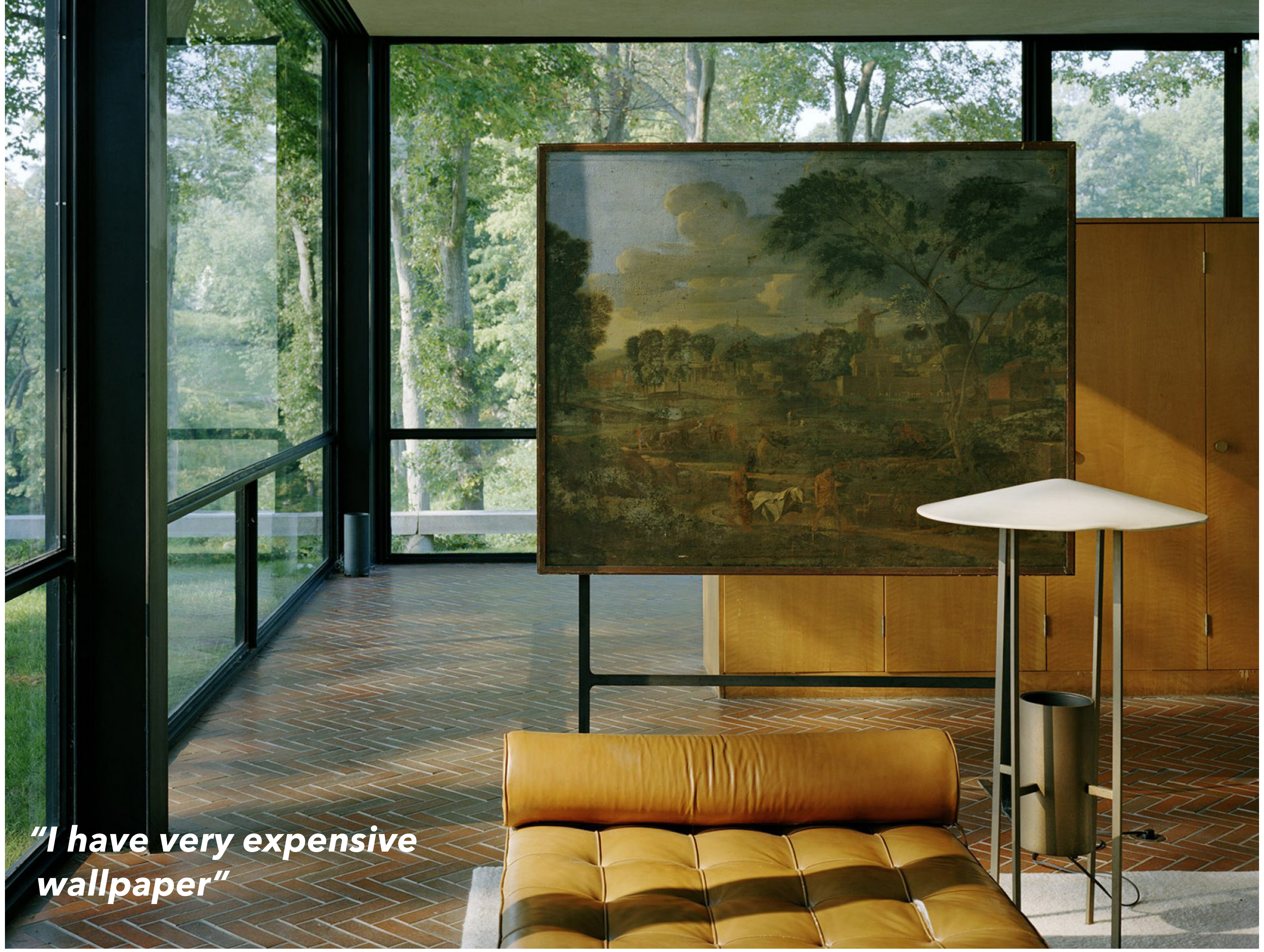
With this seasonal use, the living space of the inhabitants was substantially enlarged in summer time while the heated space could be kept small and efficient during winter.

11
Lundgren H. (2008) 'Bostadshusens planlösningar', Kulturmiljövård, [online], accessed 21.3.2023

12
Stockholms läns museum (n.d) 'Traditionella hustyper och planlösningar' [online], accessed 21.3.2023

13
Granberg J (1984) 'Gården i den förindustriella staden', Minab/Gotab, Stockholm: pp. 84-85

14
Wikipedia (2021) 'Fritidshus' [online], accessed 21.3.2023



Interior view of the glass house
© Eirik Johnson, n.d.

15
Architectural Forum (11/1949) 'GLASS HOUSE permits its owner to live in a room in Nature', Architectural Forum

16
Cassidy-Geiger M (2016) 'The Philip Johnson Glass House', Skira Rizzoli Publications Inc., New York: pp. 70-80

17
National Trust for Historic Preservation (25.1.2012) 'I have expensive wallpaper.' [video], Vimeo, accessed 25.1.2023

18
Architecture History 'THE GLASS HOUSE', 20th century architecture [online], accessed 25.1.2023

19
Giovannini J. (16.7.1987) 'Johnson and His Glass House: Reflections', New York Times

MODERNISM - PHILIP JOHNSONS GLASS HOUSE 1949

The modernist movement and their dogma of light, air, sun and hygiene as well as the rapid development of building construction and material enabled more and more transparent buildings in the 20th century. The ribbon windows and glass walls blur the boundaries between indoor and outdoor and the surroundings become an essential part of the building. The built manifestation of that thought is the New Canaan Glass House by Philip Johnson. Even though situated in the United States, the Glass House is included in this chapter to show the modernist idea of building with the landscape as probably one of the clearest examples of its type.

The house seems to be such a simple idea - a box with four glass walls. A brick foundation from which the only solid vertical element grows, the round bathroom and fireplace element in brick, penetrating a roof slab. In between just four glass walls, single glazing and therefore the lightweight wall in extremis. The Architectural Forum stated in 1949 in an article about the house and its connection to the surroundings: "The open secret is that the house alone is not the complete dwelling unit. The real living space is the tree-bounded, three-level piece of land. The glass pavilion sits on a grassy shelf which drops abruptly on one side into a sea of trees and which rises park-like on the other toward the highway."[15]

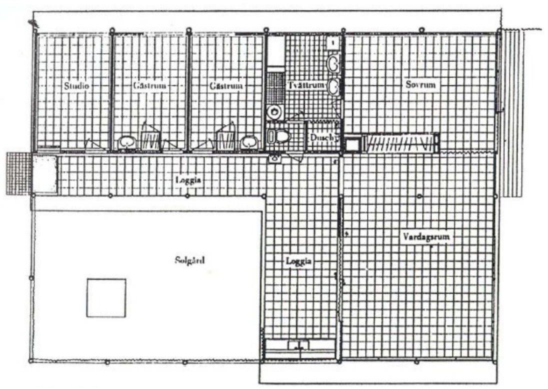
From a young age, Johnson was exposed and influenced by nature, farming and gardens while spending the weekends on the family's farm in New London, Ohio and trips to Europe from a young age.[16] It's not surprising that in the end, the house Johnson built for himself to live (and die) in became a glass pavilion in a garden. The transparent walls allow a direct visual contact with the surrounding, nature becomes a piece of art, a living wallpaper and an inseparable part of the house itself. "I have very expensive wallpaper", Johnson once said.[17]

"It's very liveable because, like anything else, you adapt to it. When it's too hot you eat or sleep outside. In a house like this, you live in the weather (...)"

Conceptually Johnson describes the house as "not a controlled environment" and the central fireplace is lifted to a ceremonial element.[18] The fireplace is psychologically an important element and transmits the image of a simple and ascetic house. Yet the whole slab is equipped with a heating system and makes the whole space inhabitable at all times, even without a combustion fire. The statement of the house as an uncontrolled environment can therefore be questioned, however a certain seasonal correlation between the environment and the house can be recognized. As Johnson himself stated in a newspaper article: "It's very liveable because, like anything else, you adapt to it. When it's too hot you eat or sleep outside. In a house like this, you live in the weather (...)."[19]

Top
Living room with open wall towards the courtyard.
© Åke E:son Lindman, n.d.

Right
Floor plan Frösakull
© Bruno Mathsson, 1959



20
Bruno Mathsson International AB (n.d.) 'About Bruno Mathsson' [online], accessed 26.1.2023

21
Sjöö K. (2007) 'Bruno Mathssons Sommarhus - Byggnadsminnesutredning', Länsstyrelsen Hallands Län, Halmstad

SWEDISH NATURISM - BRUNO MATHSSON FRÖSAKULL 1960

The Swedish furniture designer and self taught architect Bruno Mathsson built a series of houses in the 1950's, inspired by the American modernist architecture and adapted to the Swedish context.

The Frösakull summer house was built in 1960, outside Halmstad on the Swedish west coast. The house is based on the earlier by Mathsson presented concept of 'The house of tomorrow'. A simple and rational building, inspired by the American glass architecture, whose architects he met on a trip to the US in 1948.[20] In regard to the climate, Mathsson advocated for big glazings also in the Swedish context if constructed well, with under floor heating and insulated glass panels.[21] Mathsson himself even patented and produced a triple glazing panel with nitrogen filling called the 'Bruno Pane'.[22]

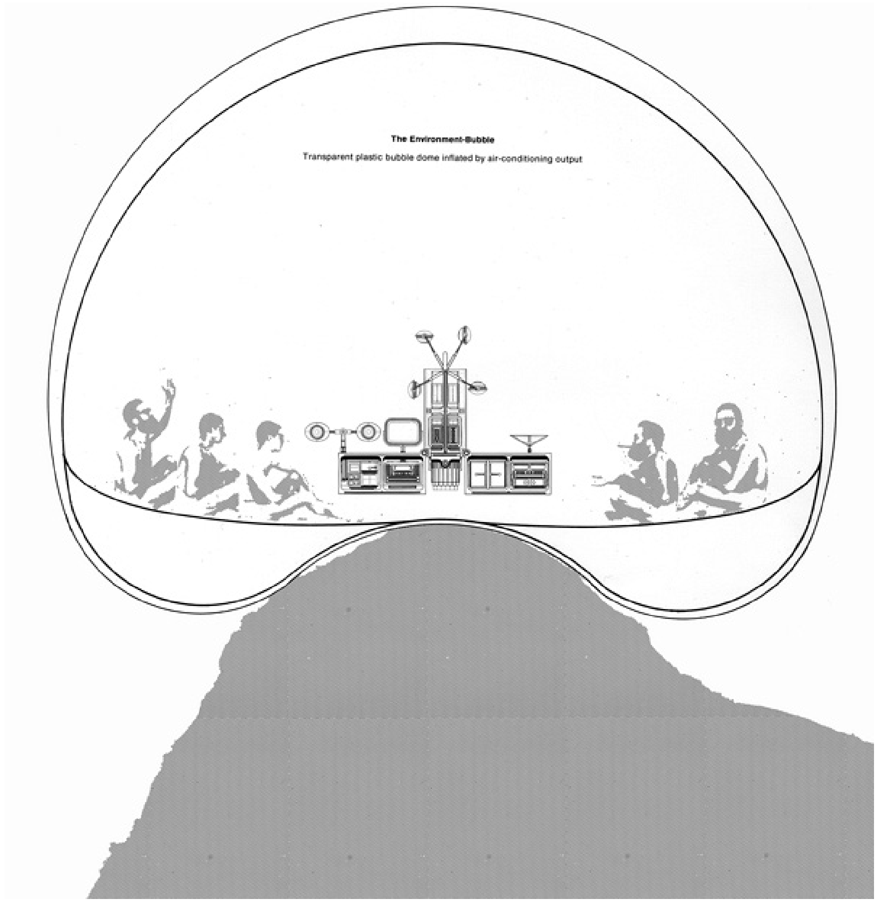
The layout of the Frösakull house is very simple and consists of two parts: Towards north a series of bedrooms and a bathroom with a wooden wall and single windows. Directed towards the south a big living room with kitchen utilities opens up to the partly covered atrium in front of the smaller bedrooms. In contrast to Johnson's Glass house, the technical and service areas are spread out throughout the plan, the kitchen is dissolved into a fixed built-in fridge and a mobile stove. The boundaries between functions and the degree of privacy are diffused. The wall between the living room and the courtyard is on rails and can be entirely opened, creating a whole new spatial organisation depending on the weather conditions. This flexibility and built in variability makes the building more into a stage for living than a traditional home. This fluid transition between indoor and outdoor and the use of sunlight in the building is rooted in Mathsson's personal lifestyle ideology: fitness and naturism. Sun and oxygen were a main concern of these movements and clear elements in the summer house.[22]

In regard to the concept 'The house of tomorrow' Mathsson said: "First and foremost, I want to use the heat and energy from the sun. In this respect I have gone one step further by making the roof out of transparent corrugated and bent plastic, which resembles the waves on a lake. If desired, the house can be fitted with a sunscreen. The house will be heated by solar energy, so the warm air generated right under the plastic roof by the sunlight can be conducted down to the floor, where the heat will then rise up. Naturally, this needs to be supplemented with the existing electric under-floor heating."[22b]

"First and foremost, I want to use the heat and energy from the sun. In this respect I have gone one step further by making the roof out of transparent corrugated and bent plastic, (...)"

22
Mattsson H. (2011) ' "A Home is not a House" - Ascetic Swedish Naturism meets luxurious American Modernism', in Olsson M. (ed) Södrakull Frösakull, Steidl & Partners, London

22b
Article in *Värnamo nyheter* (4.2.1956), cited in 22



"The basic proposition is simply that the power membrane should blow down a curtain of warmed/ cooled/conditioned air around the perimeter of the windward side of the un-house (...)"

The Environment-Bubble
Illustration for Banham's
'A Home is not a House',
Art in America (April 1965).
© François Dallegret, 1965

ENVIRONMENTAL BUBBLE - REYNER BANHAM 1965

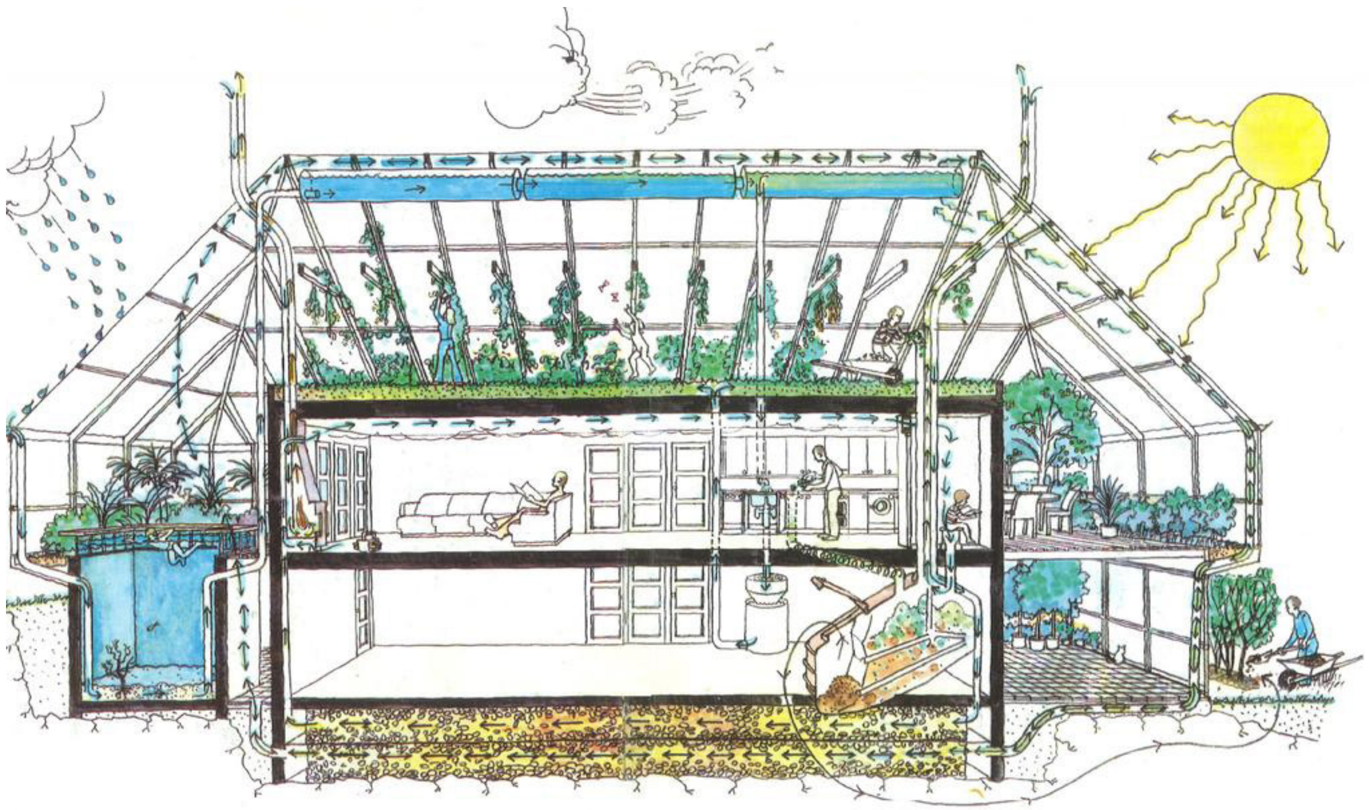
In the late 1950's, the British architecture theorist Reyner Banham wrote that architecture is a service to humans, like clothes to warm and protect our bodies, a roof that protects us from the rain. Architecture is therefore not something material, it's a condition that enables activities.[22] In his writing "A home is not a house" from 1965, the relation to the environment is categorised in two different approaches. The first one is avoidance: by hiding under a rock, tent or primitive roof the people escape the environmental influences and this led, according to Banham, to architecture as it is today. The other way of interaction with the environment is interfering with the local meteorology. By means of for example a camp-fire, the immediate surrounding is changed and altered by the human. In contrast to architecture according to the first strategy, Banham attests this interference with great freedom and variability. Climate becomes a part of the space, shaping and defining the size of the fire-warmed space, a constant negotiation with the environment. "There will thus be a variety of environmental choices balancing light against warmth according to need and interest."

"There will thus be a variety of environmental choices balancing light against warmth according to need and interest."

This ideal of a home is then described by Banham as a Anti- or Un-house and manifested in the Environmental Bubble. A space, enclosed by a plastic bubble dome, held above the ground by an air cushion, surrounded by nothing but the environment. A clear renunciation of the American buildings at that time, where according to Banham the shell was only there to enclose the technical installations, but without a function in itself. The environmental bubble on the other hand is freed from this shell, creating a livable environment through the technical installations in the sense of the camp-fire idea.
"The basic proposition is simply that the power membrane should blow down a curtain of warmed/cooled/conditioned air around the perimeter of the windward side of the un-house , and leave the surrounding weather to waft it through the living space, whose relationship in plan to the membrane above need not be a one-to-one relationship." [23]

22
Mattsson H. (2011) ' "A Home is not a House" - Ascetic Swedish Naturism meets luxurious American Modernism', in Olsson M. (ed) Södrakull Frösakull, Steidl & Partners, London

23
Banham R. (4/1965) 'A Home is not a House', Art in America (Volume 2, 1965)



Principle sketch of Bengt Warne's 'Naturhus' in Saltjsöbaden
© Fredriksson & Warne (1993)

'Give the inhabitants of houses the opportunity to control the flows and cycles themselves. Let us burn, ventilate, water, grow and change according to our own needs and preferences.'

NATURHUS - BENGT WARNE 1976

"Living in a greenhouse gives architecture a fourth dimension, where time is represented by movements of naturally recycled endless flows of growth, sun, rain, wind and soil, in plants, energy, air, water and earth. I call this NATURHUS."

From the 1970's on, the Swedish architect and researcher Bengt Warne started building houses that were surrounded by a greenhouse. The name 'Naturhus', used for his house in Saltsjöbaden in Stockholm 1976, became shortly after the synonym for this new typology of house. According to this concept, 'Naturhus' is a house which functions in relation to nature in a circular system - ressources are borrowed and handed back clean again. This aspect was described as followed by Bengt Warne: "Living in a greenhouse gives architecture a fourth dimension, where time is represented by movements of naturally recycled endless flows of growth, sun, rain, wind and soil, in plants, energy, air, water and earth. I call this NATURHUS."[24]

The greenhouse acts as a buffer zone to regulate the climate and to mediate between inside and outside. A reduction in energy consumption of around -30% and a temperature of ~4-5°C over the outside climate is established.[25]

Bengt Warne formulated four criteria for what a 'Naturhus' should achieve:[26]

1. Look at the real needs and not the imaginary ones. Technology must be subordinated to the principles of biology. In lifestyle, construction and housing, we must learn from nature.
2. Let our homes work with nature. Organisms live on primal flows like sun, wind, rain, soil and plants. We can design our houses according to the same principles.
3. Give the inhabitants of houses the opportunity to control the flows and cycles themselves. Let us burn, ventilate, water, grow and change according to our own needs and preferences.
4. Use sophisticated but environmentally friendly technologies when nature's energies are not enough.

The concept of 'Naturhus' got new momentum in the 2000's when several new buildings were planned in the spirit of Bengt Warne. A difficulty to this day is, however, the strict building regulations in Sweden. Over the years, the regulation for energy calculation and the demands for insulation values and non standardised building parts have consistently increased.[26]

It is worth mentioning that similar concepts exist around the world, one of the most famous are the projects by the french office Lacaton Vassal. They have been combining housing with green houses as an additional seasonal housing space since the 1990's. However, in their projects the circular aspect of living with nature is missing.

24
Nature House (n.d), 'Bengt Warne eco architect 1929-2006' [online], accessed 15.3.2023

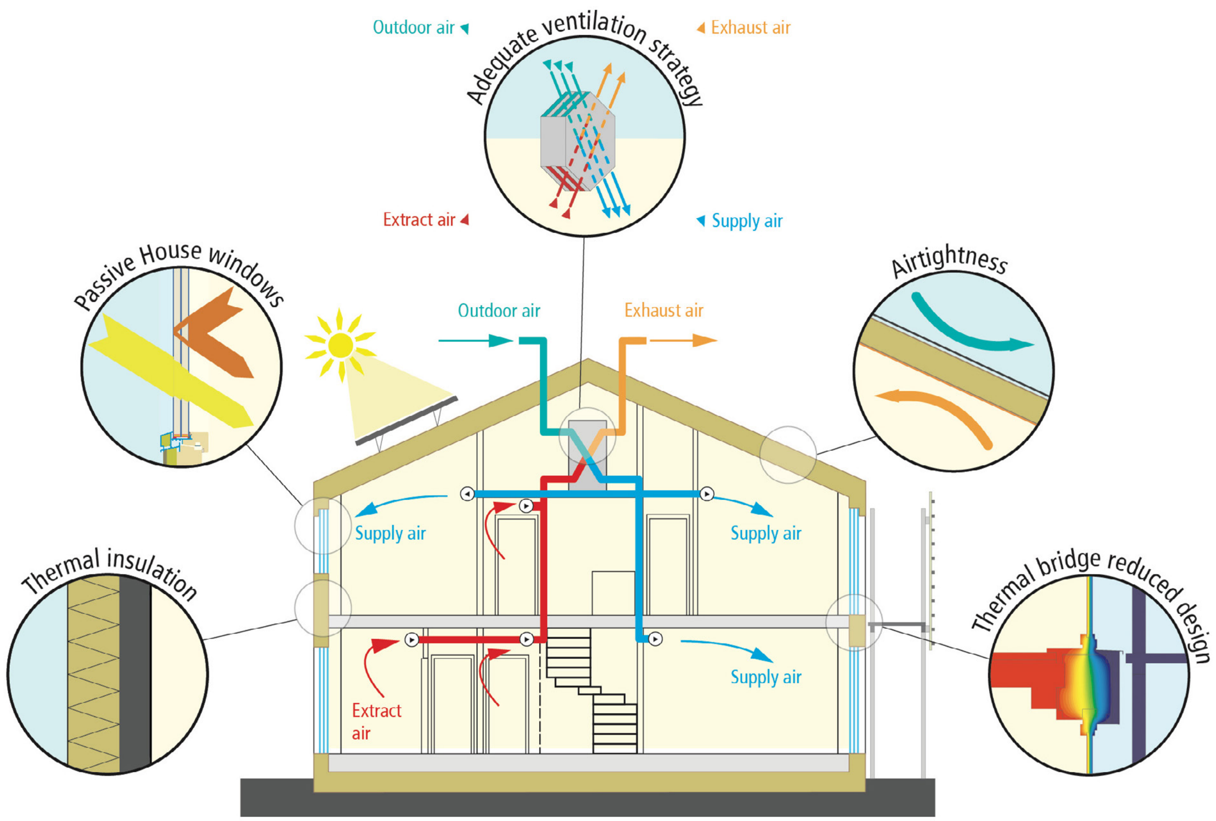
25
Persson O., Wennerstål P. (2015) 'Energimodellering av naturhus - en studie av Sundby naturhus' [bachelor's thesis], Lund University, accessed 15.3.2023

26
Granmar M. (2021) 'Naturhus: Bygg, bo och odla för en hållbar framtid', Natur & Kultur, Stockholm: pp. 10-21

‘The name passive house (...) describes the fact that a building as such is predominantly heated by solar heat and internal heat gains (...).’

27
Feist W. (2022) ‘The Passive House – historical review’, Passipedia [online], accessed 31.5.2023

28
Passive House Institute (n.d.) ‘Passive House Institute / About us’ [online], accessed 31.5.2023



Basic principles for the construction of Passive Houses.
© Passive House Institute (n.d.)

29
Passive House Network Minnesota (2022) ‘What is a passive house?’ [online], accessed 31.5.2023

30
Passive House Institute (n.d.) ‘Passive House requirements’ [online], accessed 31.5.2023

31
Davis J. (2022) ‘The Pros and cons of building and living in a passive house’, Stuff [online], accessed 22.4.2023

PASSIVE HOUSE

Passive house is a voluntary standard that aims to build more sustainable and to reduce the energy consumption of a building. The basic idea originates from research in vernacular architecture that works without any heating or cooling. Several people researched and influenced the concept since the late 1980’s.[27] Wolfgang Feist at the ‘Institut für Wohnen und Umwelt’ (Institute for Housing and the Environment) in Darmstadt, Germany, founded in 1996 the Passive House Institute (PHI). PHI is to date an independent institute, conducting research around passive buildings, simulation methods and is involved in the certification process.[28] The name passive house is derived from the German term ‘Passivhaus’ and describes the fact that a building as such is predominantly heated by solar heat and internal heat gains in contrast to ‘conventional’ buildings with an active heating aggregate.[29] To achieve this, the concept is based on five basic principles to construct Passive houses:[30]

- Thermal insulation: Very well-insulated, U-value ≤0.15 $W/(m^2K)$
- Passive house windows: Well insulated, U-value ≤0.80 $W/(m^2K)$
- Automated ventilation system: With efficient heat recovery (exchanger)
- Airtightness of the building: Airtight construction (with blower door test)
- Absence of thermal bridges: Avoid and minimise thermal bridges

“One con, and this is not really a con, is my daughter has no idea that outside will be cold. I literally have to force her to wrap up to go to school. She’ll be running around in shorts and T-shirts year-round.”

Over the last decades, the passive house standard has often been regarded and promoted by politicians and the building industry as the only way to build sustainably. Studies have shown that energy consumption can be massively reduced compared to conventional buildings with current building standards. However, with the technologization and the extremely airtight construction, both building cost as well as complexity have raised. With that, a sharp boundary between the inside and the outside has been established, sealing the house hermetically from the surrounding. The architect Siân Taylor who lives in her own passive house in New Zealand described this detachment in an interview as following: “One con, and this is not really a con, is my daughter has no idea that outside will be cold. I literally have to force her to wrap up to go to school. She’ll be running around in shorts and T-shirts year-round.”[31] What the architect describes here is the antithesis to the building as a shelter in the modernist way - a living detached completely from the environment.

REFLECTION AND VISION

Historically, the building as shelter was never meant to provide comfort, as it only served to mitigate the extreme conditions that were beyond the human body's ability for adaptation. With the modernist movement the house was continuously understood as a shelter as described by Fitch: "(...) the ultimate task of architecture is to act in favor of man: to interpose itself between man and the natural environment in which he finds himself, in such a way as to remove the gross environmental load from his shoulders."[32]

With the environmental technologies to control the interior conditions in the late 19th and early 20th century, the characteristic sleek glass constructions of modernist architecture became possible. At the same time, the idea of the 'Urhütte' as the minimal shelter could be translated into comfortable modern buildings. For example Johnson's glass house seems to be a shelter, a modern tent to protect the inhabitants from the elements. However, it indeed offers a great extent of comfort with underfloor heating, automatic ventilation and high level of insulation. With that came the separation between the inner and outer spheres - modernists such as Le Corbusier and Frank Lloyd Wright even used the term 'hermetic' to describe the outer walls' new role.[33]

As often in (architecture) history, for every movement a countermovement arises. The Naturist ideal of fresh (outdoor) air stands diametral to the modernist understanding of a clean indoor environment achieved by technology. Nevertheless, the idea of a hermetic isolated building in a modernist sense is still valid today. Even more with advanced understanding in energy behaviour and further technological development. This leads ultimately to the latest proclamation of a sustainable building, the passive house. The contemporary mantra of building in this manner is 'Build tight, ventilate right'.[34] With the blower door test, a certain level of air tightness needs to be proven to achieve most of the current standard energy labels that go beyond the legal minimum requirements. The introduction of advanced technical solutions to control the indoor climate has changed the outer wall's function and perception to become a boundary. With that, other aspects such as an area of exchange and negotiation has disappeared and the users have become even more dependent on technology.

This shift can be seen as very critical as it moves responsibility and control over the built space away from its users. In this thesis, I would like to explore the possibility of the inahbitants regaining power. To see the boundaries as a place where exchange happens - especially in regard to energy. This boundary will not be seen as a hard border but as a space of negotiation between the

'The introduction of advanced technical solutions to control the indoor climate has changed the outer wall's function and perception to become a boundary.'

32
Fitch J.M. (1972), 'The Environmental Forces That Shape It' in American Building 2, Houghton-Mifflin, Boston, p 1.

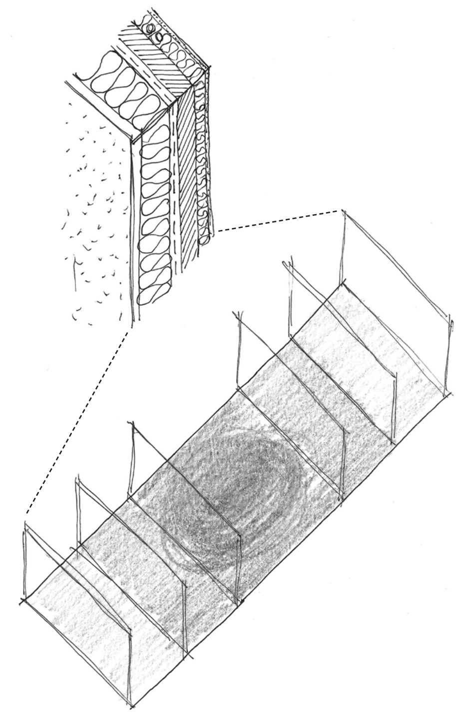
33
Addington M. (2009). 'Contingent Behaviours', Architectural Design Vol. 79 (3), pp.12–17

34
Aiken B. (2021), 'Build Tight, Ventilate Right', Centre for Alternative Technology [online], accessed 10.5.2023

indoor climate and the exterior, managed by the inhabitant. In combination with the earlier introduced concept of different climate zones, a coherent layering of climates and boundaries arise, shaped by their specific requirements and possible to be changed by the dweller.

The complex and multilayered modern wall is exploded and subdivided. The sharp boundary is dissolved into soft transitional spaces, where a constant negotiation between the indoor climate and the exterior happens.

Properties of a contemporary wall:
- Representation outside
- Weather protection
- Heat insulation
- Humidity control
- Structural performance
- Sound insulation
- Installations
- Representation inside



Another interesting and important aspect for the case study is the concept of seasonal living as shown in the example of the Swedish 'Parstuga'. The size of the actively used domestic spaces can adapt, from a condensed winter house to a big open summer space. This deliberate retreat to a small heated area as a way to handle the cold season is also handed down in an old German farmer's saying: "Im Winter kleiner sitzen" (To 'sit' smaller in winter). This idea of downsizing and expanding in correlation with the seasons is a common theme in vernacular architecture. The ability of the user to actively change and influence the space is interesting and important to create a sense of belonging to one's domestic space.

"Im Winter kleiner sitzen" (To 'sit' smaller in winter)

5. CASE STUDY

LOCATION

The site chosen for the case study is Norra Sorgenfri in Malmö. Situated in the northeast of the city, it's in close connection to several attractive areas like St. Knuts and Rörsjöstaden. Norra Sorgenfri is one of the oldest industrial areas in Malmö which is currently being transformed to a housing area. This process began already in the 1990's when industry and companies moved further outside the city and demolition started.
The area is especially interesting due to its location, its history and its current status as an area in transformation, a kind of atmosphere of departure.

Left:
Orthophoto Malmö (2018)
© Lantmäteriet
The area of Norra Sorgenfri (dashed) and the block 'Verket' (solid) was marked by the author.

Right:
Gasverk in Norra Sorgenfri, built 1898 with the oven building to the left and the water tower on the right.
Image taken latest 1902.
© Carl Wilhelm Roikjer / Malmö museum

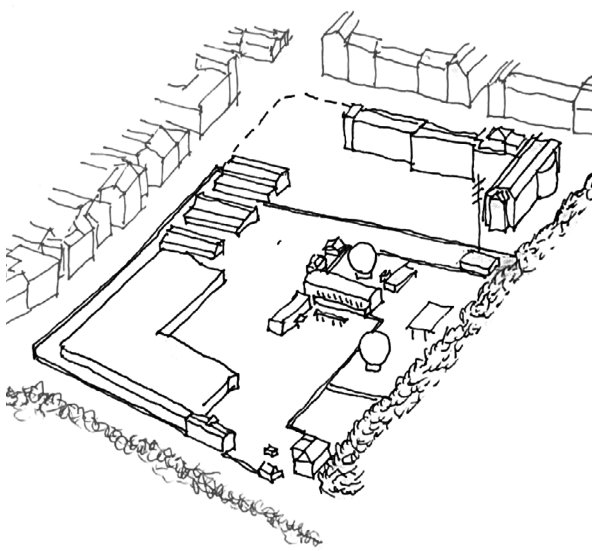
URBAN STRATEGY

The transformations in Norra Sorgenfri that already have happened or are ongoing are often based on a tabula rasa attempt where all buildings in a block are demolished and new houses are erected. Whilst the industrial monuments and infrastructures are gone, only their name indicates what once was and the importance the place bore for Malmös development to an industrial city.

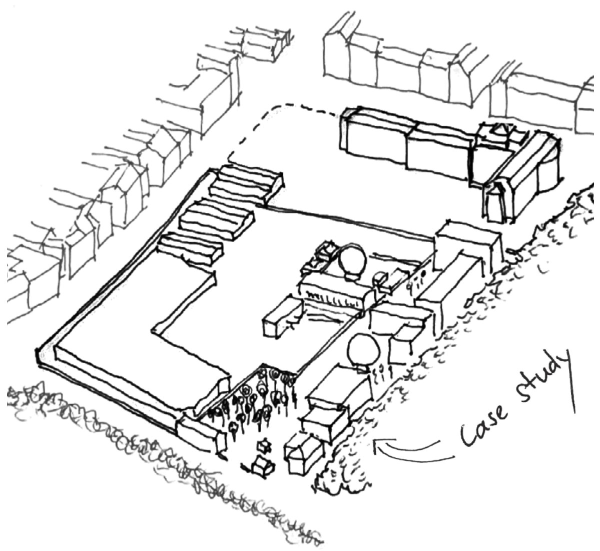
As a critical comment to that development, an alternative slow transformation plan for one of the last still used industrial areas is presented. The block 'Verket', where the old gas plant (see previous page) was located is today still used by some companies and there is yet no detail plan for the upcoming transformation. The following proposed urban strategy is to be understood as an idea proposal rather than a finished product.

The block is divided into three major development areas that follow already existing subdivisions of the different users on the site, gradually transforming the whole block. This approach allows the city and the future users to redefine and question the already happening development after every step. Changed needs or demands in the future can through that process easily be implemented and create a more natural grown community than the today pursued palimpsest.

Today | Status quo



Transformation 1 | Southeast corner & along the graveyard

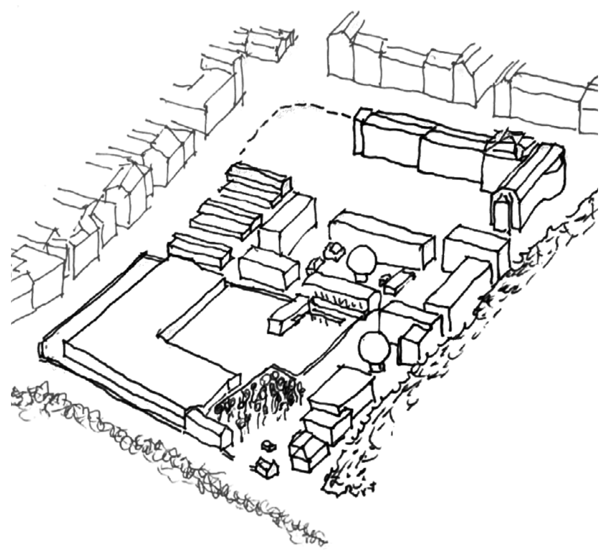


The first area to be developed and also the location for the case study is the south strip along the graveyard. The area is already today separately fenced and the existing buildings which formed the entrance to the 'Gasverket' can in a first step be transformed to public functions and workspaces. Housing along the graveyard hosts the first dwellers of the block and follows the historical tradition of the site. In old plans, one can see that the industry owners' villas were situated there along the graveyard.

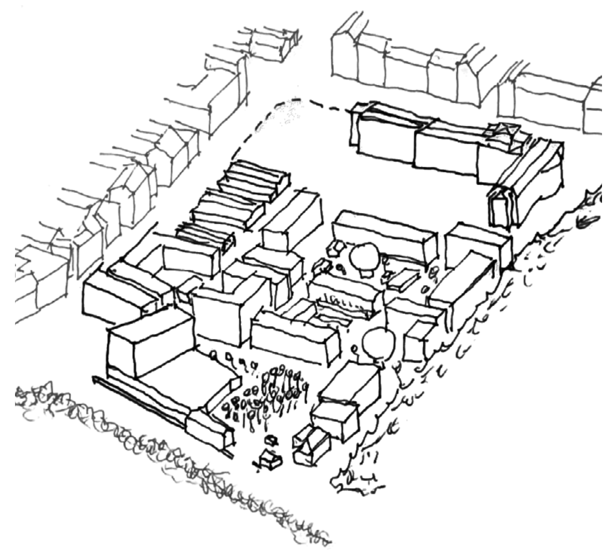
Secondly, the transformed area is expanded towards the street on the north side of the block. There, three historical workshop halls can be transformed and repurposed. The existing buildings in the heart of the block will be extended by additional housing forming a new central cluster.

In the last step, the remaining big industrial hall in the northwest corner of the block is partially transformed and demolished, making space for a new urban block of housing that forms a connection to the neighbouring block north.

Transformation 2 | Connection to Industrigatan



Transformation 3 | Northwest corner and urban blocks



PROJECT SITE

The chosen site for this thesis and the case study is within the first step of the transformation, in the southwest corner of the block 'Verket'. The site is today a very two-sided space with clearly present borders. The public graveyard with its lush greenery meets the fenced grey industrial area very abruptly. This duality holds a strong tension and bears some critical moments of interaction, even more so in the future. The graveyard, which also serves as a recreational space, is characterised by the large old tree alleys and a green, quiet atmosphere. On the other side of the fence, 'Verket' is strongly defined by heavy industrial work. Almost the whole area is covered by asphalt and concrete and made for vehicles rather than humans. Even though the area is today not accessible, certain qualities are visible and show the potential of the site.

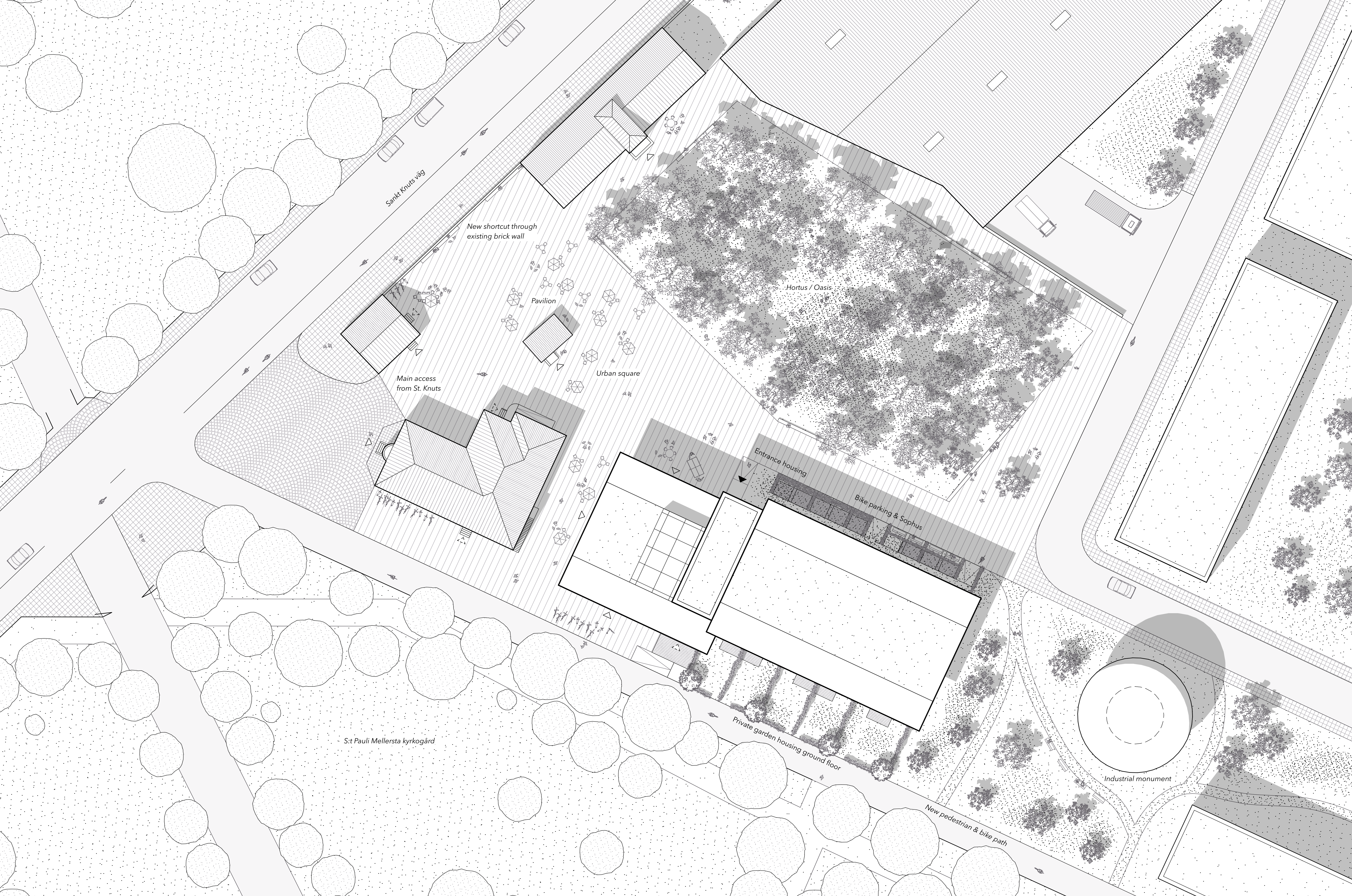
Directly in the corner towards St. Knuts väg, a group of older brick buildings form the entrance to the block. The buildings hosted mainly personal rooms such as changing rooms and canteen as well as offices and the gatekeepers workspace in a separate pavilion. The houses went through several transformations and are still used as offices and administrational spaces to date. The original details are mostly kept and the buildings are today contemporary witnesses to the history of the site. Furthermore, the big gas tank on the site as well as the iconic brick wall towards St. Knuts väg complement the historic ensemble. The majority of the buildings on the site are of cultural-historical and identity-generating value according to Malmö Stadsbyggnadskontor.[35]

35 Malmö Stadsbyggnadskontor (2008), 'Norra Sorgenfri Planprogram' [online], accessed 20.5.2023

View from St. Knuts väg through the historic entrance into the Kv. Verket.

View from the graveyard into Kv. Verket. The area is characterised by hard surfaces and an environment built for machines rather than humans.

S:t Pauli Mellersta kyrkogård (graveyard) looking from south towards Kv. Verket and the new residential block behind. The graveyard is also used recreationally and is characterised by the large tree alleys.



Sankt Knuts väg
New shortcut through existing brick wall
Pavilion
Hortus / Oasis
Main access from St. Knuts
Urban square
Entrance housing
Bike parking & Sophus
S:t Pauli Mellersta kyrkogård
Private garden housing ground floor
Industrial monument
New pedestrian & bike path

CONNECTING AND AMPLIFYING

The historical entrance to the site is experiencing a revival with the transformation. The main access from the city via St. Knuts väg leads past the gatekeepers pavilion onto a new urban square. There, a stone pavement relating to the existing surfaces of the area connect all the public spaces. The heart of the entrance sequence is the protected green area which forms an oasis available both for the future locals and visitors. All the public functions are able to extend and use the square, thereby creating a vivid space. From the square, the old gas tank is visible and forms an important sightline, which together with the industrial brick buildings immediately anchor the place both in history and present.

The former sharp border between graveyard and the block is carefully opened up. Where the fence once was, a new pedestrian and bike path connects the place towards Nobelvägen in the west. The important main alleys of the graveyard are continued and connected to the new path, therefore allowing a more free movement within the new area.

The case study itself is positioned alongside the graveyard and divided in its volumetry. The slight shift creates an articulated volume and offers different connections to the surroundings. Towards the square in the north, the building has a strong presence in space. A pergola-like structure in front of the building combines housing functions such as bike parking and recycling station as well as providing public benches towards the square. This element acts as a buffer between the public and the house, creating a soft but determined boundary. On the south side, the housing on the ground floor has private gardens as a buffer zone towards the pedestrian path and the graveyard. The western part of the project hosts public spaces in the ground floor which can extend all around the house onto the square.

All together, the newly created urban space is thought of as different functions and surfaces that blend into each other, creating a vivid and fluid movement whilst still establishing different spheres and distinct characters.

Previous page:
Siteplan of the new urban plan with the case study | 1:500

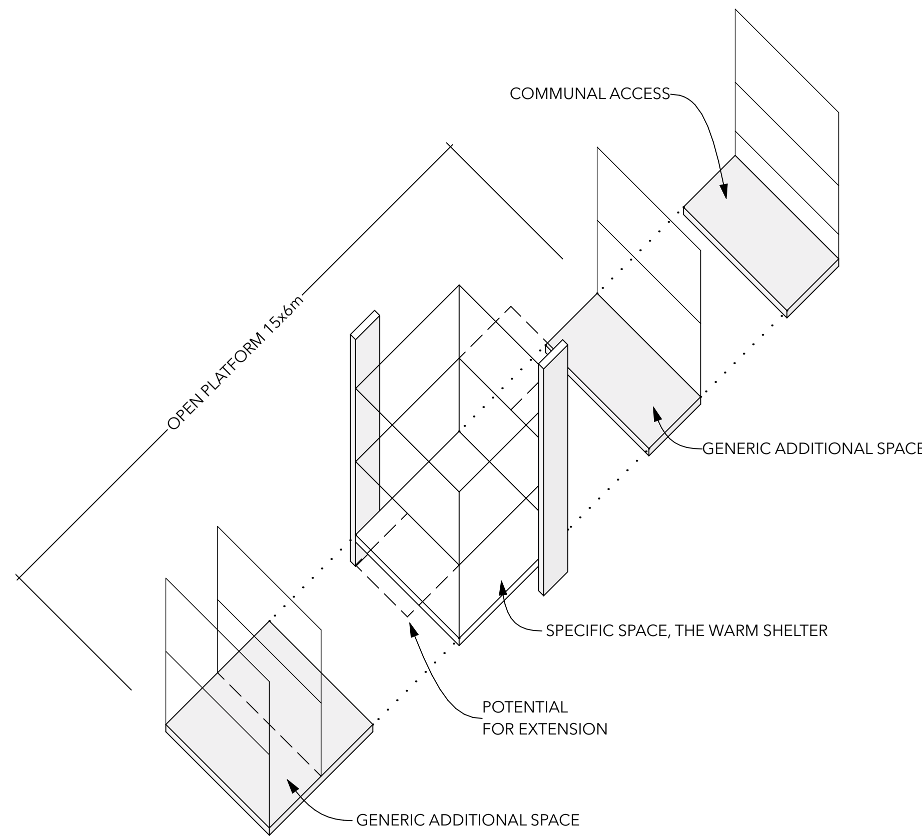
N 10 m

Bottom:
Outer view from the new urban square towards the old gas tank.

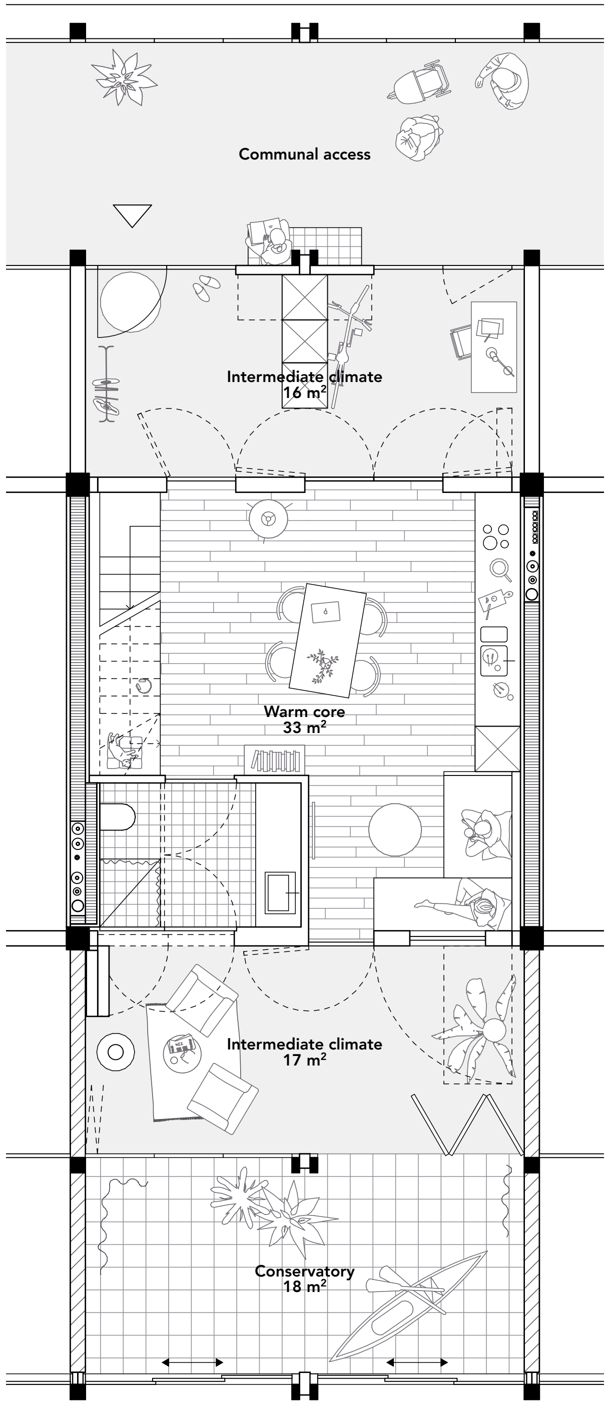
PERFORMATIVE DWELLING

The project was developed from the inside, early on with a focus on the dwelling. Rooted in the theoretical explorations and learnings, the proposed flat is a possible answer to the question of how an adaptable and seasonal living could look like. The following performative dwelling investigates a new typology and builds the foundation for the case study.

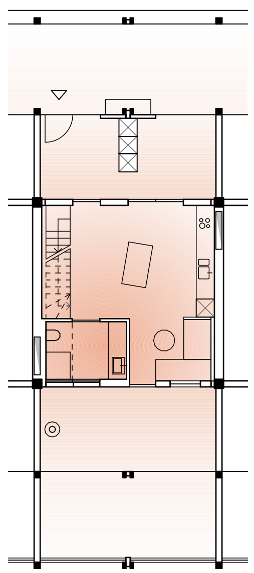
Three climate zones are arranged in a linear manner from north to south. The outer layer consists of a communal corridor towards north and a private conservatory towards south. At the core of the flat lies the 'winter cottage' which is the most insulated part and also hosts all the basic functions and installations. The intermediate climate is part of the private domestic space but can be conditioned/ used with either of the other zones. The flat can grow and adapt with the seasons and based on the needs of the inhabitants.



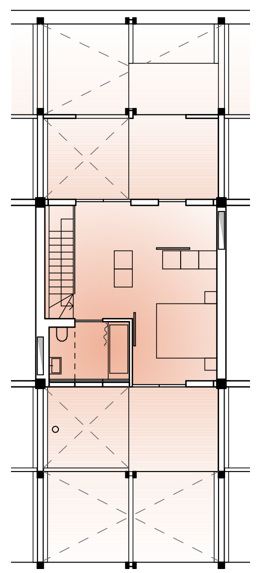
Concept diagram of the performative and programmable dwelling



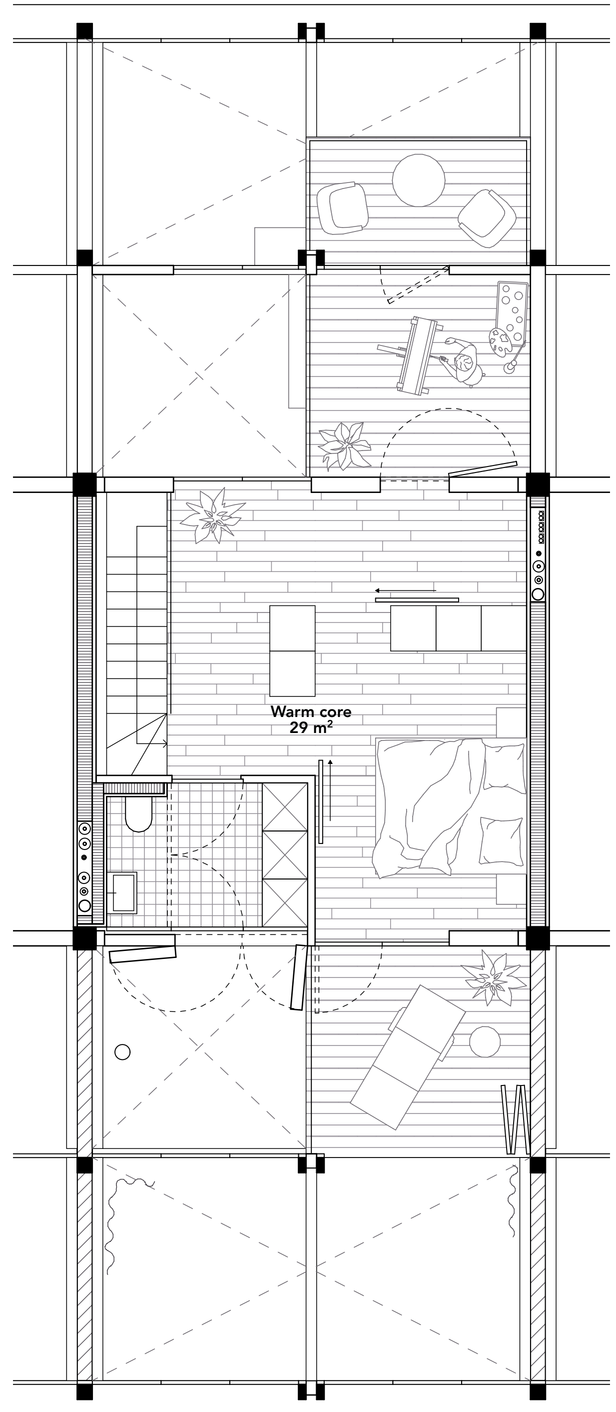
Entrance floor performative dwelling | 1:100 N 2 m



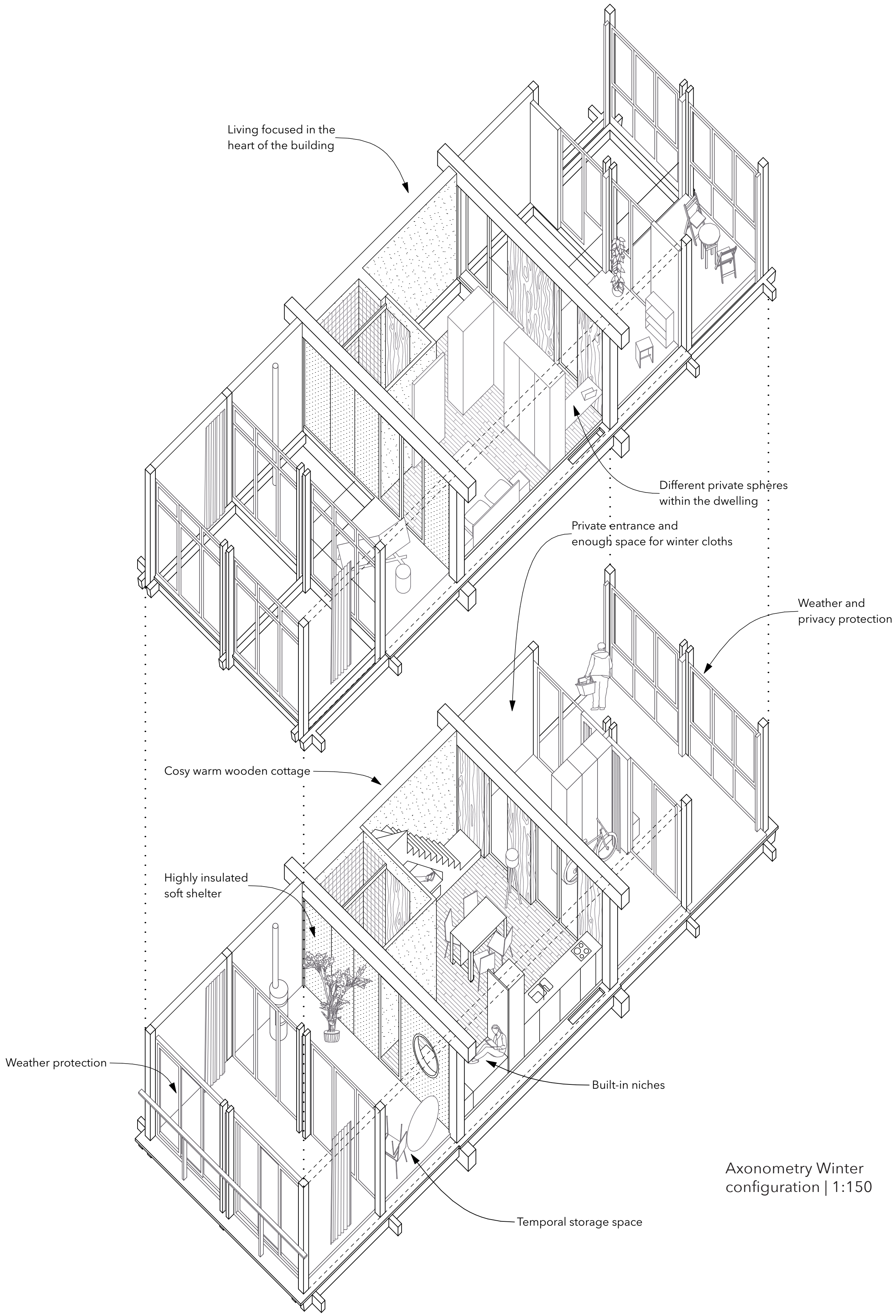
Entrance floor
temperature zones



Upper floor
temperature zones



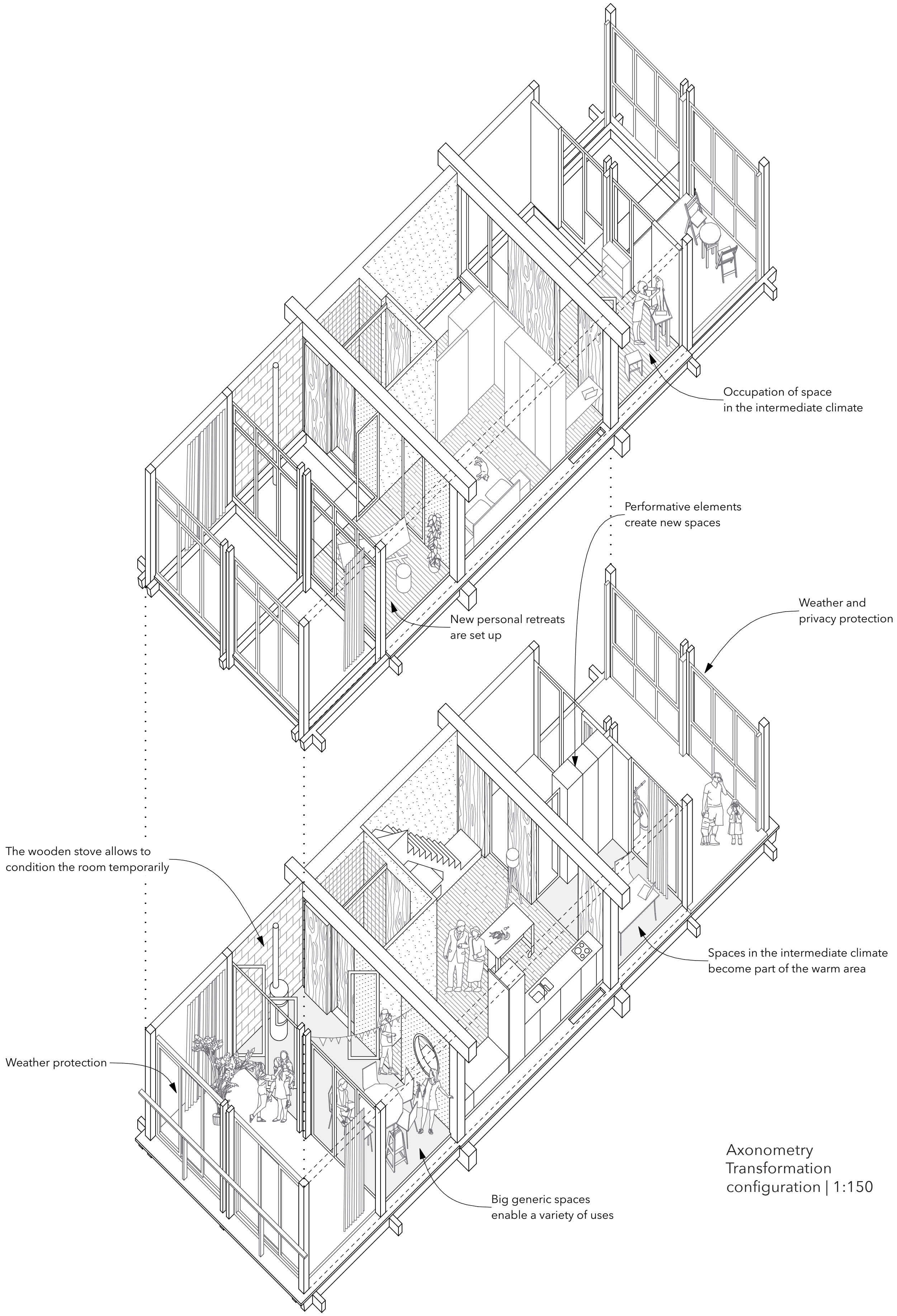
Upper floor performative dwelling | 1:100 N 2 m



Axonometry Winter configuration | 1:150

WINTER COTTAGE - CONDENSED LIVING

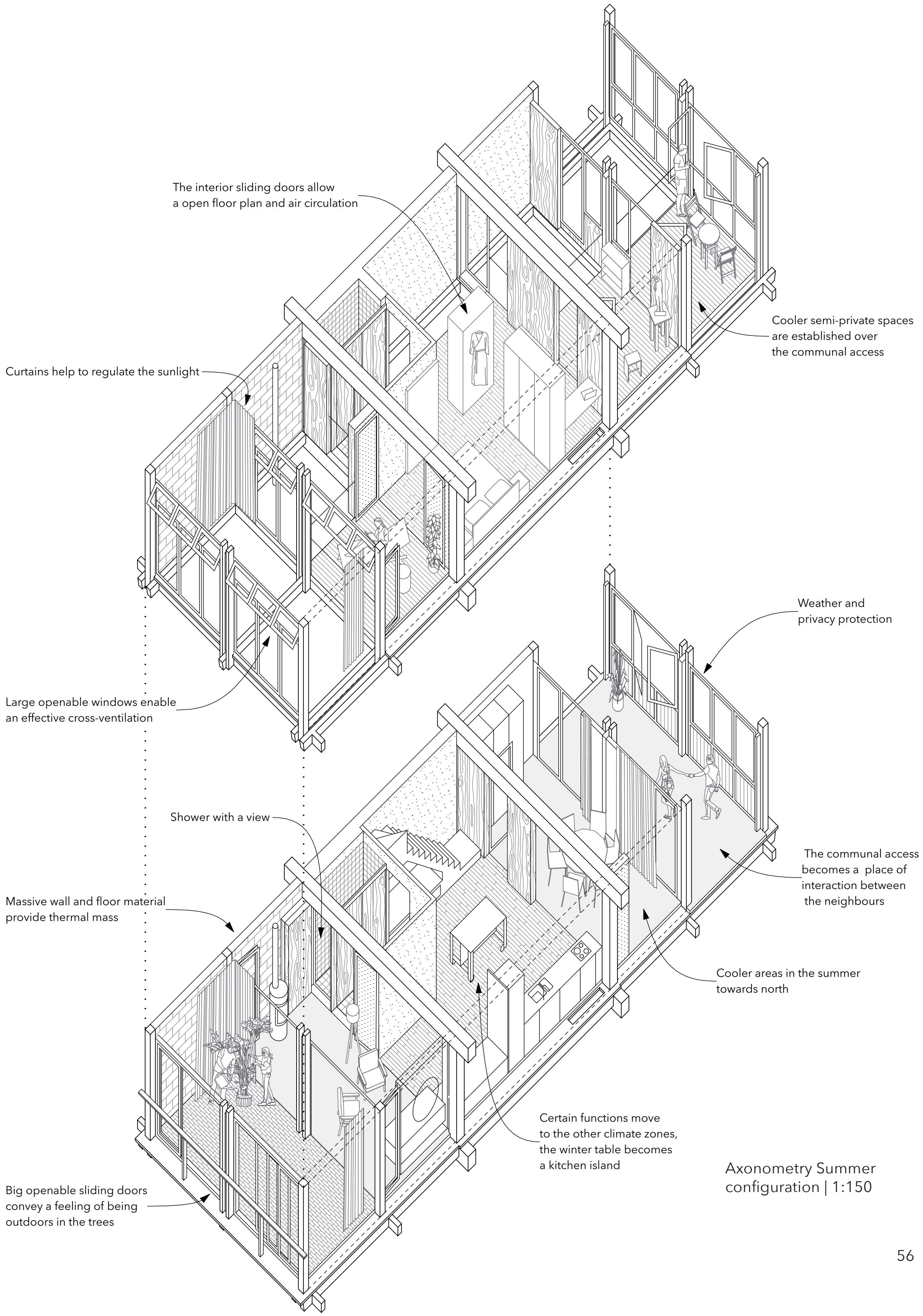
The atmosphere is characterised by the warm wooden surfaces in the central area of the flat. Here, an insulated and warm cocoon allows the inhabitants to comfortably spend the coldest weeks of the year. Double height spaces of the rooms in front let the low angled sunlight reach deep inside the flat. Carefully composed axialities anchor the room in itself and create a framed connection to the surrounding spaces. All basic installations are organised in the central space, allowing a compact but pleasant life during winter time. The surfaces of the warm wooden core on the outside, towards the intermediate climate, are only covered in fabric, allowing the construction to naturally breath and renounce the use of any vapour barriers. This also adds an atmospheric quality to the winter cottage, making it appear as the soft and cosy shelter it is.



Axonometry
Transformation
configuration | 1:150

TRANSFORMATION - OPENING UP

When the first warm days arrive, the dwellers slowly claim more space. The flat is extended to host additional events such as family gathering or to reactivate the personal little ceramic atelier. Different movable elements allow to create new room configurations and hereby also partly climatise the intermediate zone. A wood oven in the south allows to even actively condition the space for certain occasions, making it possible to use this room during a much wider timespan of the year. The intermediate climate is characterised by a neutral homogeneity of discrete plaster walls with wooden details. The materiality reflects the generic nature of the space and allows further customization by the inhabitants.



Axonometry Summer
configuration | 1:150

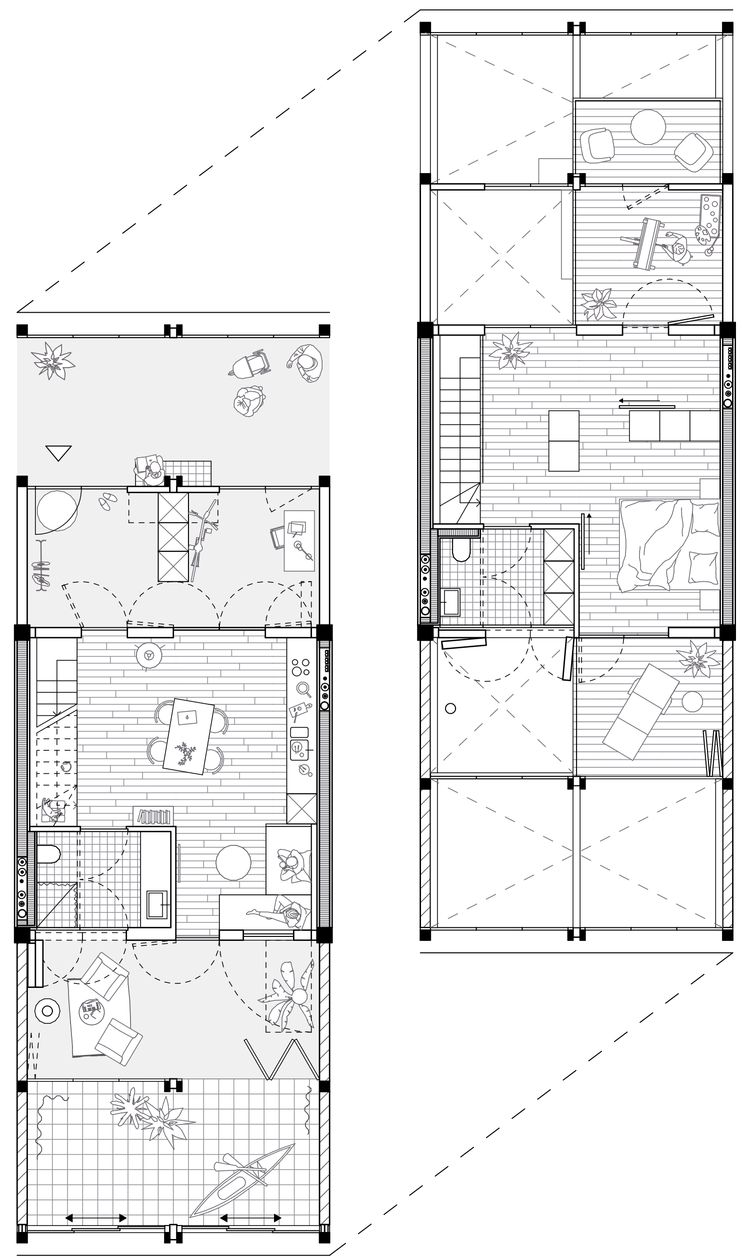
SUMMER HOUSE - A HOUSE WITH A GARDEN

With the warmest season, the dwelling reaches its maximum extension. A state of freed living, the comfort of owning a 'house' in the city. The conservatory can be used as the plot around a house - a green garden, a place to fix your bike, a retreat to relax, a space to fulfil the inhabitants vision. Everything seems possible! The raw and mineral materials of the space both indicate the rougher use of the space as well as providing thermal mass. The high sun energy is absorbed by the brick wall + floor and slowly released again. Together with the fully openable glass facades and the curtains , a quick manual regulation of the indoor climate is achieved. In the insulated core and towards north, cooler niches are established to spend the time during very hot days.

VARIATION OF THE TYPOLOGY

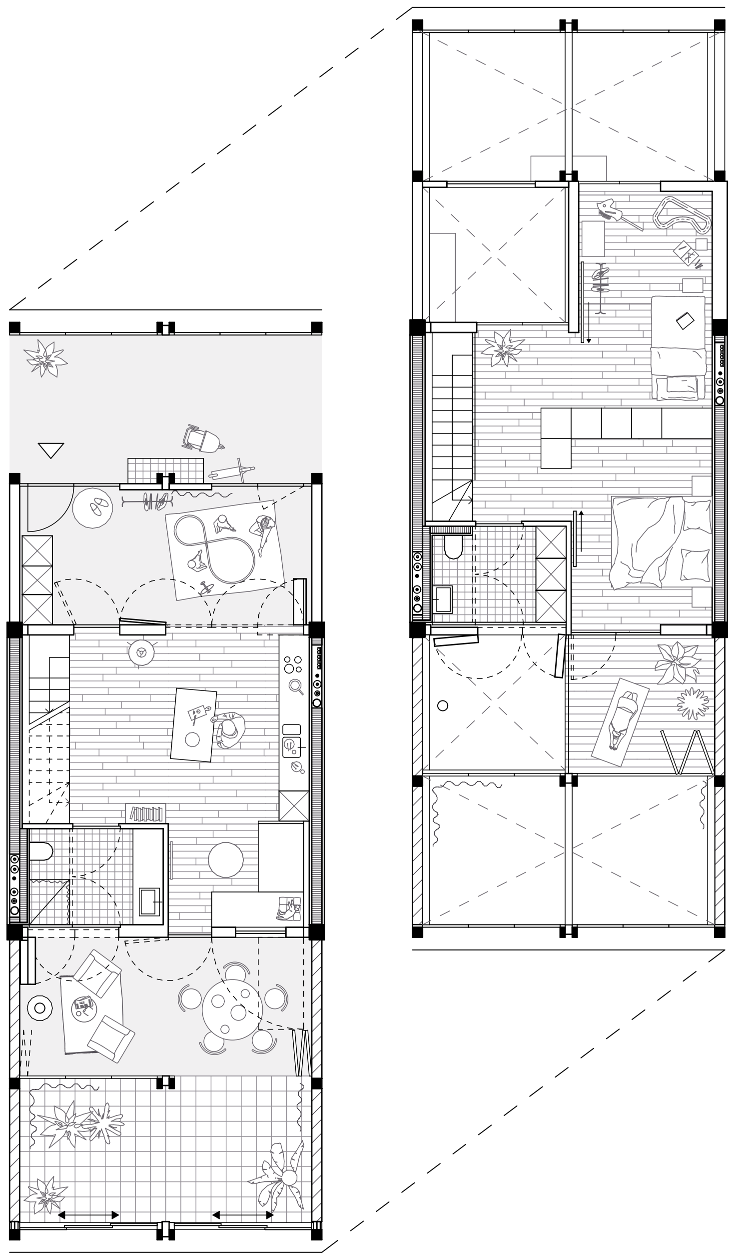
The aspect of temporality in the performative dwelling is not only defined by the seasonality, it also can change in relation to the lives of the inhabitants. The housing programme is embedded in a structural timber grid that allows flexibility and alteration within this system. Walls can be shifted or added, and therefore also the borders of the climate zones can be negotiated. The simple construction allows the inhabitants to change their flat themselves. In regard to a circular economy, this means that residents can also design individual "infills" themselves with reused components (frames, cupboards, wooden panels, curtains). Compared to contemporary housing with very specific floor plans, the proposed system provides a variety of generic spaces that enable individualisation. Since household composition and size vary over time, rooms or spaces can be added and changed to fit the current need. With that possibility, inhabitants can, if desired, remain for a much longer time in the dwelling, making it their own home. It provides the versatility and possibility to grow and adapt over a lifetime. A vertical variation in numbers of floors per flat as well as special situations such as corners provide a diversity in possible housing types. A selection of these variations are shown on the following pages. The different types include:
- Standard flat (basic type)
- Extended in intermediate zone (eg. extra bedroom)
- Triplex (additional level)
- Corner
- Studio

More alterations are implemented in the overall floor plans, showing the potential of the created system in its ability to host a big variety of households and lifestyles.



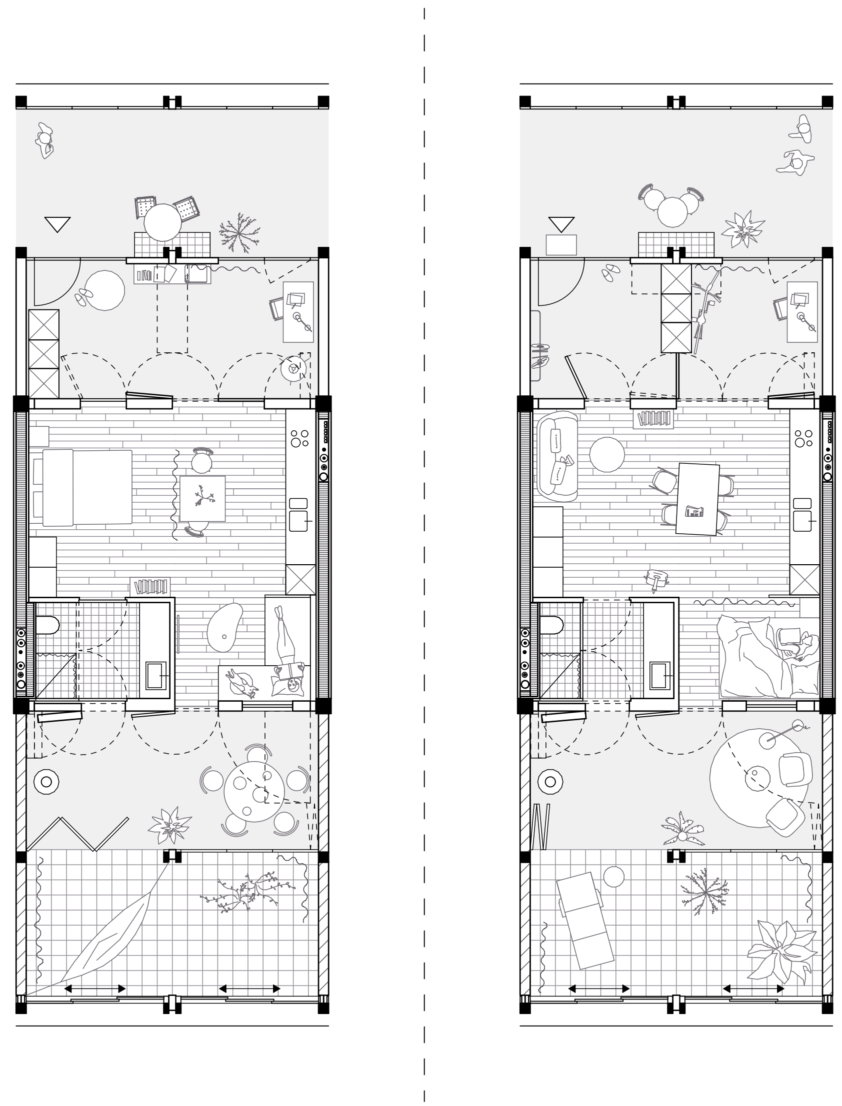
Standard type with one bedroom and additional semi-outdoor spaces in the intermediate climate zone. | 1:150

N 3 m



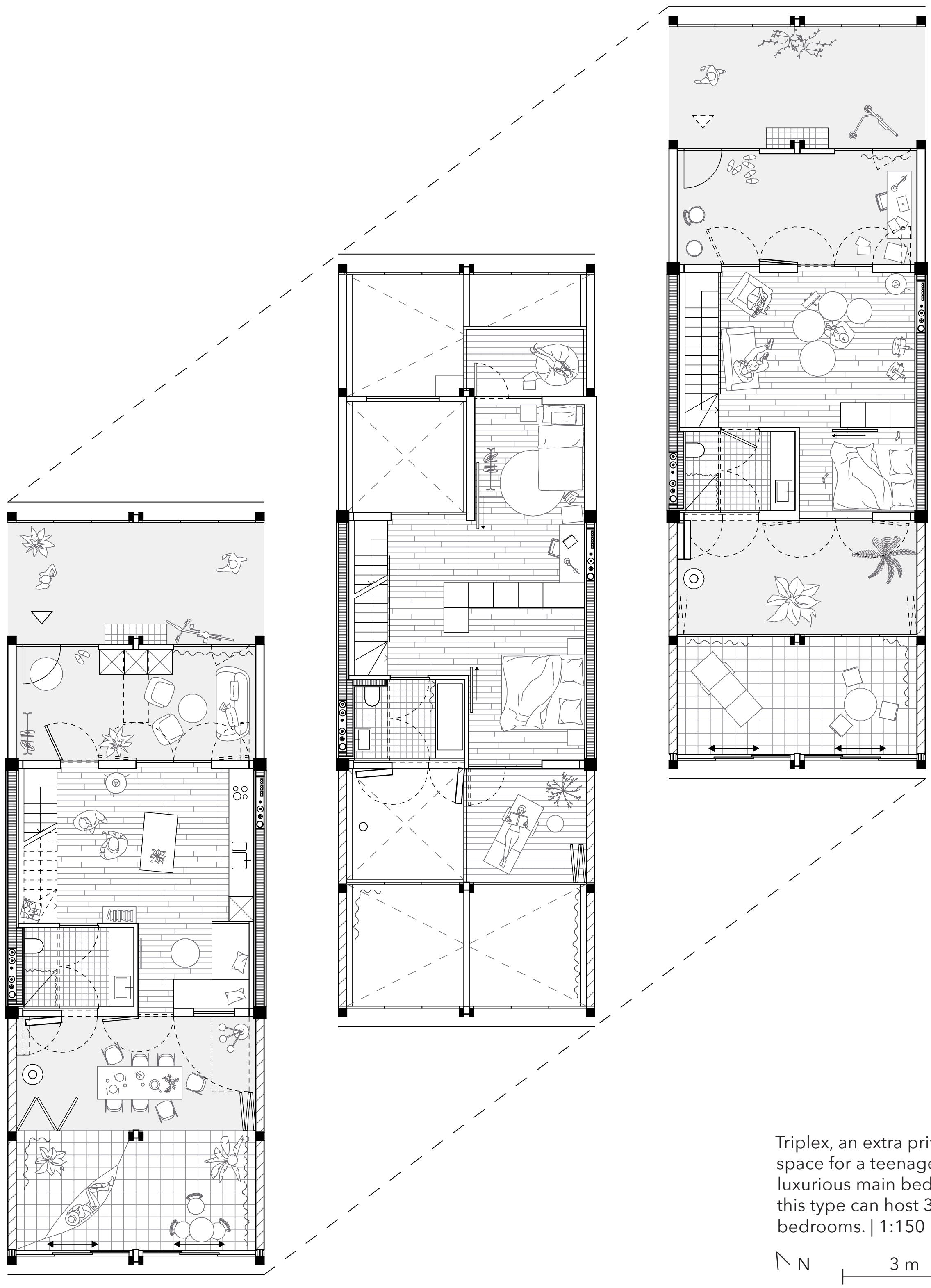
Extended dwelling with an additional kids bedroom. The dwelling hosts both social spaces and individual retreats. | 1:150

N 3 m



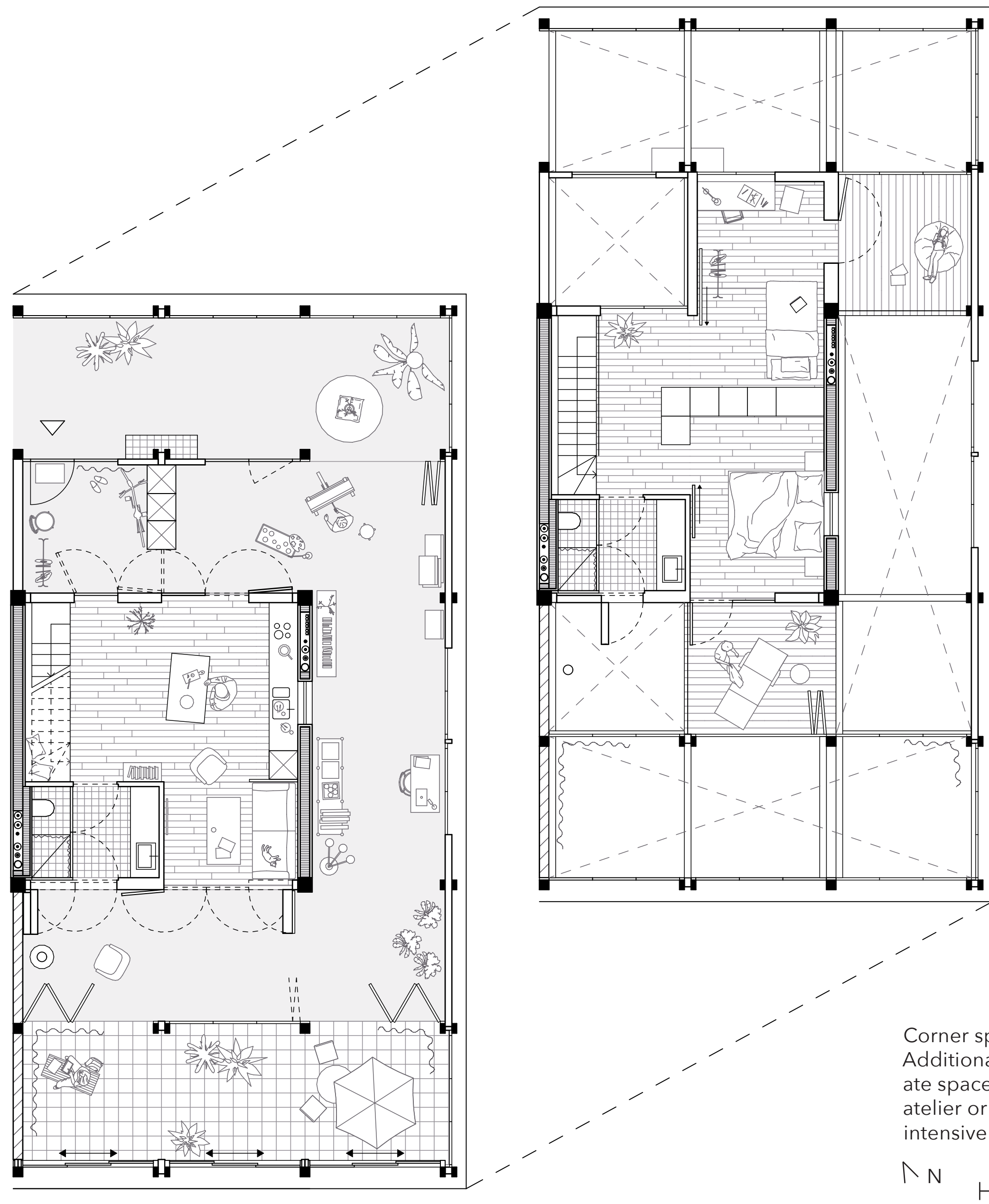
Studio type, within the winter zone, a variety of different organisations can be implemented. Two different options are shown here | 1:150

N 3 m



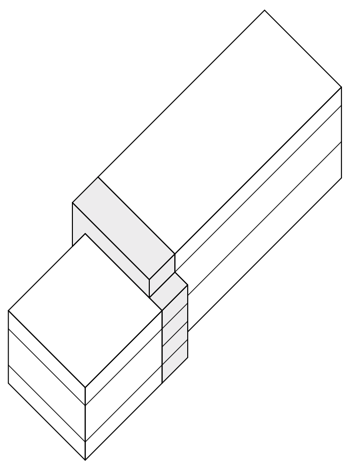
Triplex, an extra private space for a teenager or a luxurious main bedroom, this type can host 3-4 bedrooms. | 1:150

N 3 m



Corner special case. Additional intermediate spaces allow for atelier or other space intensive uses. | 1:150

N 3 m

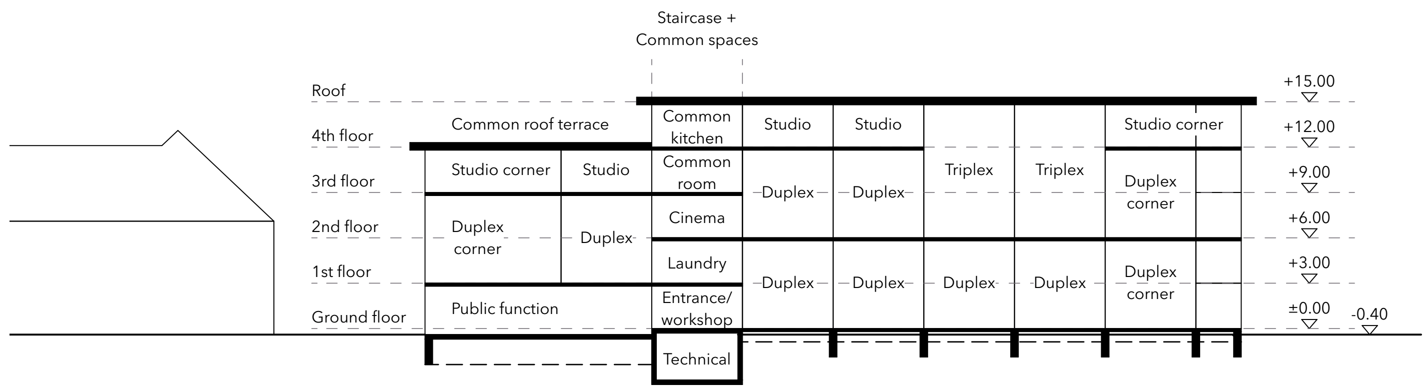


Volumetric diagram of the communal functions at the heart of the building.

PROGRAMME OF THE CASE STUDY

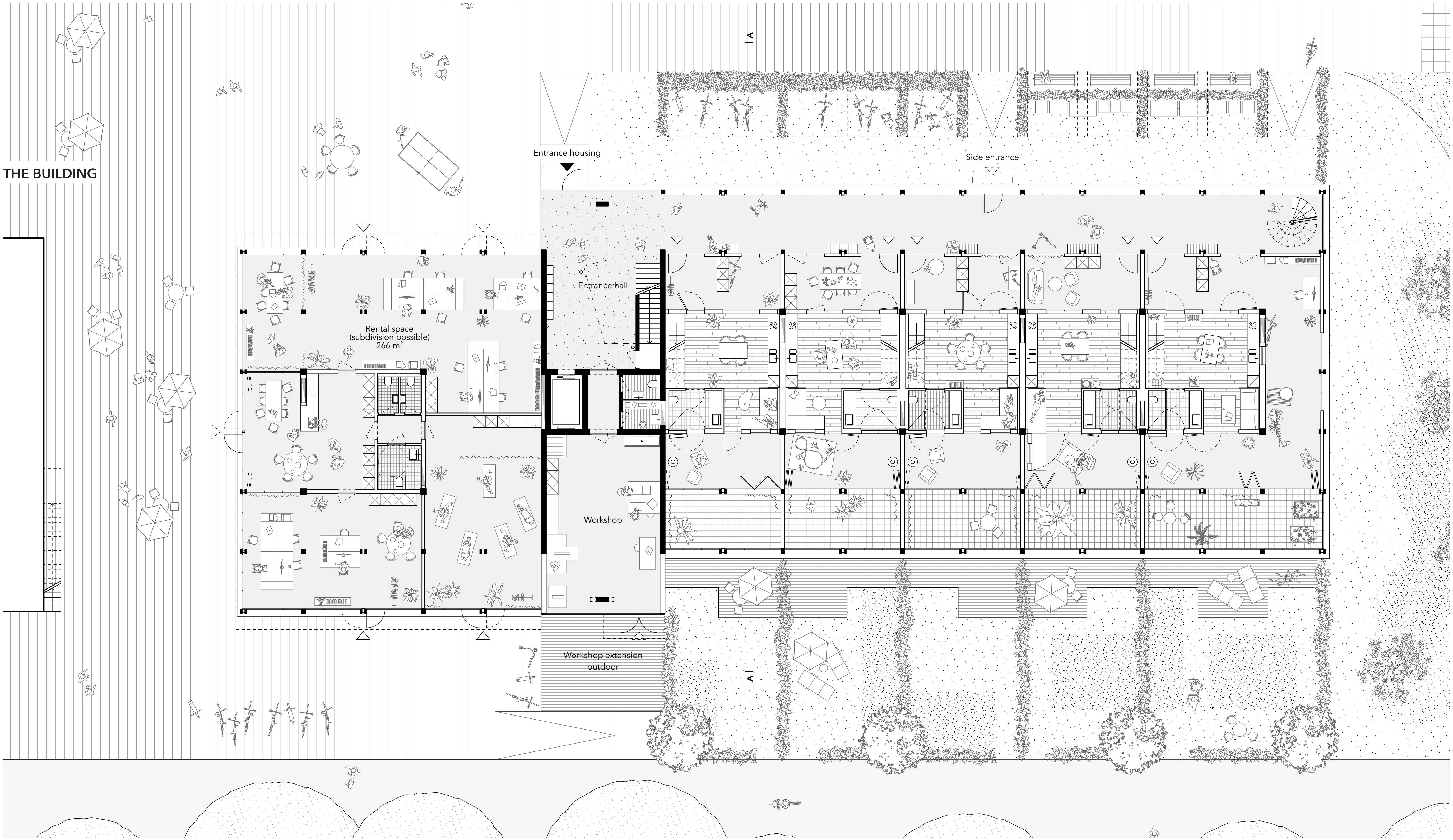
The intersection of the two main building parts host communal functions. The shared spaces include a workshop area on the ground floor, laundry room and a cinema in the middle and a double floor communal room with kitchen and access to the communal roof terrace on top. Linked to the communal heart of the building, a variety of different flat types are connected via a communal access corridor from the central staircase.

The variety of housing types and sizes on each floor ensures a colourful mix of different lifestyles next to each other. Synergies are created: Pensioners watch the children from time to time and the computer scientist from the studio on top helps the older couple with IT problems. Through these interactions, social security and an efficient use of resources are achieved.

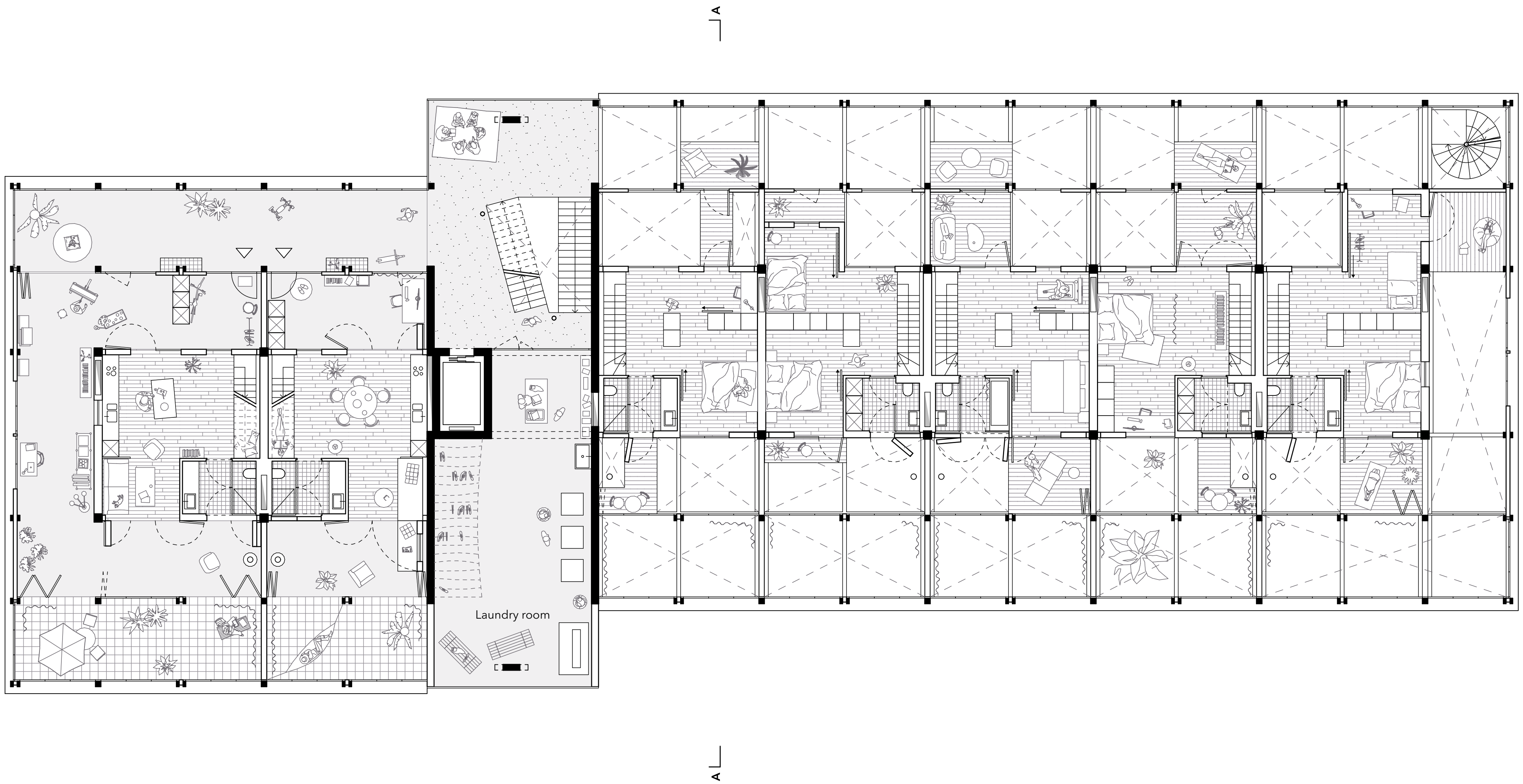


Programmatic diagram of the case study.

THE BUILDING

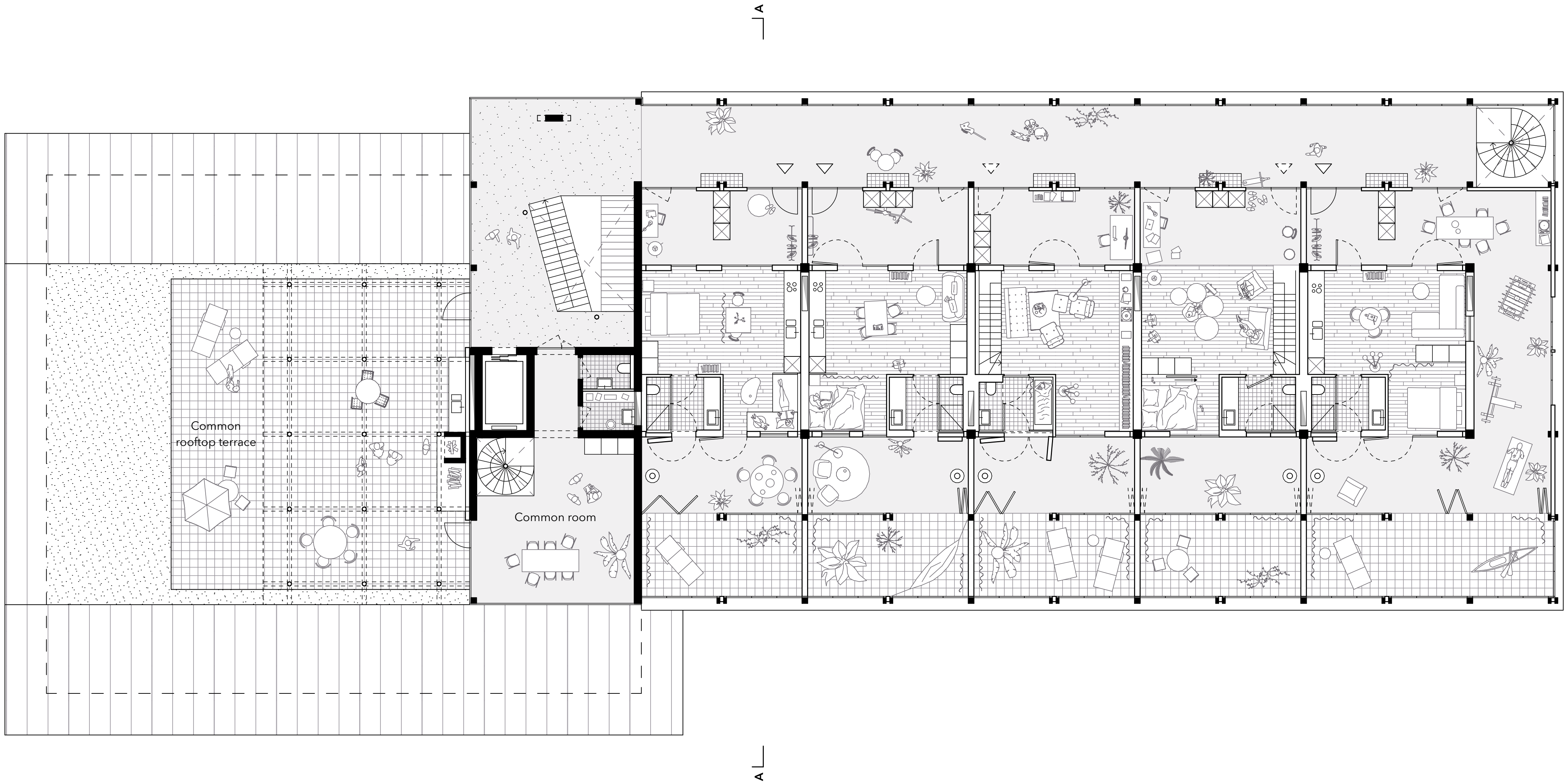


Ground floor | 1:200 N 5 m



A simple grid forms the framework for the implementation of a wide variety of households and phases of life. It creates the basis for different flat types, standards and degrees of privacy. A uniform wooden skeleton of columns, beams and slabs, forms the structure of the flats. It can be flexibly filled and changed over time.

1st + 3rd floor | 1:200 N 5 m



4th floor | 1:200

N

5 m

Towards the public square the communal access corridors are located. Together with the central staircase they connect and access each individual dwelling. The translucent material in the window sill provides a certain protection but at the same time, the silhouettes of people moving inside the building will be visible on the north facade just like on a cinema screen. The activity of the residents activating the building and forming a dynamic public identity. With its communal character the access corridor provides a buffer zone between the public and the private spheres. The double height spaces on both sides allow light to reach deep inside the building while also supporting an effective cross ventilation.

Section A-A | 1:200

6. REFLECTION

PROCESS AND OUTCOME

The process of this thesis led from an abstract idea about climate zones to the specific case study with a new typology of living. During that work, different focuses and interesting topics were touched upon. A critical reflection on dwelling and the production of housing today, the transformation of Norra Sorgenfri with its 'Tabula Rasa' attempt and the creation of a new typology to just name a few. While all these aspects have their justification and importance in regard to the topic, the most focus was on the typology. The critical reflection of housing production today led to a new typology of living with the seasons and in different temperature zones within a dwelling. This gradient of temperature has not only an impact on the (building micro-) climate but also spatial qualities. Along this gradient, the dwelling changes from a very specific space (the winter cottage) with its basic and distinct functions to extremely unspecific and general spaces around it. These generic spaces bear unique qualities in themself and allow the dweller to use them in every thinkable way. With these unprogrammed spaces and the aspect of being able to extend and alter them, the typology as a system allows for a diversity in households types and sizes. The dwellings have been tested in a vertical grouping such as the triplex variation. A horizontal connection and extension of dwelling units is also possible and could be investigated in a further step. This would enable more free arrangement of the dwellings and create diverse in-between spaces.

In today's housing production the dwellings are most often designed for specific groups such as the core family, couple or single households. The flats for these groups are characterised by one big social room (living room), a bedroom with a double bed and smaller bedrooms. With the decreasing amount of square metres these flats get very specific and a change in the life of the dwellers may very quickly force them to move to another housing. With a more flexible and changeable system of dwellings such as proposed in this thesis, the possibility to remain in your flat is given. Families grow and shrink, maybe a room is rented out to improve the economy or the teenager child wants more of a private space. The time frame in this project is therefore not limited to the seasonal living but raises interesting and important questions about the temporal aspect of a dweller's life (within a building). The proposed dwelling could be, if desired, for a lifetime. A place to grow and to be changed over the years by the inhabitants, a home that adapts to both external and internal factors. A breathing space, possible to fill with life of all sorts.

During the process as well as in the presentation discussion, the square metres of a flat became a discussion point. The proposed dwelling with its winter area of around 62m² plus the 50m² in the other climate zones (without any extensions) are well over today's normal amount of space for a couple. I myself am quite critical towards this high amount of space and I believe that the whole dwelling could be made more efficient and compact to a certain extent. However, it will always be bigger than a contemporary specific housing solution. On the other hand the typology allows it to be altered and react to changes as discussed before. This flexibility and the potential to host more people than in the basic configuration makes the dwellings more feasible. The additional spaces can in my opinion also not be calculated in the same way as the heated inner space but is more to be understood as an extension like a winter garden on a house. Compared to single family houses with their own garden, the project is still more efficient in space use even with a higher number of square metres than a traditional flat. An important factor, especially when talking about the temporal aspect of the project, is of course the space usage of a dweller over their lifetime. It is likely that the overall space use is in fact minimised by the flexibility that this typology offers.

Furthermore, the dissolved functions of the outer walls into different climate zones allow for a simpler and cheaper way to build and opens up for the possibility of reuse. Reusing old building elements often creates the problem that they don't hold up to the current standards and energy requirements. With the climate zones the layers have different requirements and allow in parts lower standards.

The typology of seasonal living was interesting to investigate and dive into. I believe that it is a valuable contribution to the question of how to dwell now and in the future. The typology itself is however also contradictory, especially in northern countries. In wintertime, daylight is a rare good but at the same time the insulation in the shape of the buffer zones make the inhabitant stay in the most distanced place from the facades. There is obviously a discrepancy between insulation and daylight, which becomes extremely clear in this thesis. To tackle this issue, the dwellings have double height spaces towards south and a high proportion of translucent materials. Towards north, there are more closed and better insulated elements to prevent heat loss. The building itself is based on a 3m grid and became in the end configuration quite deep with 18m. A more compact and smaller grid size could be looked into. Further investigations and simulation of both the daylight within the winter house as well as the efficiency and technical aspects of the buffer zones are necessary to determine further the practicality of this typology. In this thesis I focussed on the architectural and spatial qualities and possibilities of living with the surrounding conditions.

PROSPECT AND LIMITATION

The current housing production is directed to a few stereotypical household types while trying to fulfil the needs of the masses. As a critical reflection on this, this thesis tried to establish an alternative way of living. It is clear that this typology is not for everyone, but it shows an alternative to current trends. While the thesis mainly focuses on the typology and the creation of a system, it would be very interesting to see in a next step the implementation of that in different contexts and with different functions.

Apart from conventional building processes, housing production in Sweden has already been a bit diversified and several different actors are testing alternatives in typologies (such as collectives or other alternative forms of households) as well as financial models ('Baugruppen', byggemenskap etc.). To further drive the proposed new seasonal typology, additional investigation in terms of regulatory but also technical aspects have to be done. Also an assessment of the interest and demand in this living typology would be interesting to look into. With these limitations in mind, the proposed typology could become an interesting addition to the housing market and activate a discussion about how we dwell.

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