



Learn to *Live with Less*



AR4AD150 Advanced Housing Design
MSc Architecture, Delft University of Technology

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5286026

June 26, 2026

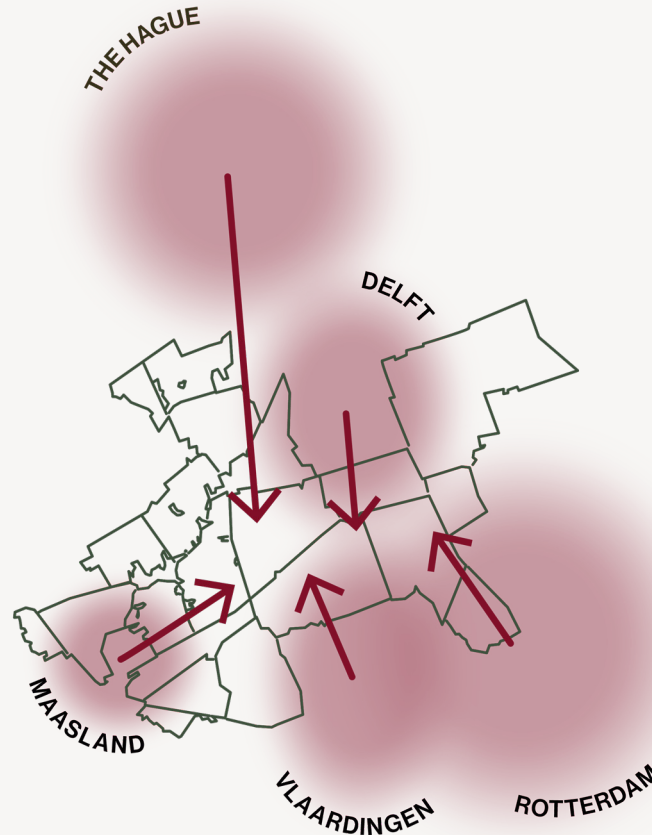
Responsible supervisor: **Olv Klijn**
Supervisor: **Robbert Guis**



I	Masterplan
II	Design process
III	Concept
IV	System
V	Housing types

Masterplan

Midden-Delfland



**THE GREEN LUNG IS UNDER PRESSURE FROM
BUILDINGS, RECREATION AND PEOPLE**

ZUS plan

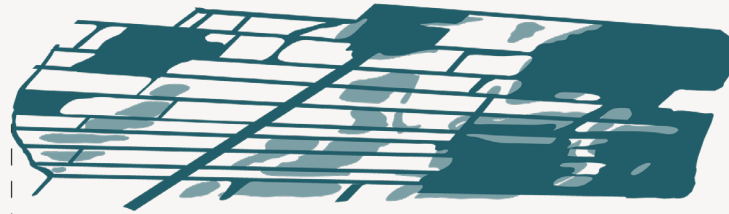


Vision

*“A **healthy living environment for people and nature**, where humans, animals and natural systems are functioning in balance. A community is being formed here, where everyone plays their part in striving for this healthy living environment. This project is a pilot in **nature driven approaches** to production, health care, recreation, work, education, biodiversity and water in the built environment.”*

New water landscape

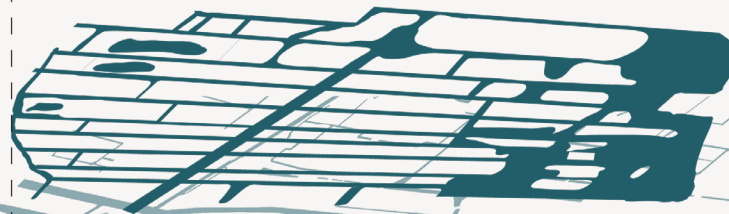
wet situation



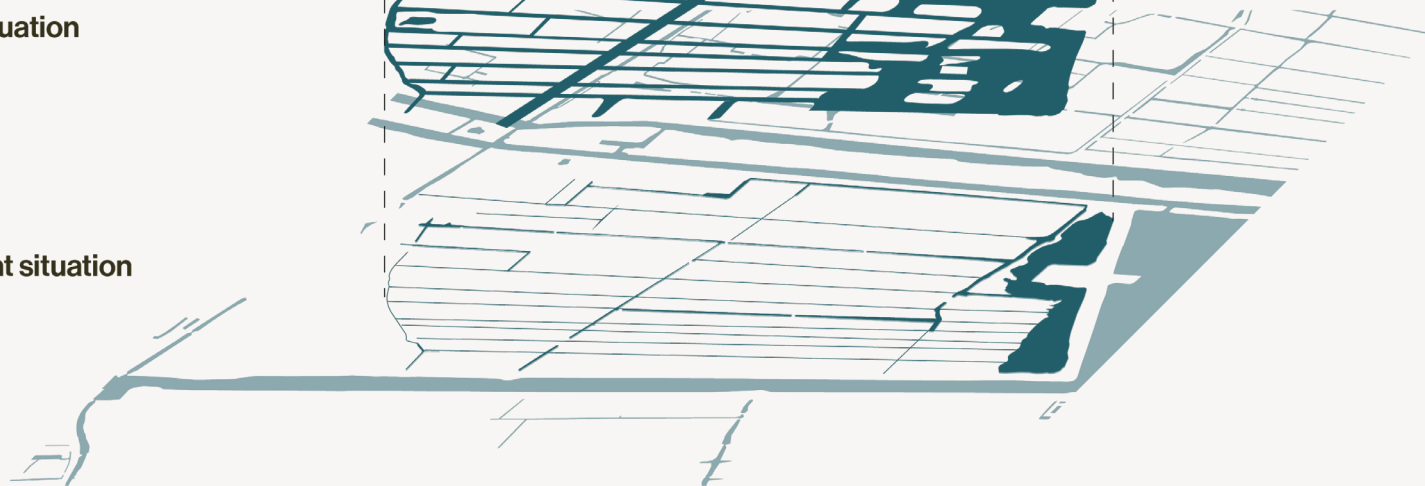
regular situation



dry situation



current situation



Masterplan



Six pillars of a healthy living environment



Design process

Recreation



Speelnatuur OERR
Tiengemeten



Nature playground Valbyparken
Copenhagen (DK)



Speelnatuur OERR
's-Graveland



Case studies



Naturbyen
EFFEKT



Geworteld wonen Rijswijk
INBO



Qville
Heem

Case studies



Cabin ANNA
Vermont (USA)



ESV 14
Qvist Arkitektur

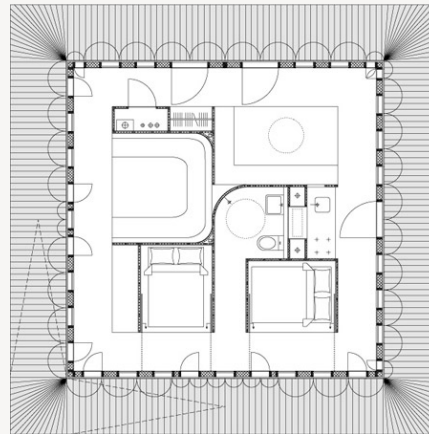


Lommerbergen
Sporthuis Centrum

Case studies



Medium Extra Ordinary
Common Practice



Merry-Go-Round
Bureau Ira Koers



House Like Village
Marc Koehler Architects

Floorplan studie

Space

53 m² (heated) living space per person
in The Netherlands

(CBS, 2022)

43 m² (heated) living space per person
in Europe

(RTL Z, 2024)



A2 presentation



Floorplan studie

Materials

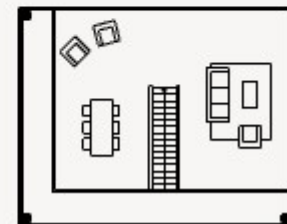
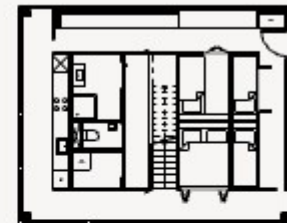
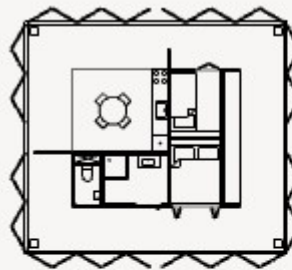
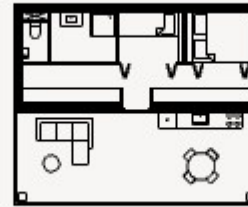
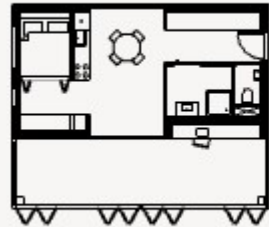
“More and more construction companies are struggling with a shortage of building materials. This particularly concerns companies active in residential construction [...].”

(Architectenweb, 2021)

Energy

“In a large part of the Netherlands, the electricity grid is virtually full (grid congestion). This is because there is increasing demand for electricity [...].”

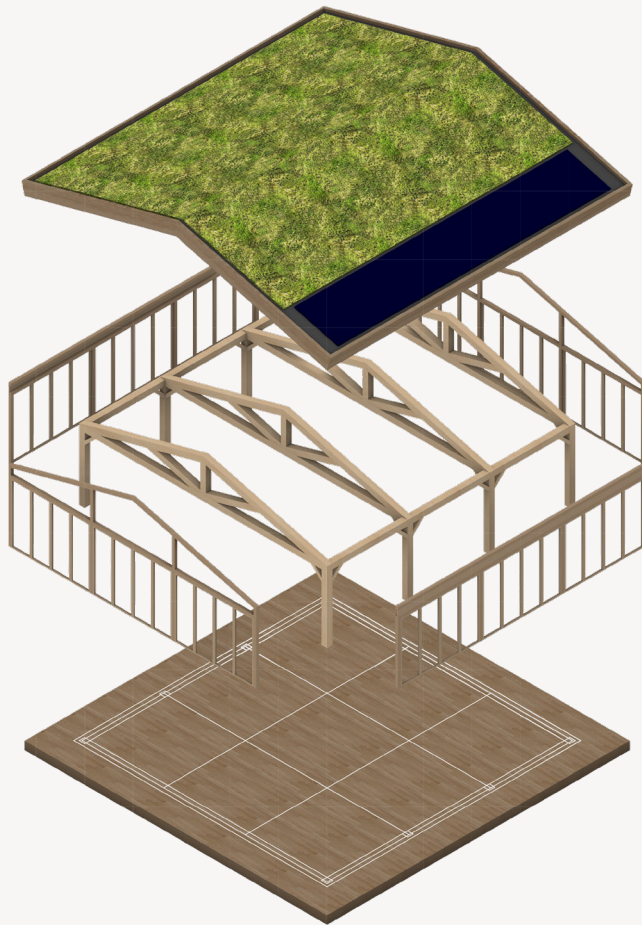
(Rijksoverheid, 2026)



What if...

We could create a housing system that encourages people to live with less: less heated living space, fewer materials and lower energy consumption, while offering a closer connection to nature

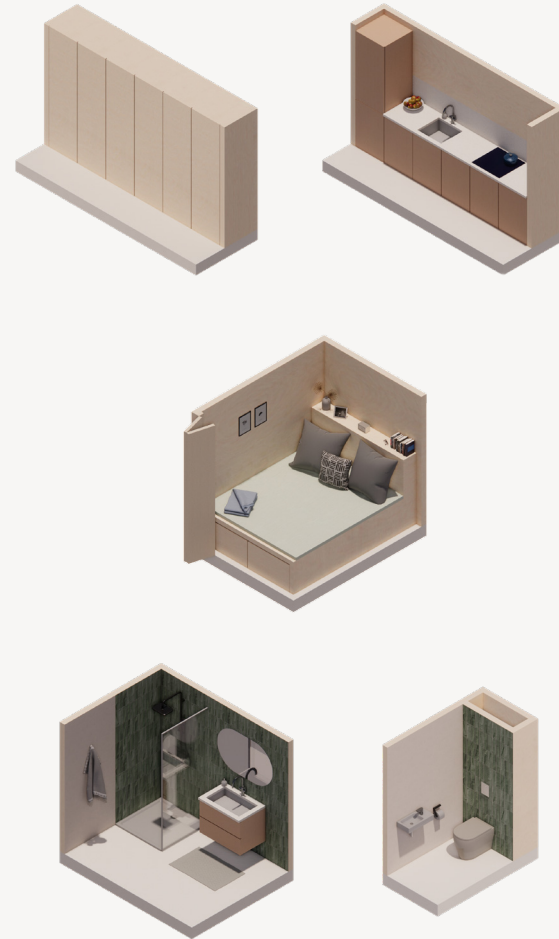
Concept



Raincoat

*With 3 different climate zones:
heated, insulated and rain & wind proof*

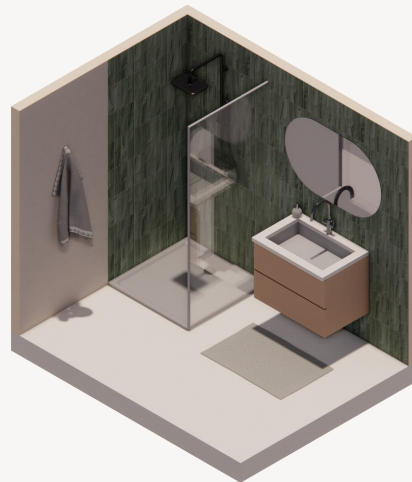
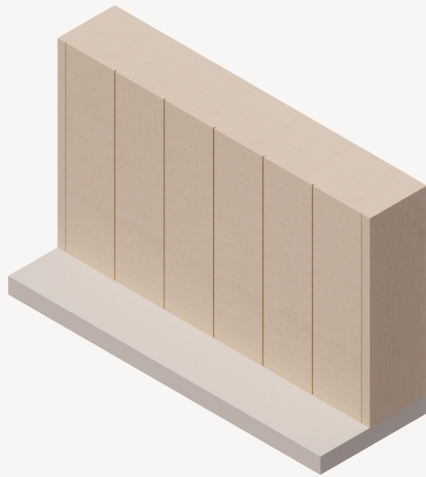
+



Elements

System

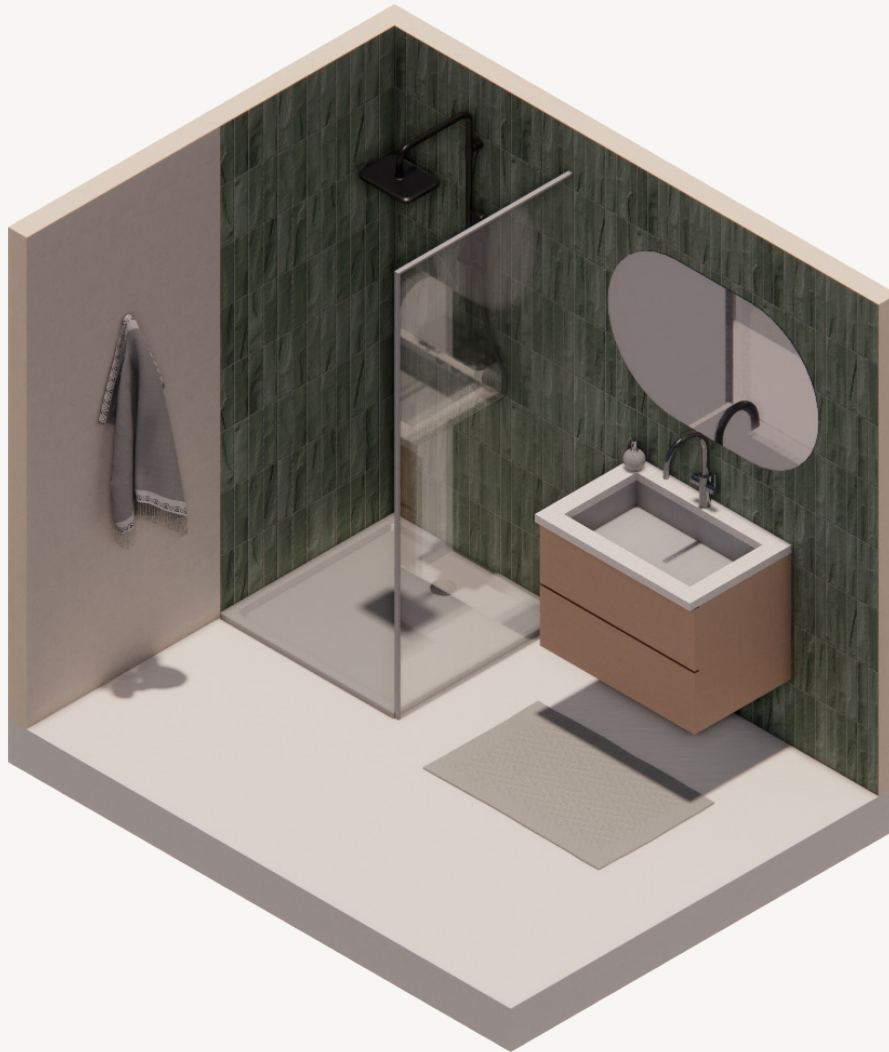
Elements



Bathroom & Toilet



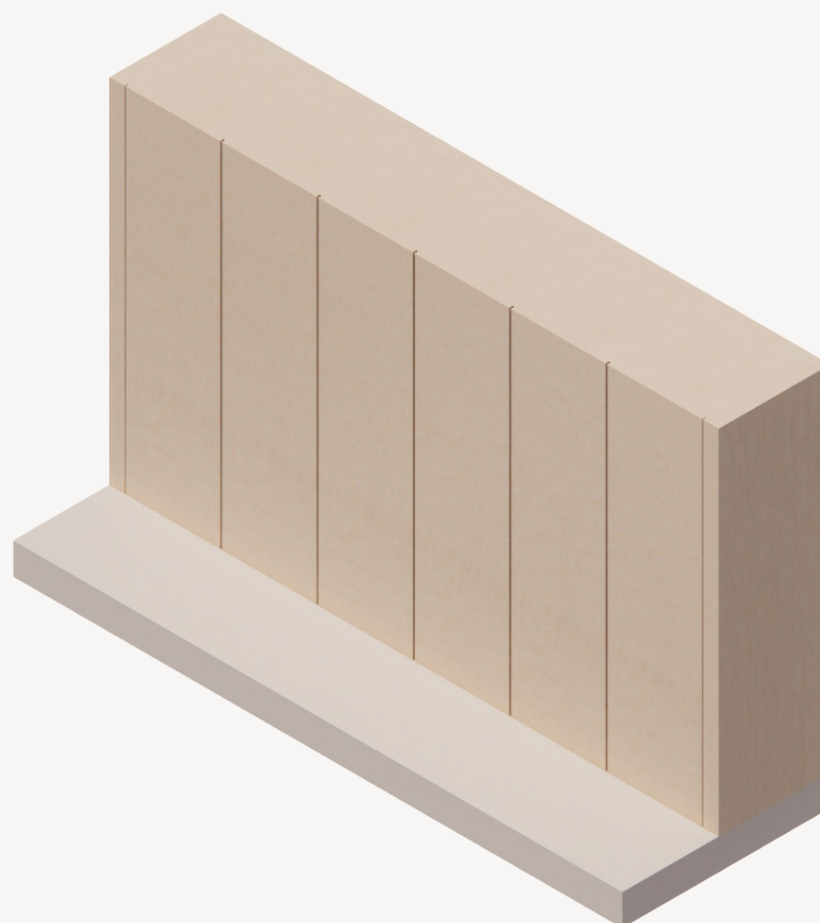
Climate
Heated
19 - 25°C



Kitchen & Storage wall



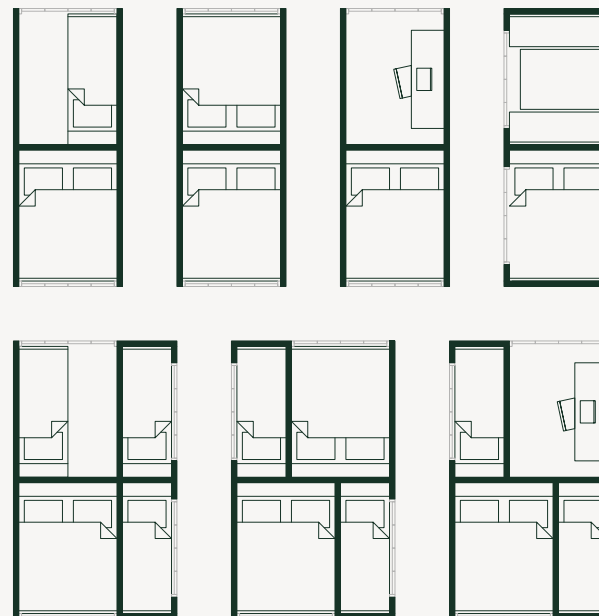
Climate
Insulated
15 - 25°C



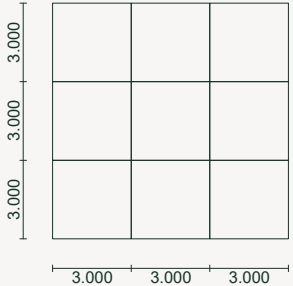
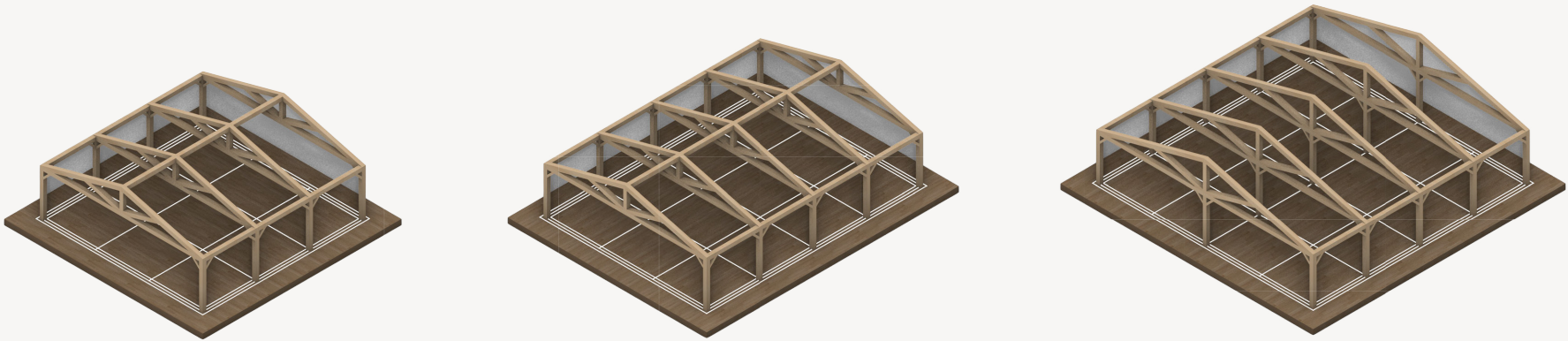
Box beds



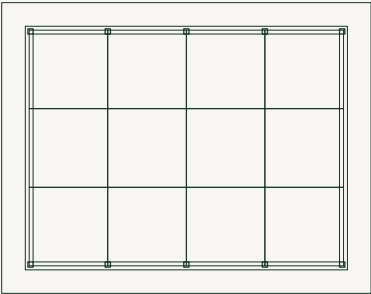
Climate
Insulated
15 - 25°C



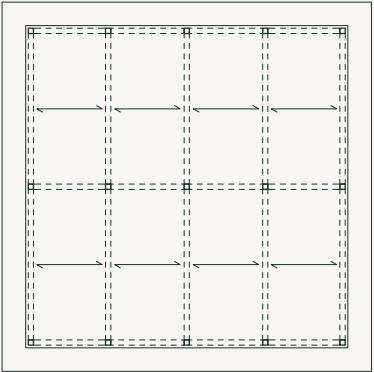
Construction



Grid basis



Add structure



Construction

Materials

1:30

Roof

- PVT-panel (40 mm), rails, framing (40 mm)
OR
Sedum (30 mm), substrate (60 mm),
Water drainage (10 mm)
- Eco EPDM
- Water retaining layer
- Timber frame construction with
Gutex thermoflex wood fiber insulation
244 mm ($R_d = 6,7 \text{ m}^2\text{K/W}$)
- Vapor barrier layer
- OSB board (18 mm)
- Birch plywood (12 mm)

Folding doors

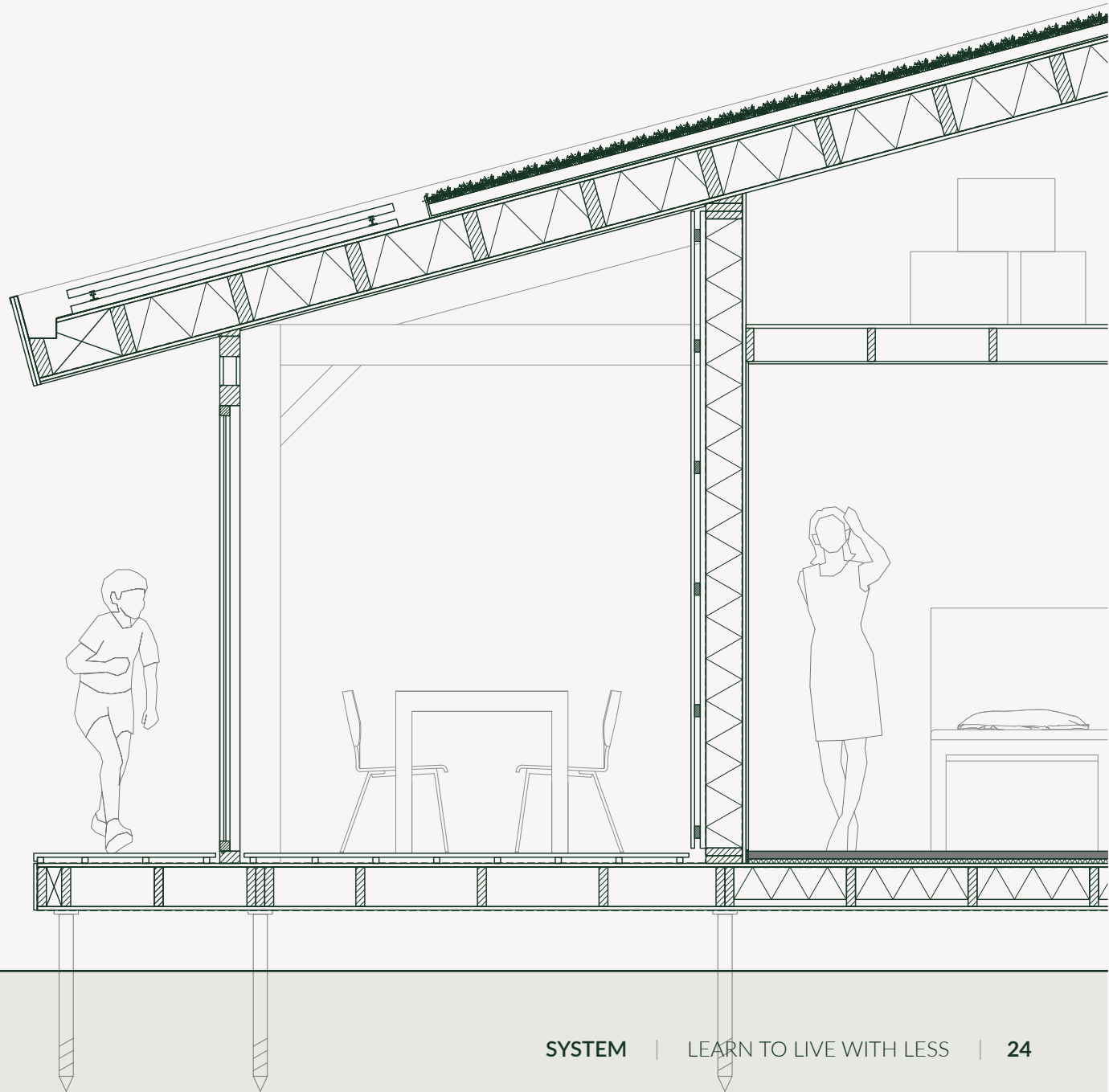
- Timber frame
- Single glass with condensation profile
- Sliding rail

Insulated wall

- Timber cladding (18 mm)
- Timber framing (2x 28 mm)
- Water retaining layer
- Gutex thermoflex wood fiber insulation
180mm ($R_d = 5,0 \text{ m}^2\text{K/W}$)
- Vapor barrier layer
- Chipboard (18 mm)
- Birch plywood (12 mm)

Floor

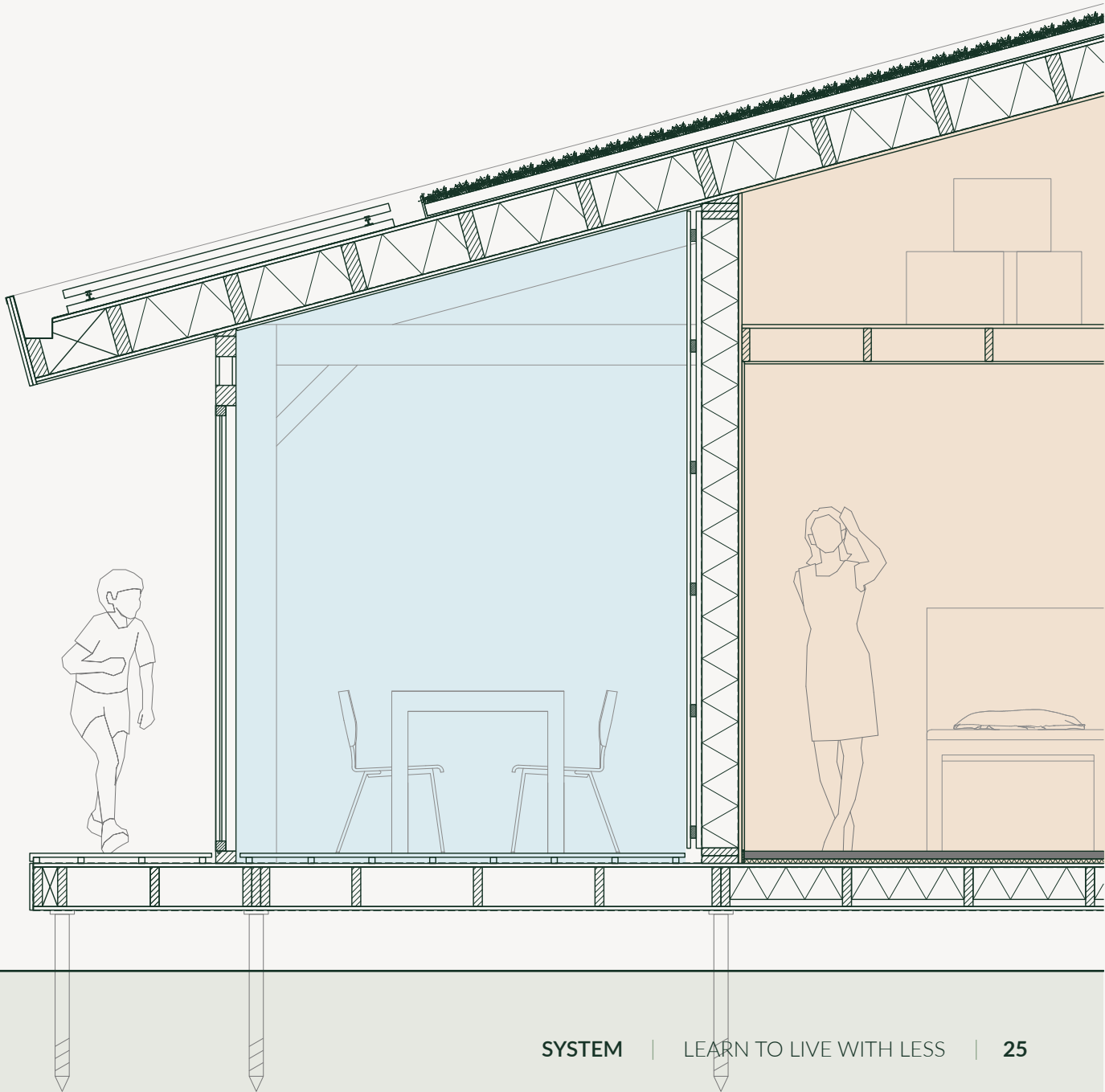
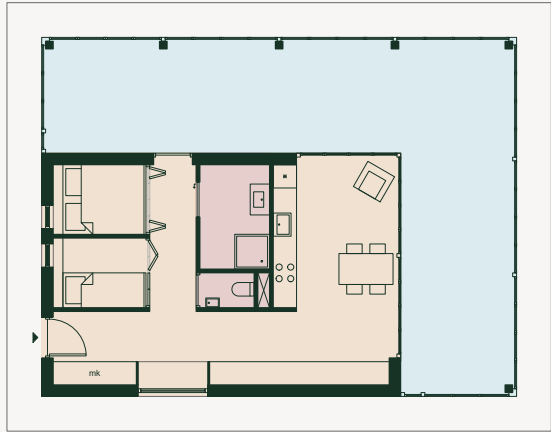
- Screed with low-temperature underfloor
heating (38 mm), wood fiber insulation
(22 mm), vapor barrier layer
OR
Timber floorboards (20 mm), timber
framing (30 mm), water retaining layer
- OSB board (18 mm)
- Timber frame construction with
Gutex thermoflex wood fiber insulation
160 mm ($R_d = 4,4 \text{ m}^2\text{K/W}$)
- OSB board (18 mm)
- Water retaining layer



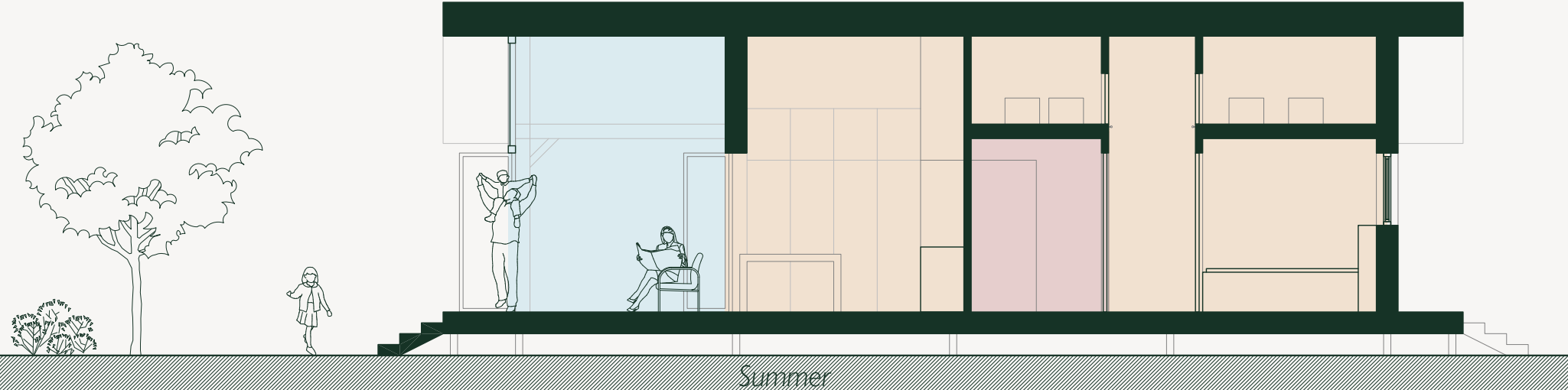
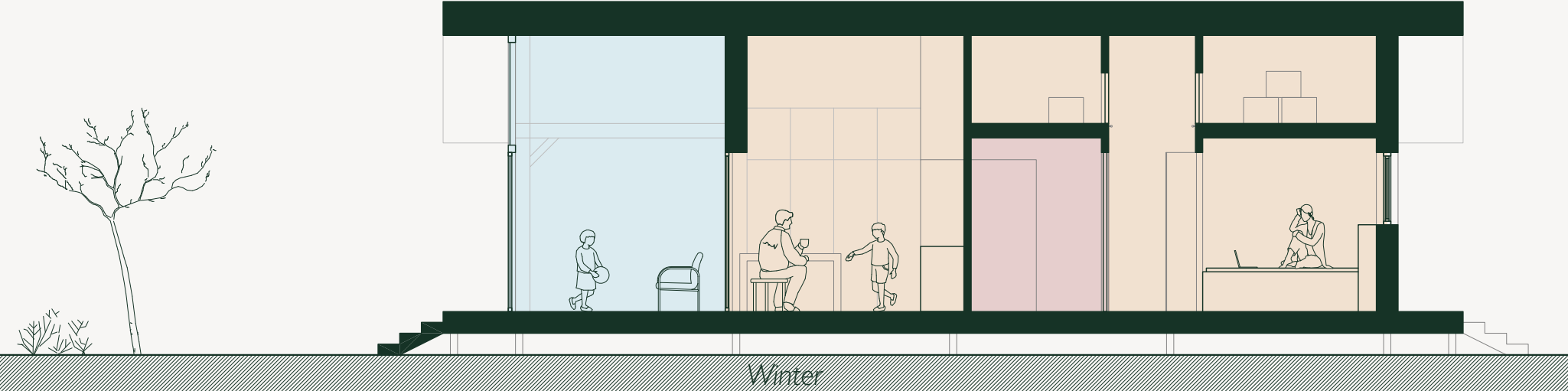
Climate zones

1:30

- Heated
- Insulated
- Rain & wind proof



Through the seasons



Heated Insulated Rain & wind proof

Climate concept



Rainwater collection

PVT panels

Electricity & heat
325 Wp/panel
2.750 - 3.600 kWh/year

Grey water
Helophyte filter

**Low-temperature
underfloor heating**
In bathroom & toilet

Vacuum toilet
Saves 80-90% water per flush
Saves 8000 liter water/person/year

Installations

- Heat pump (HP)
- Boiler (B)
- Inverter (Iv)
- Heating circuit distributor (HCD)
- Meter box (MB)
- Home battery (HB)
- Smart controlpanel + app

Housing types

Architectural features

Grid size

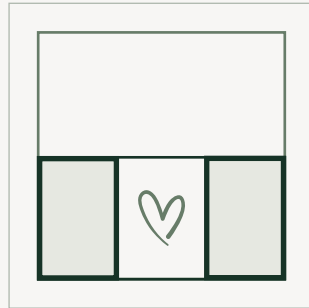
- 3x3 (9m by 9m)
- 3x4 (9m by 12m)
- 4x4 (12m by 12m)

Orientation

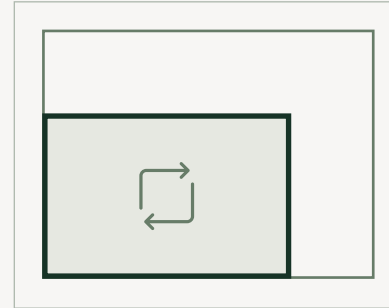
- One-sided
- Two-sided
- All-sided

Circulation

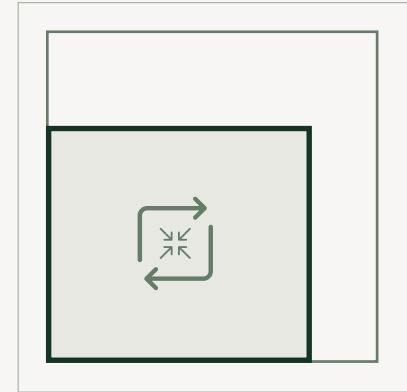
- Central
- Hallway
- Heart



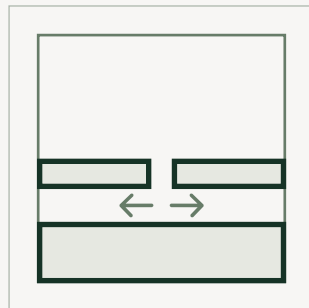
Blackbird



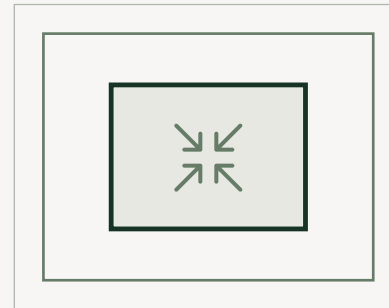
Kingfisher



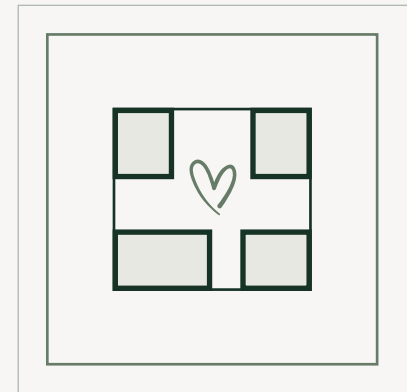
Starling



Sparrow



Godwit



Stork

Housing type

Blackbird



Floor space 86,5 m²
5,9 m² heated
43,6 m² insulated
42,9 m² rain & wind proof



Household
Single - couple
1 - 2 persons

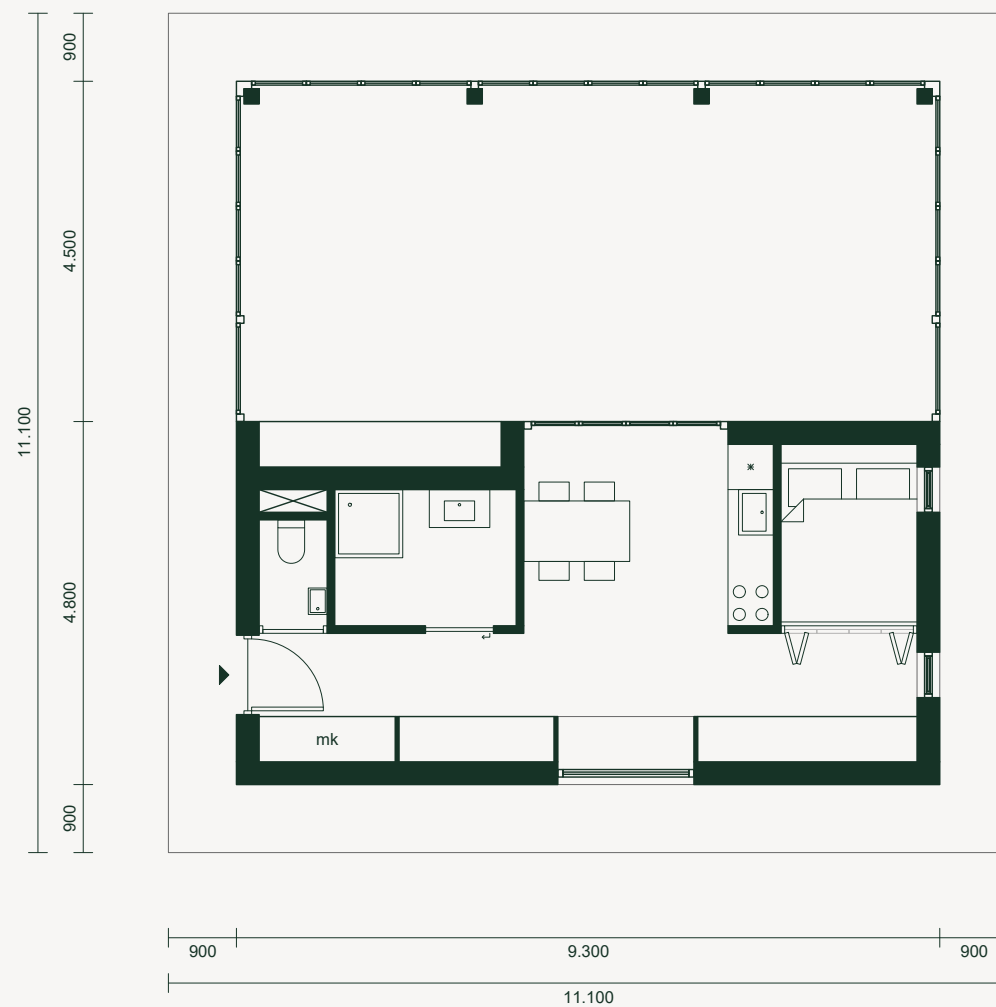


Architectural features
One-sided
Heart



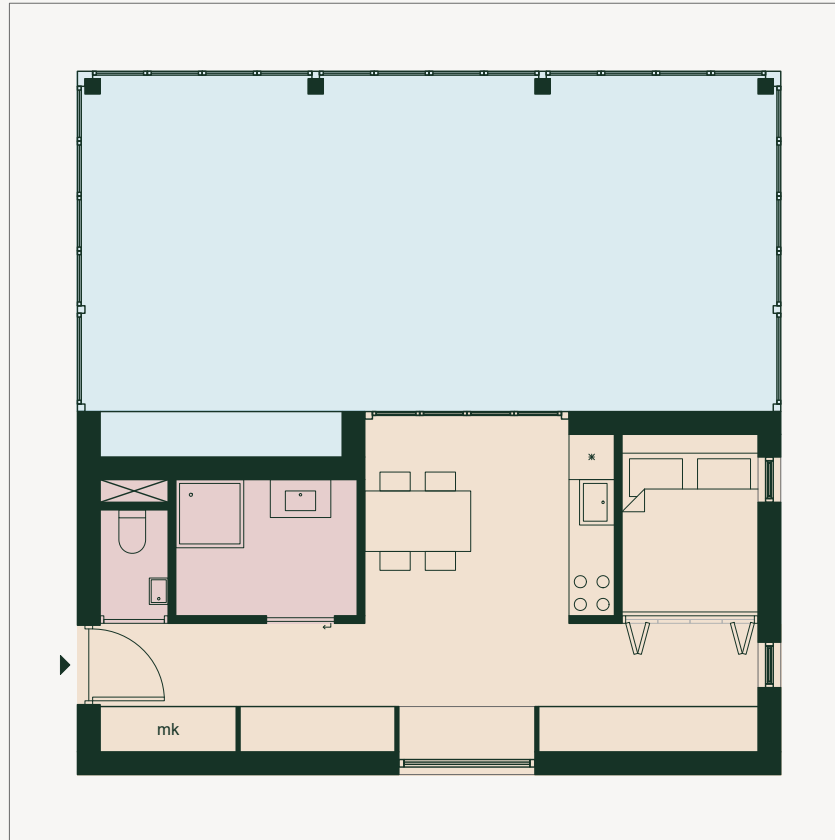
Floorplan

1:100



Climate zones

1:100

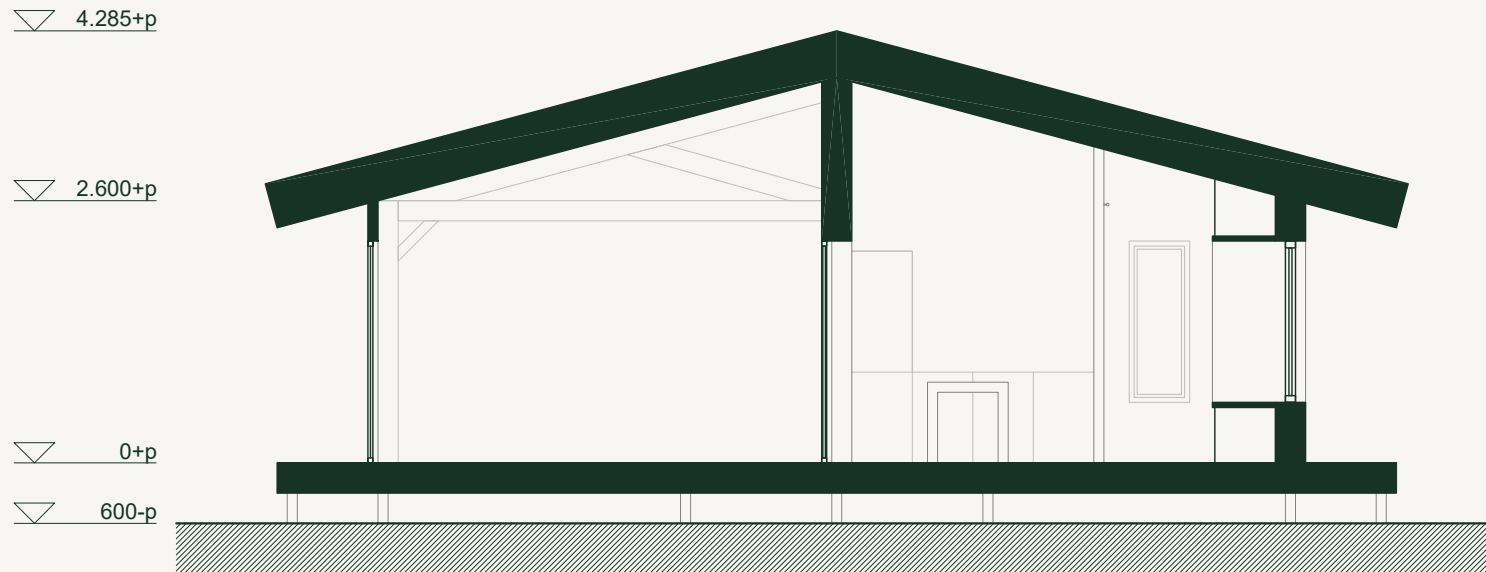
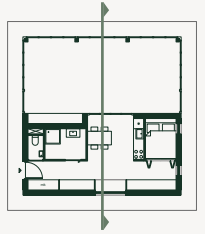


- Heated*
- Insulated*
- Rain & wind proof*



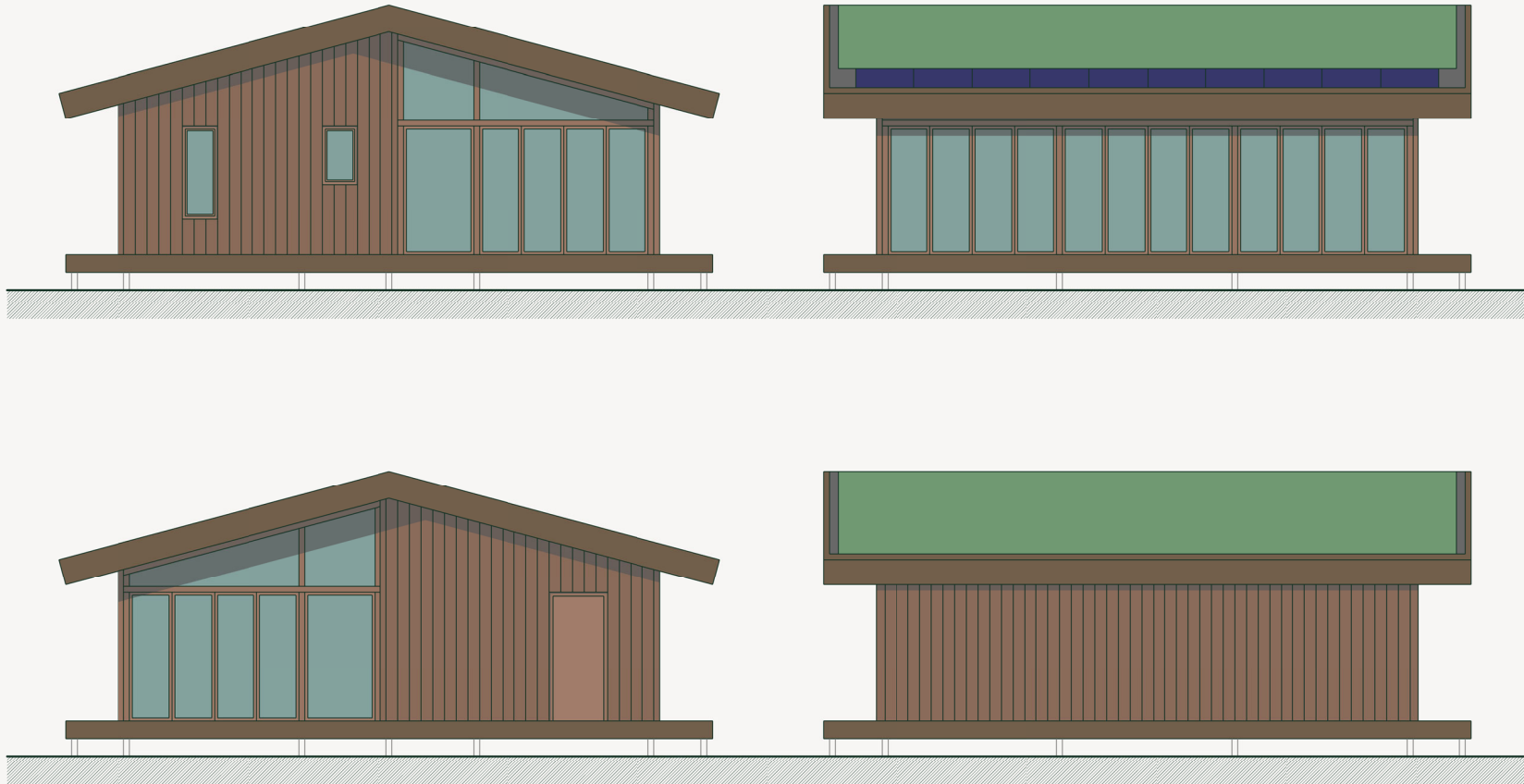
Section

1:75



Facades

1:120





Housing type

Sparrow



Floor space 86,5 m²

5,9 m² heated

44,6 m² insulated

41,9 m² rain & wind proof



Household

Single - couple - small family

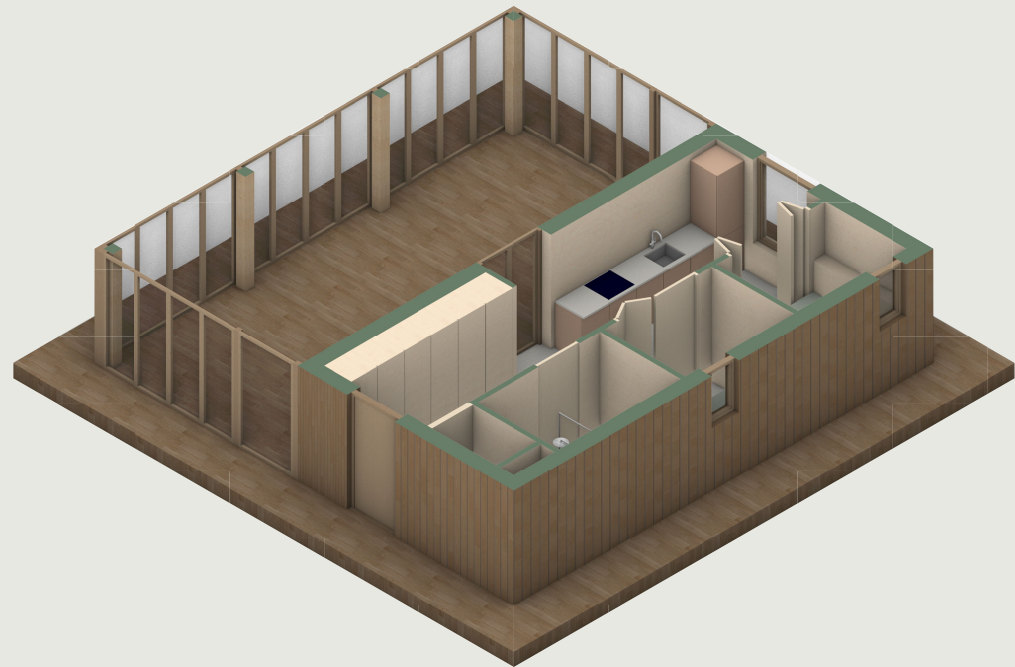
1 - 3 persons



Architectural features

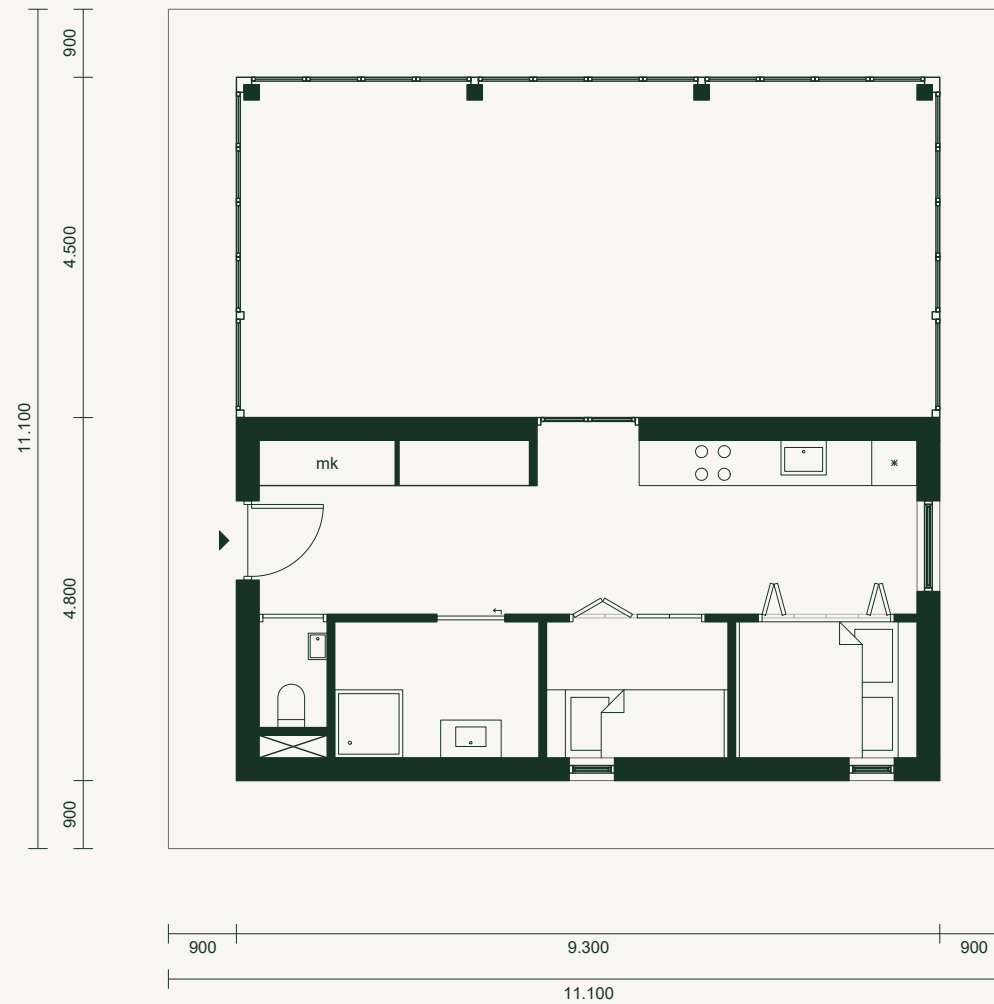
One-sided

Hallway



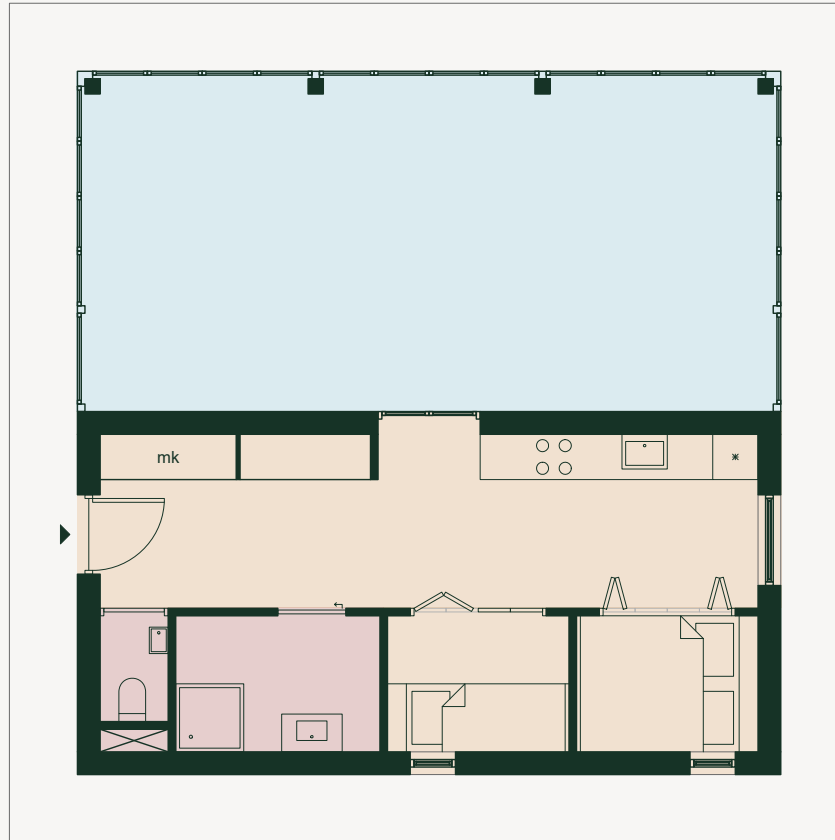
Floorplan

1:100



Climate zones

1:100

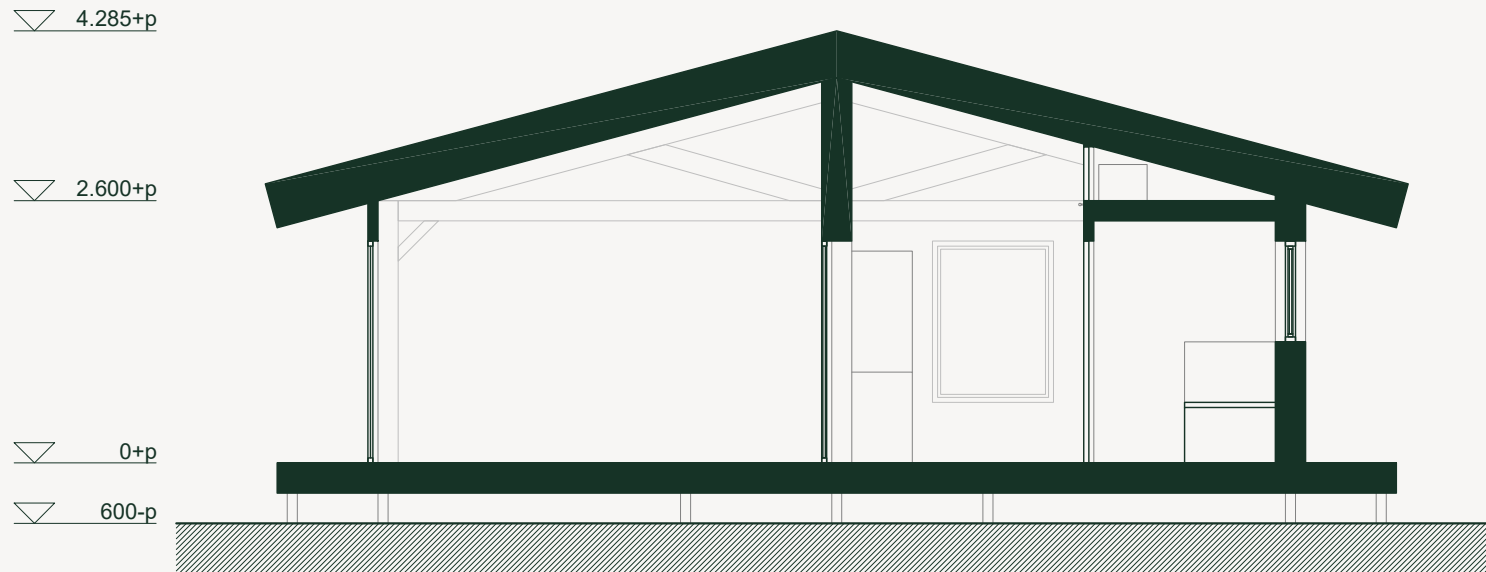
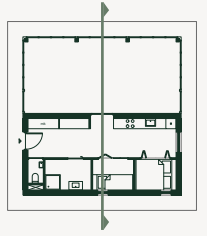


- Heated*
- Insulated*
- Rain & wind proof*



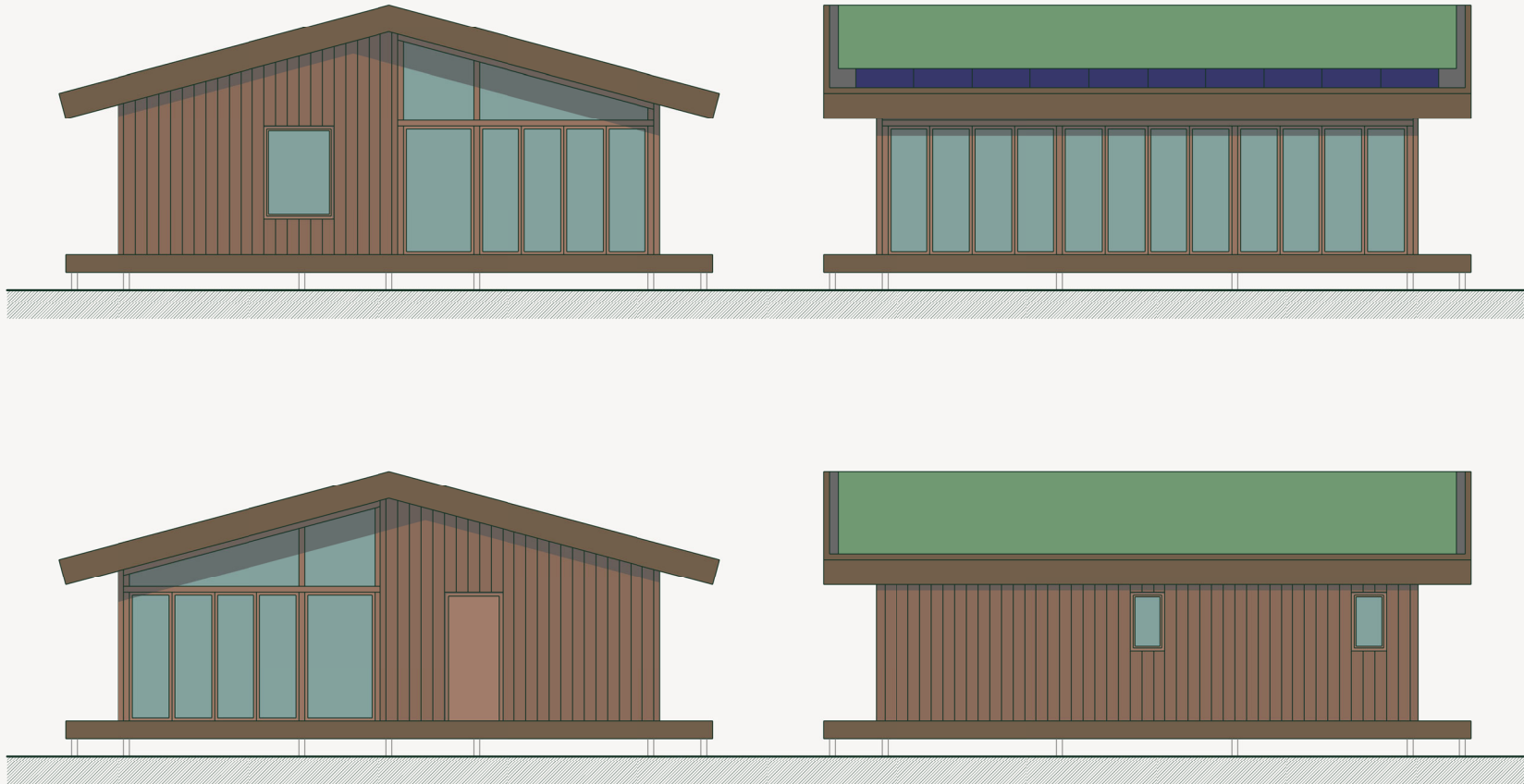
Section

1:75



Facades

1:120





Housing type

Kingfisher



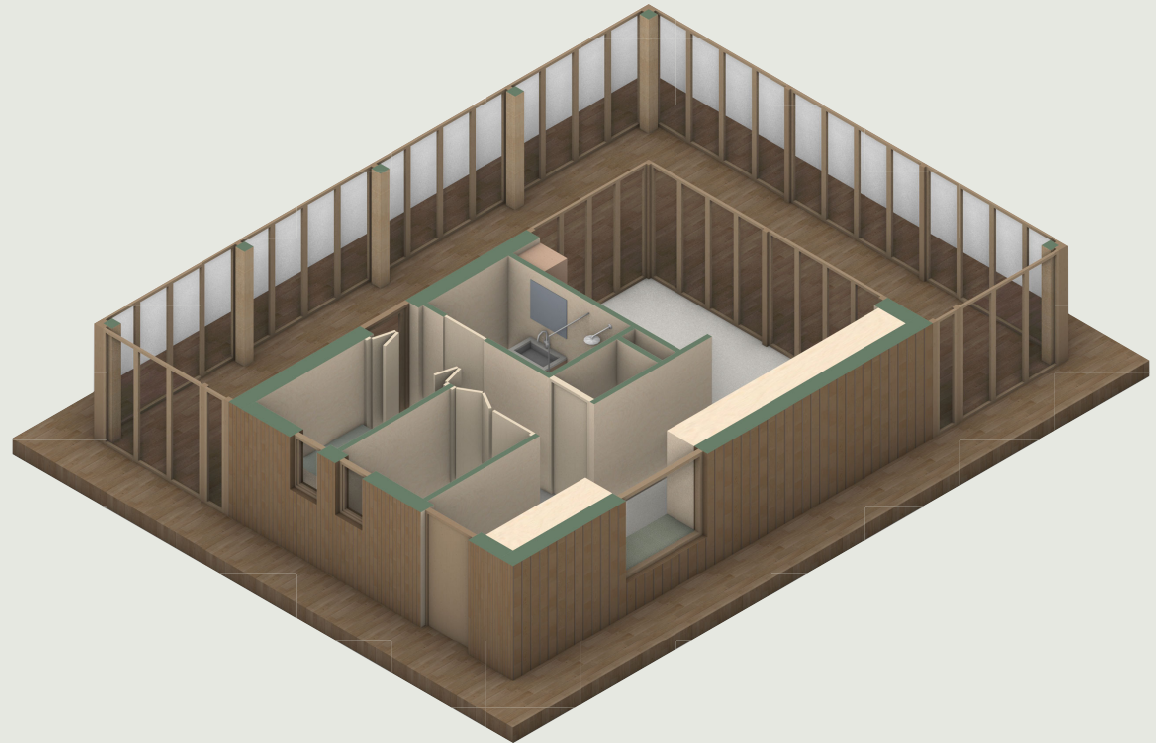
Floor space 114,4 m²
5,9 m² heated
58,6 m² insulated
55,8 m² rain & wind proof



Household
Couple - family
2 - 4 persons



Architectural features
Two-sided
Hallway



Floorplan

1:100



Climate zones

1:100

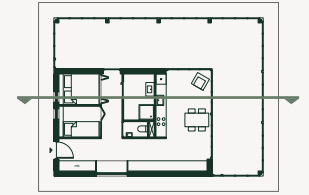


-  *Heated*
-  *Insulated*
-  *Rain & wind proof*



Section

1:75

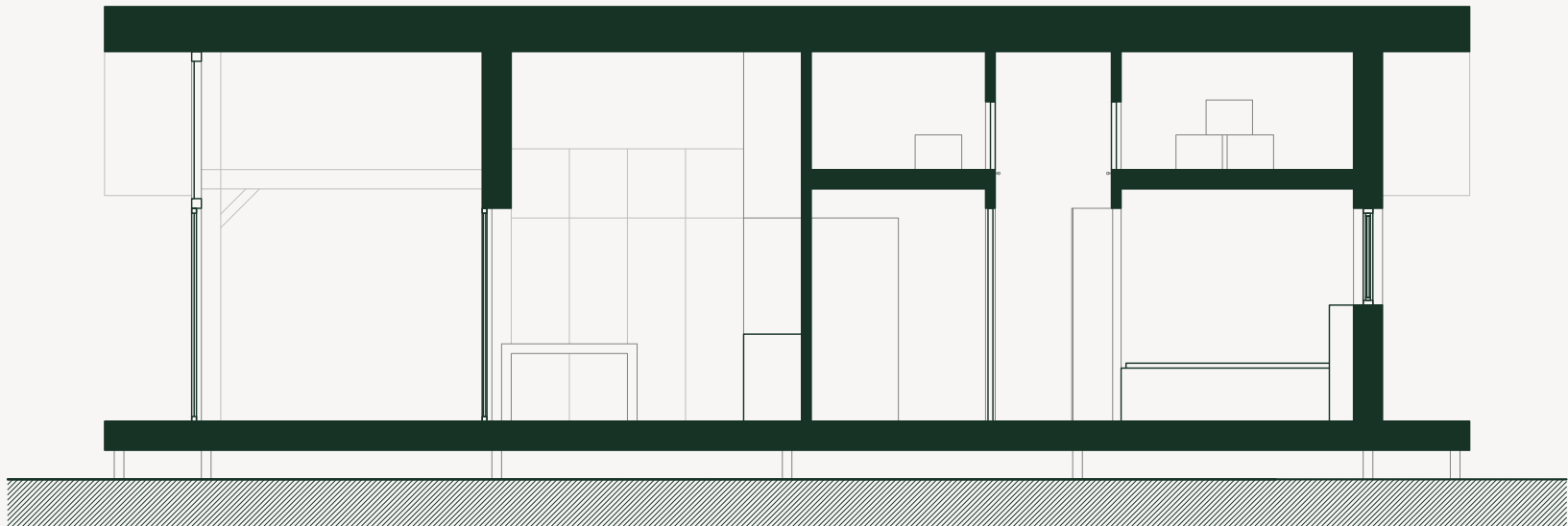


▽ 4.285+p

▽ 2.600+p

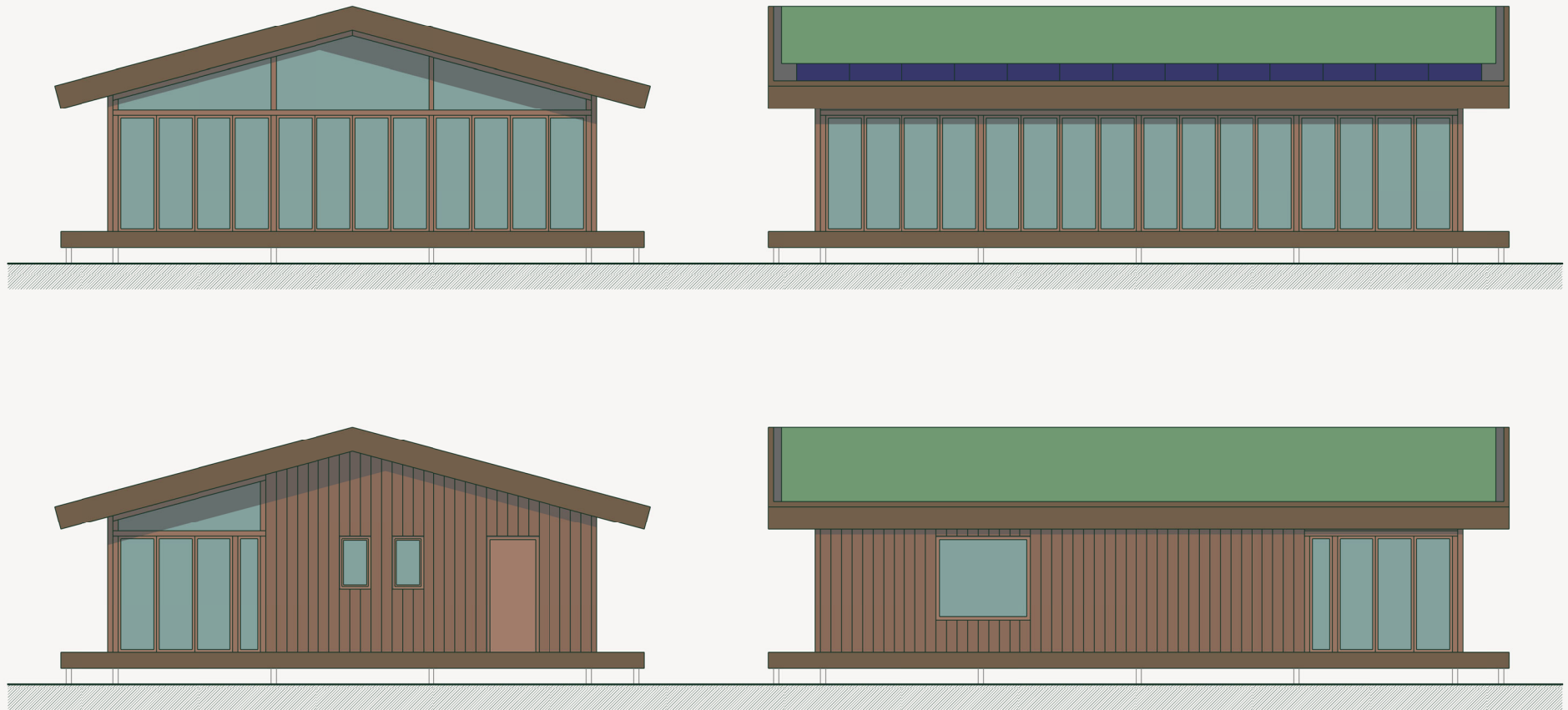
▽ 0+p

▽ 600-p



Facades

1:120





Housing type

Godwit



Floor space 114,4 m²
5,9 m² heated
34,2 m² insulated
80,2 m² rain & wind proof



Household
Couple - family
2 - 4 persons

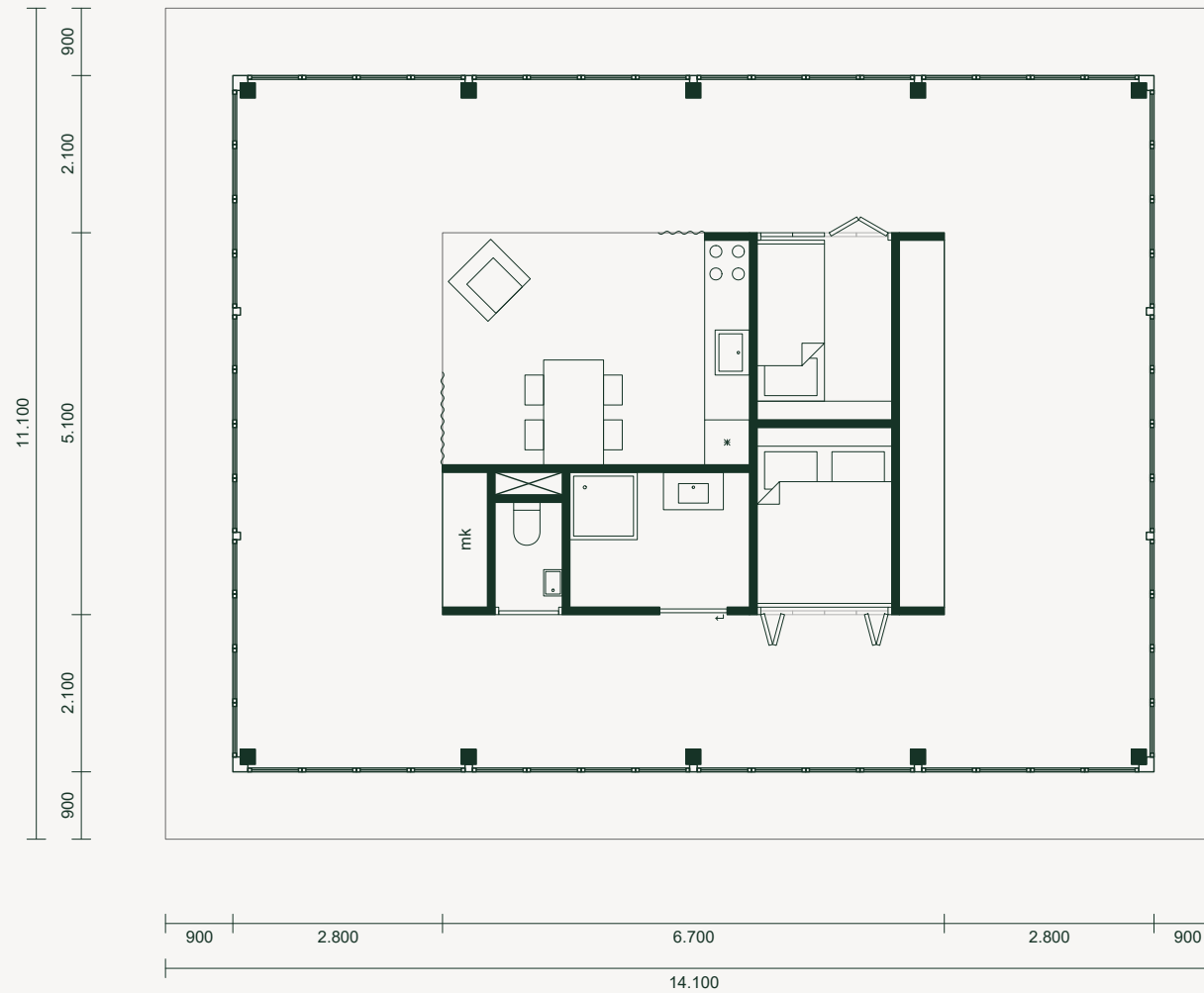


Architectural features
All-sided
Center



Floorplan

1:100



Climate zones

1:100

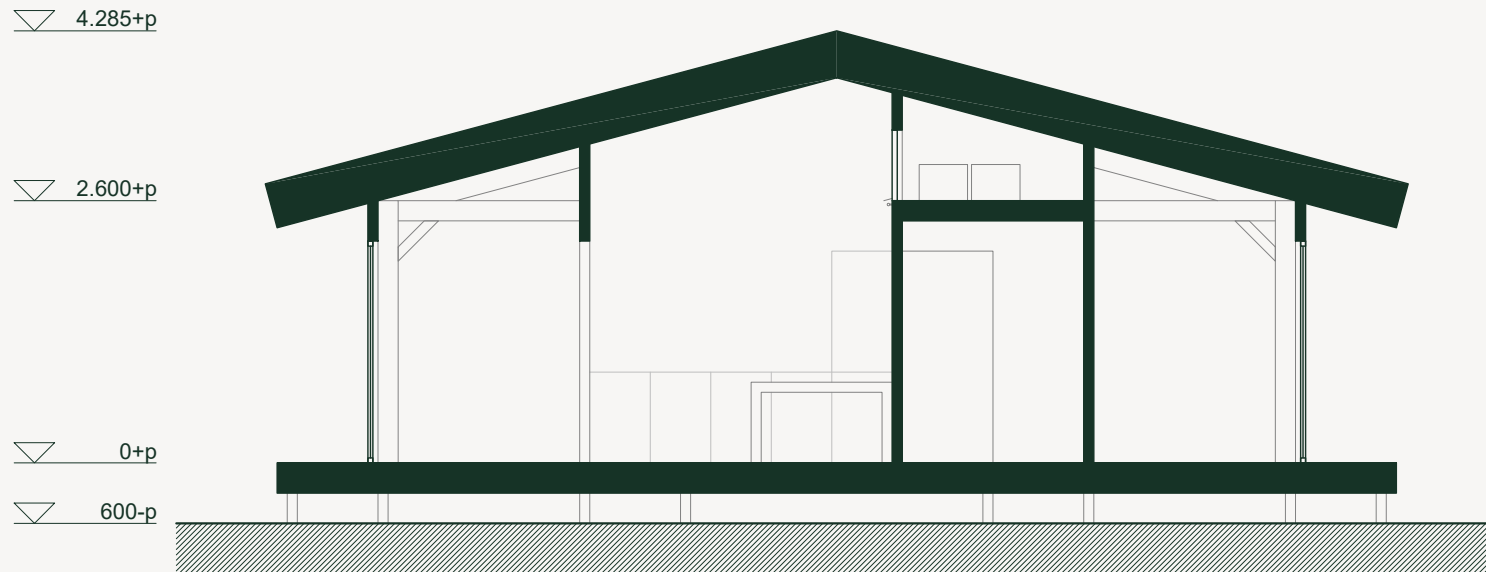
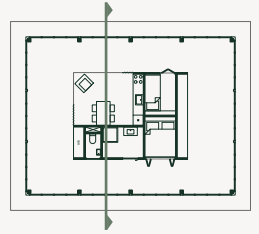


- Heated*
- Insulated*
- Rain & wind proof*



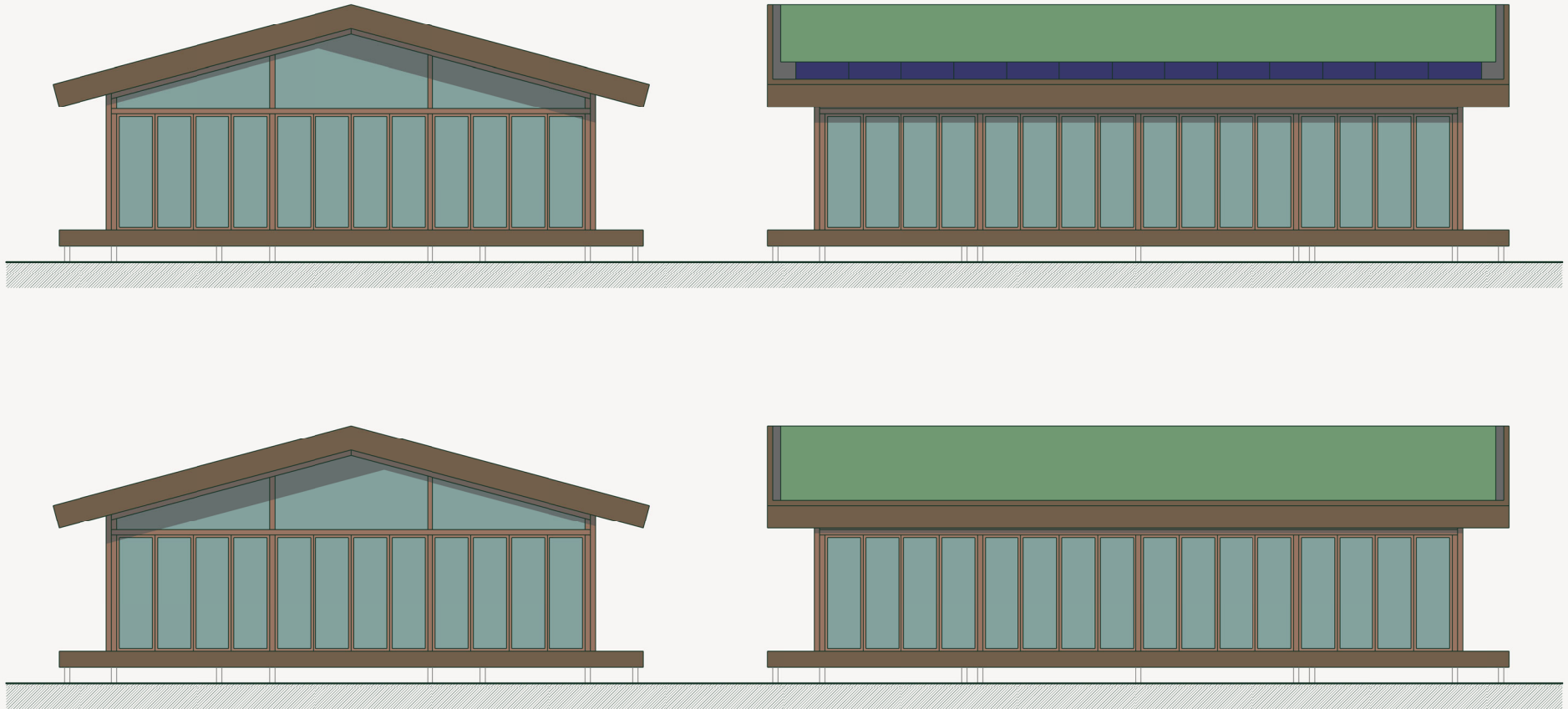
Section

1:75



Facades

1:120





Housing type

Starling



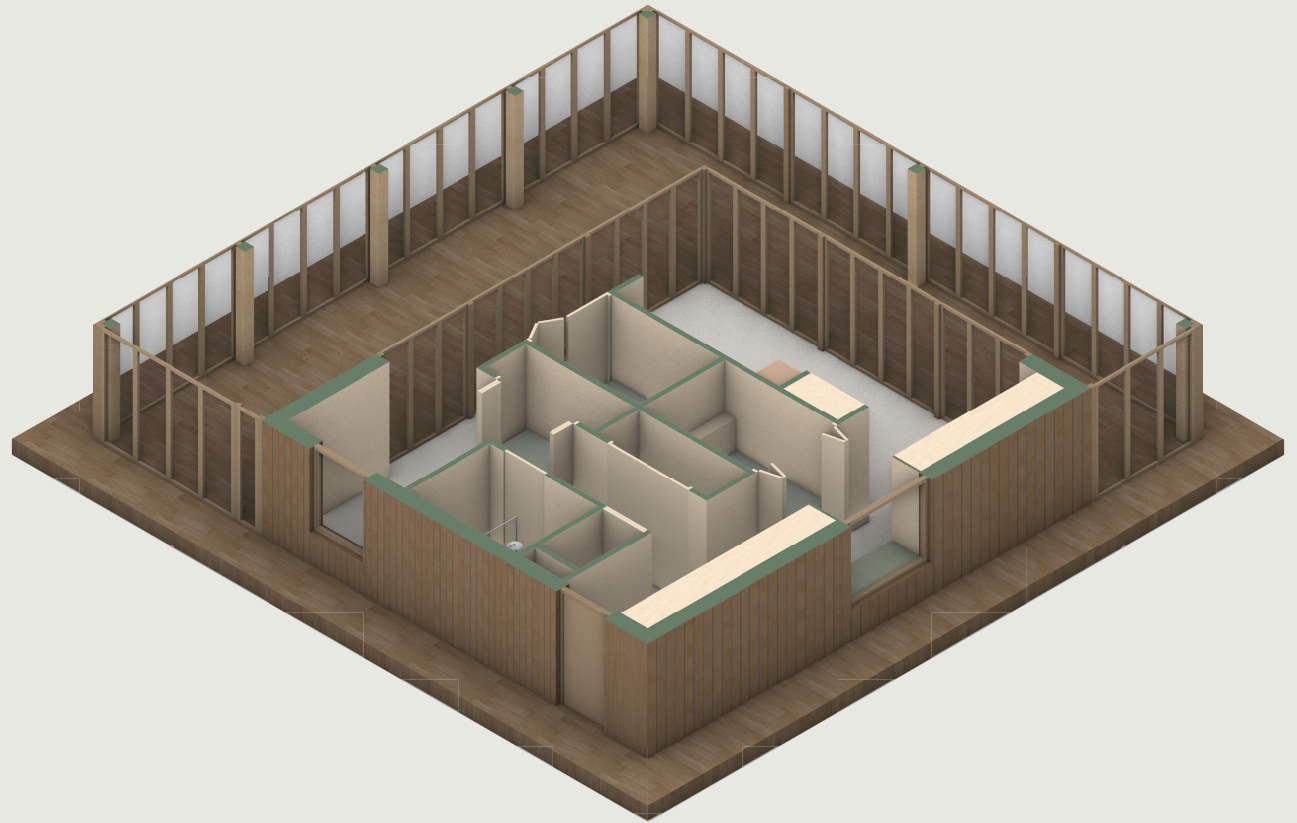
Floor space 151,3 m²
5,9 m² heated
83,2 m² insulated
68,1 m² rain & wind proof



Household
Family
3 - 6 persons

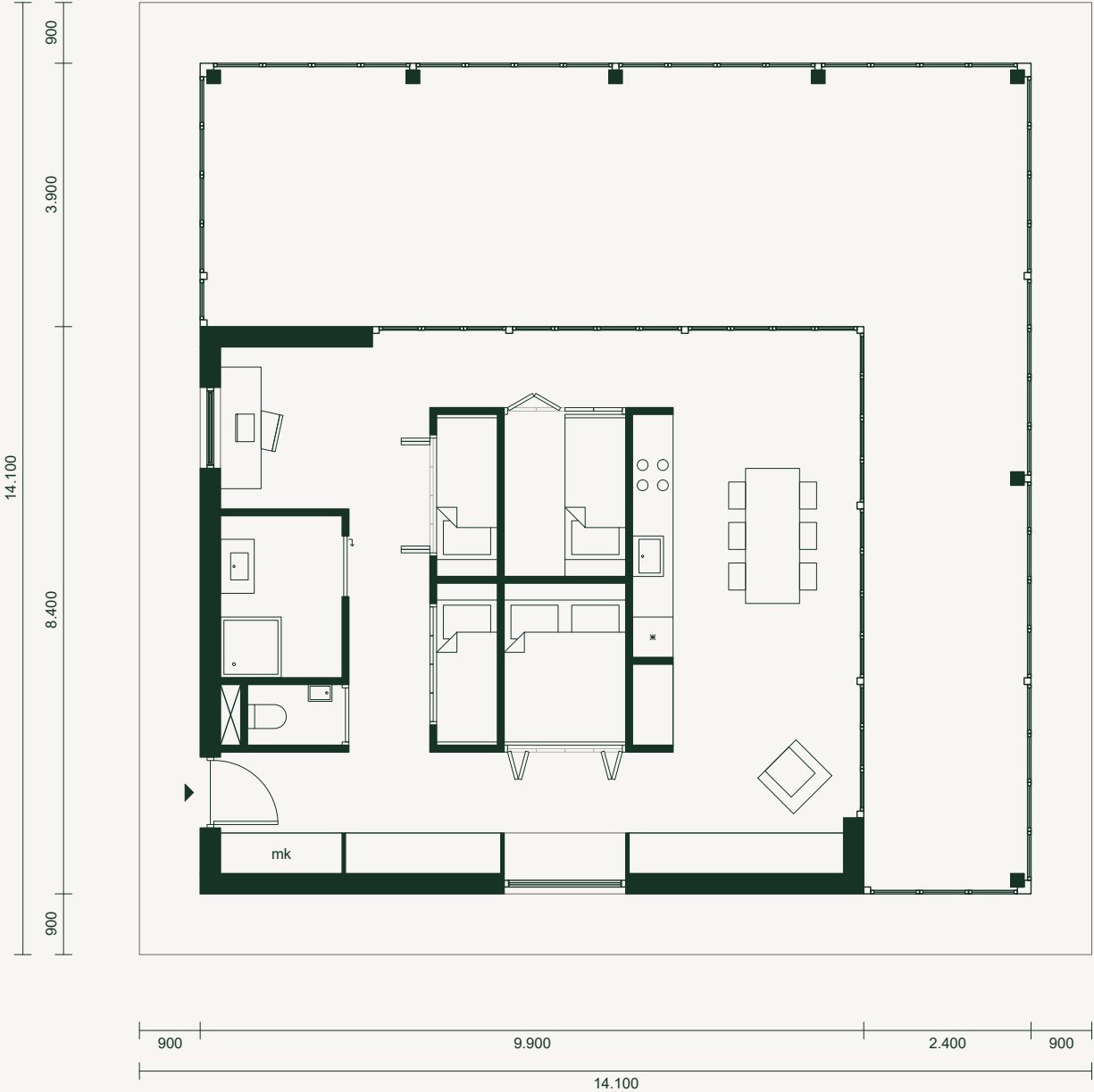


Architectural features
Two-sided
Hallway, center



Floorplan

1:100



Climate zones

1:100

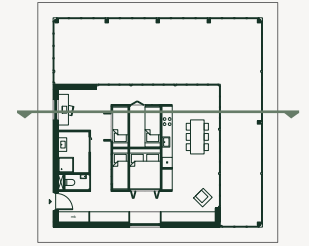


- Heated
- Insulated
- Rain & wind proof



Section

1:75



▽ 4.685+p

▽ 2.600+p

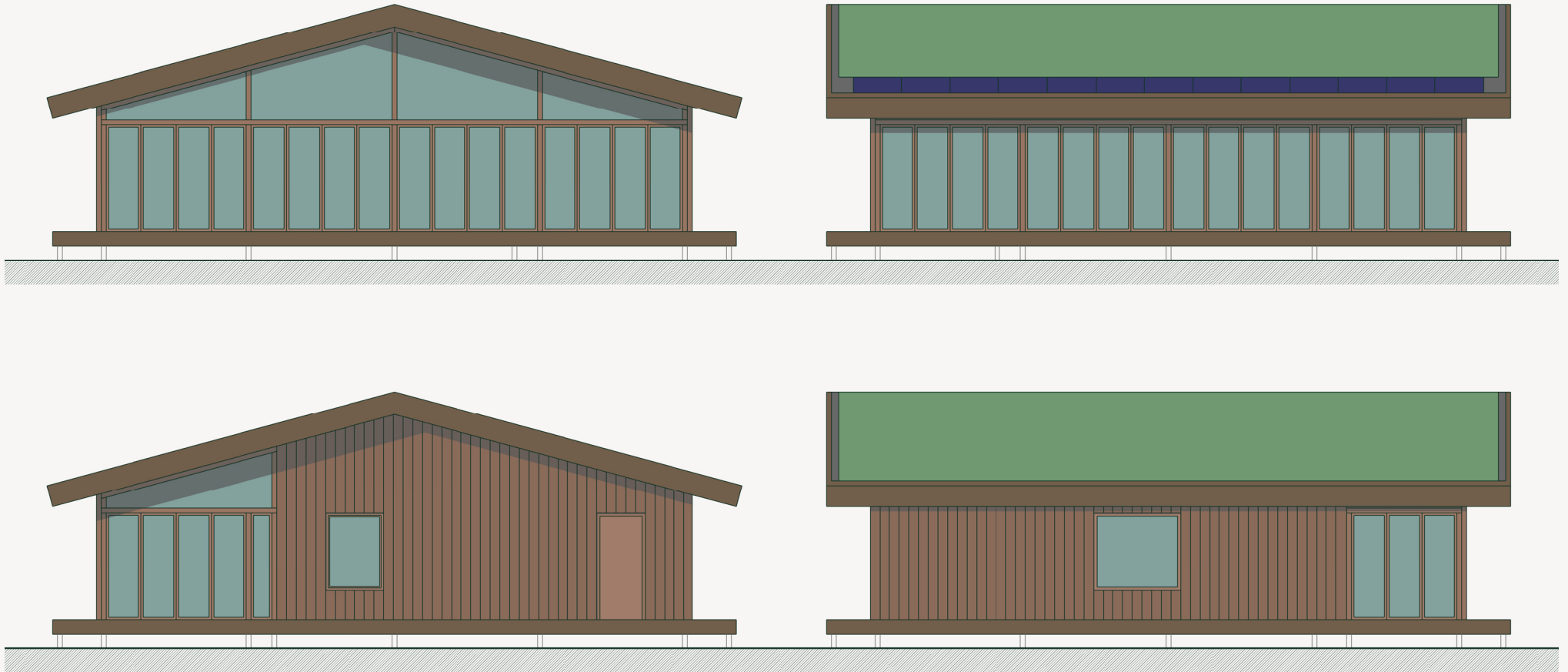
▽ 0+p

▽ 600-p



Facades

1:120





Housing type

Stork



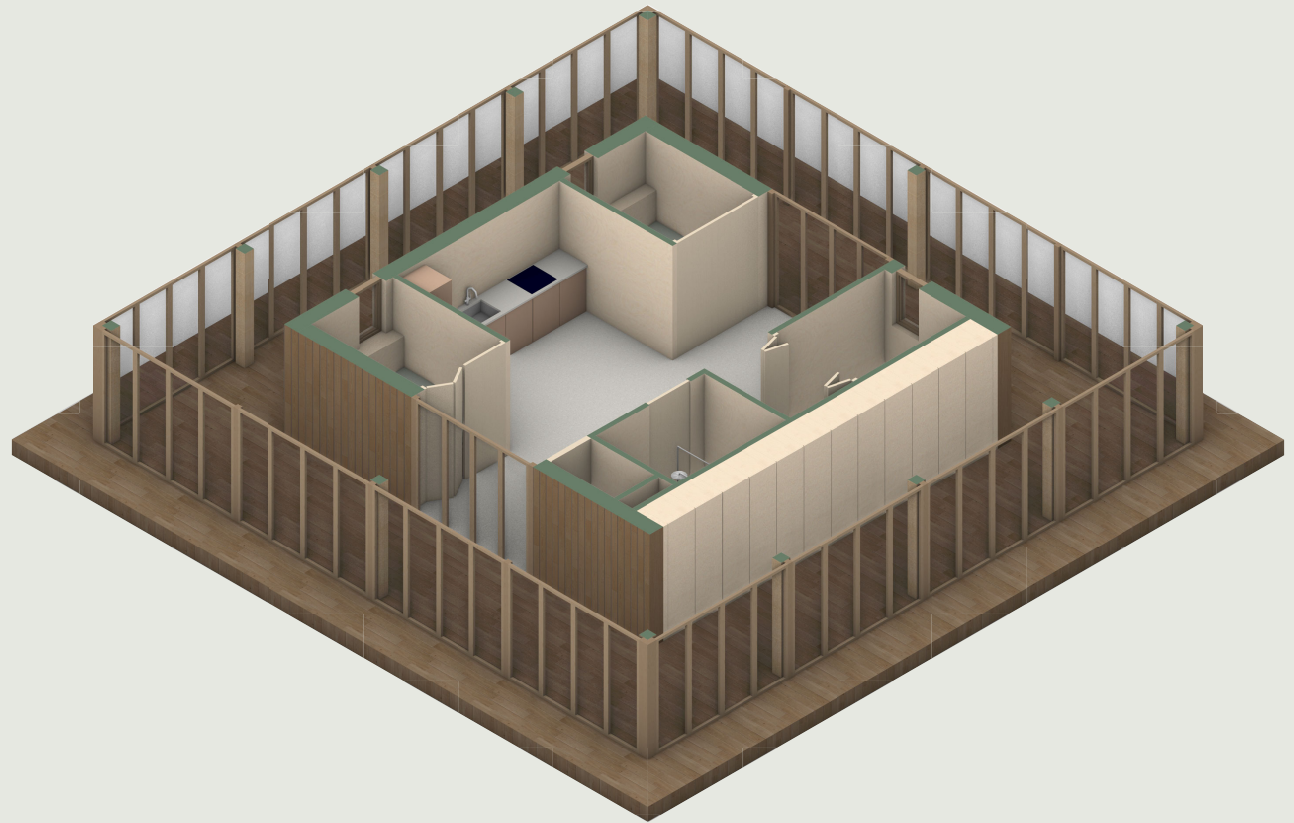
Floor space 151,3 m²
5,9 m² heated
64,8 m² insulated
86,5 m² rain & wind proof



Household
Family
3 - 6 persons

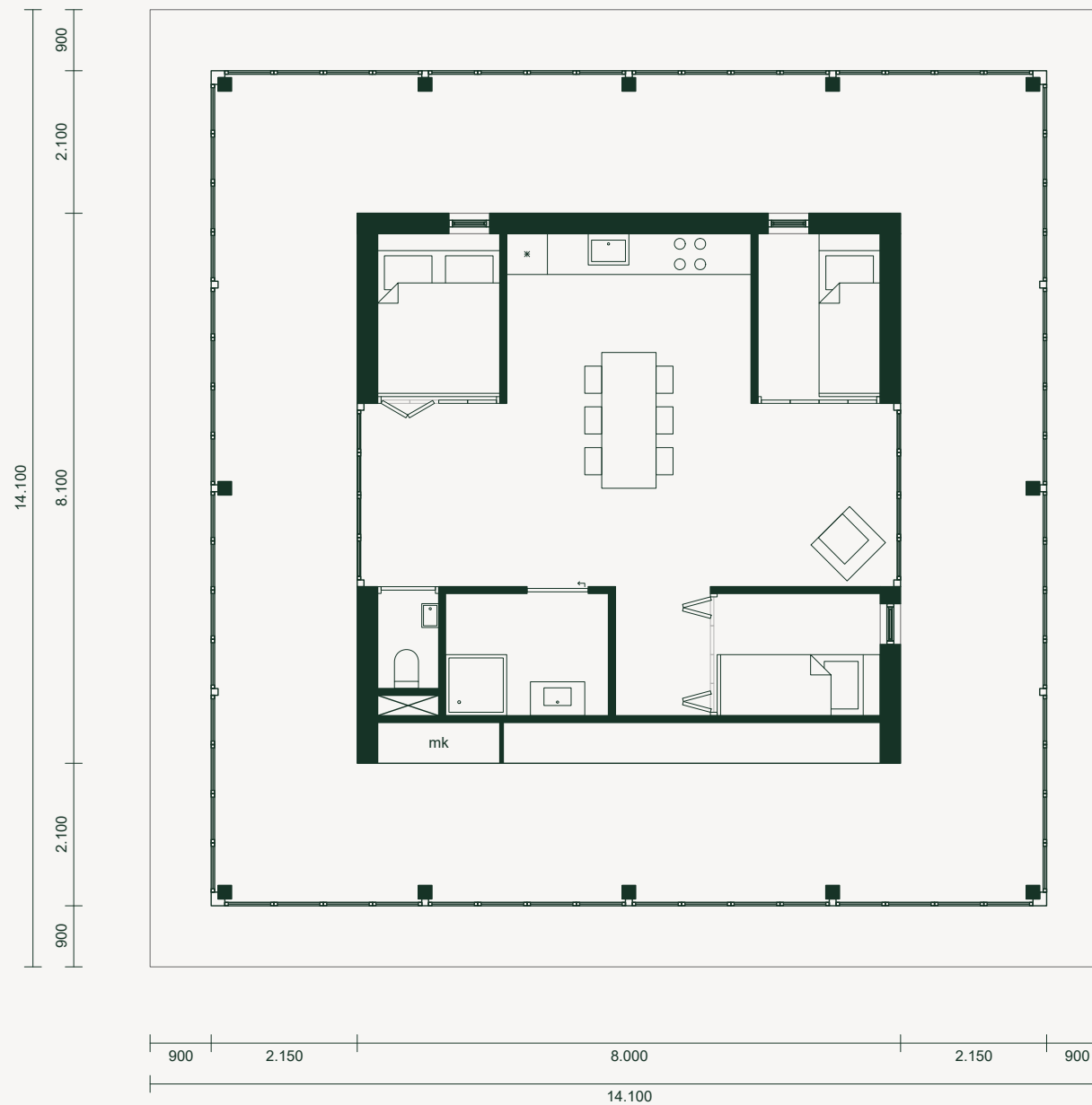


Architectural features
All-sided
Heart



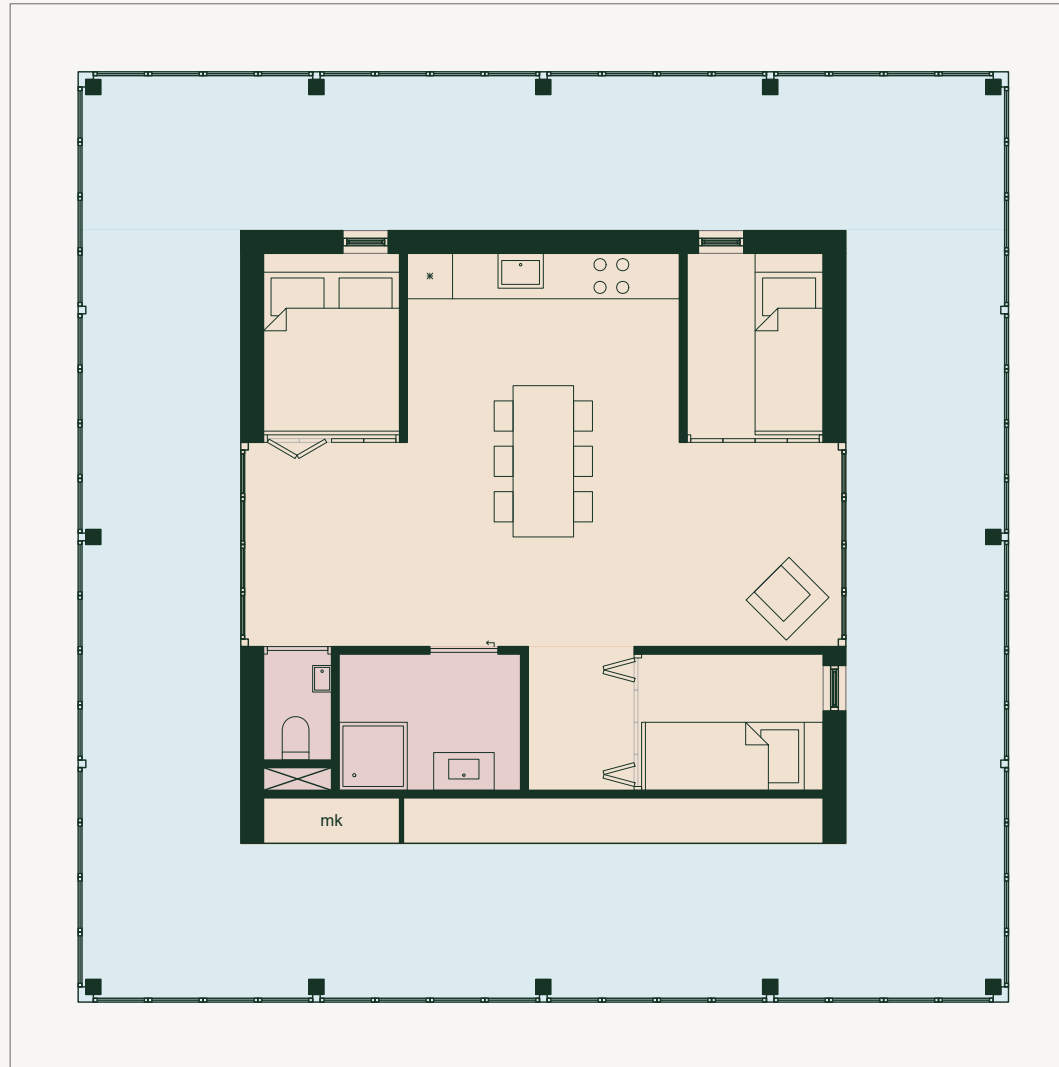
Floorplan

1:100

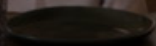


Climate zones

1:100

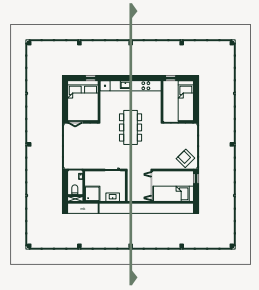


- Heated
- Insulated
- Rain & wind proof



Section

1:75



▽ 4.685+p

▽ 2.600+p

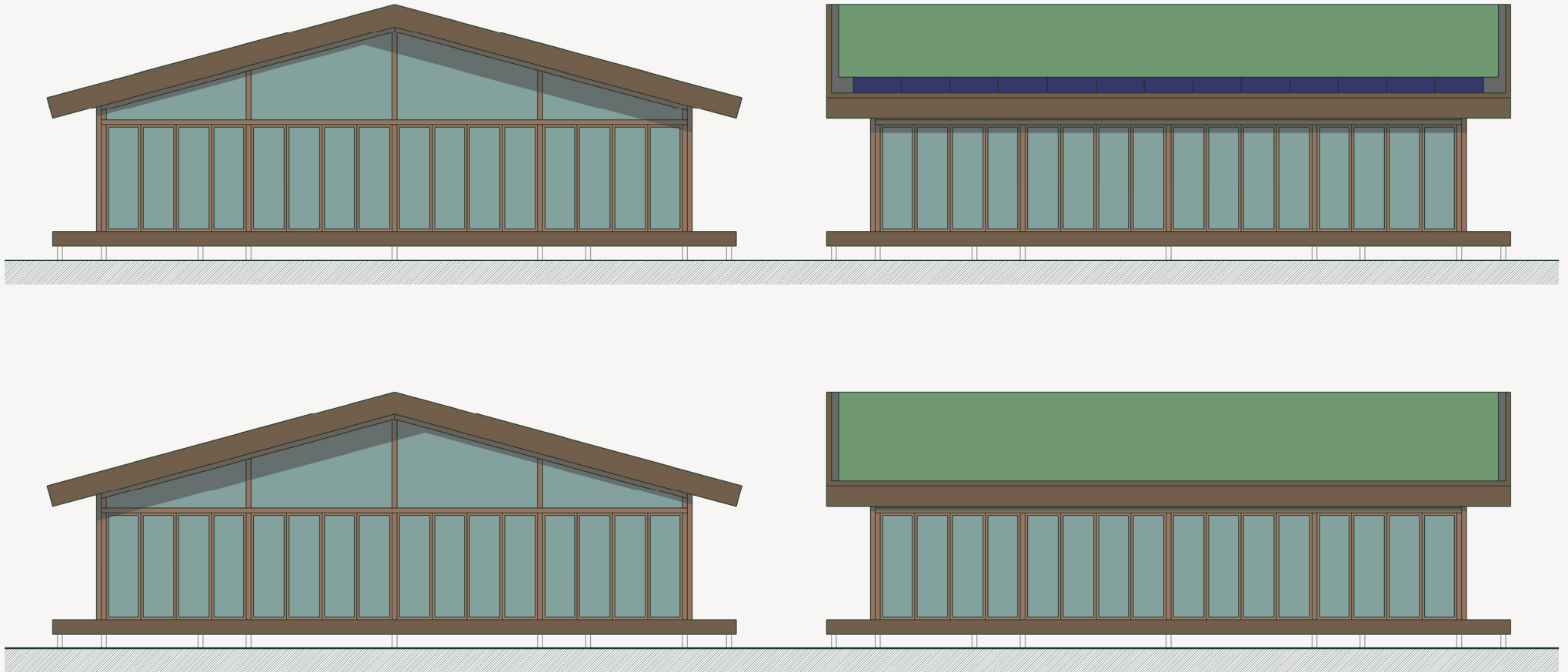
▽ 0+p

▽ 600-p



Facades

1:120







Learn to *Live with Less*