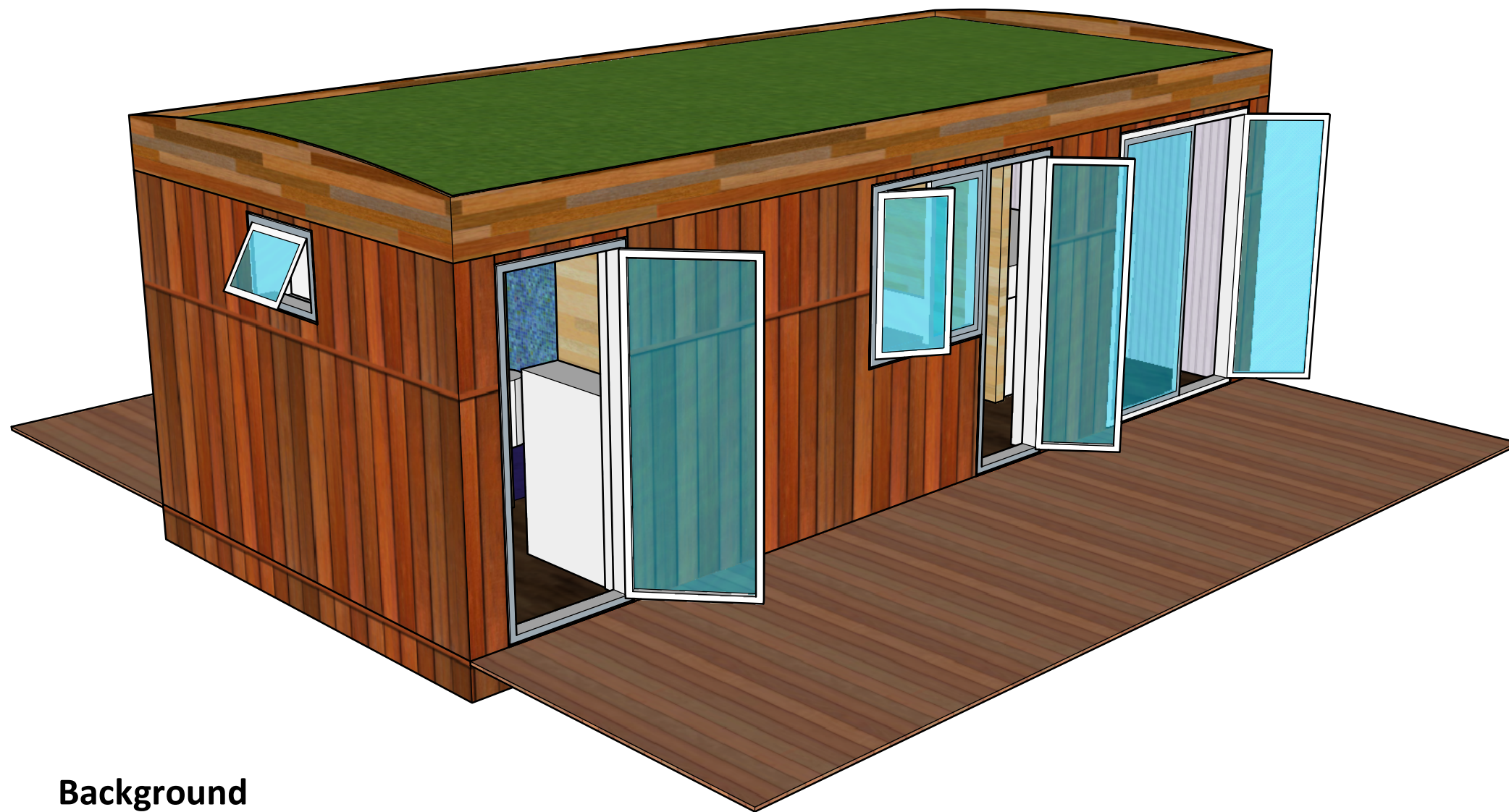


How to build sustainable youth house - an example from vocational schools in Denmark

Sketches for the development of the project.





How to build sustainable youth house - an example from vocational schools in Denmark

Sketches for the development of the project.

Several vocational schools have joined forces with a knowledge centre to develop and build a 1:1 model of the vocational schools' bid for the most sustainable youth housing. It is planned to be exhibited in Copenhagen during UIA 2023 CPH which will take place in July 2023. Here, the world's architects and stakeholders meet to be inspired for the future of sustainable building methods. Denmark's craft apprentices will also give their bid.

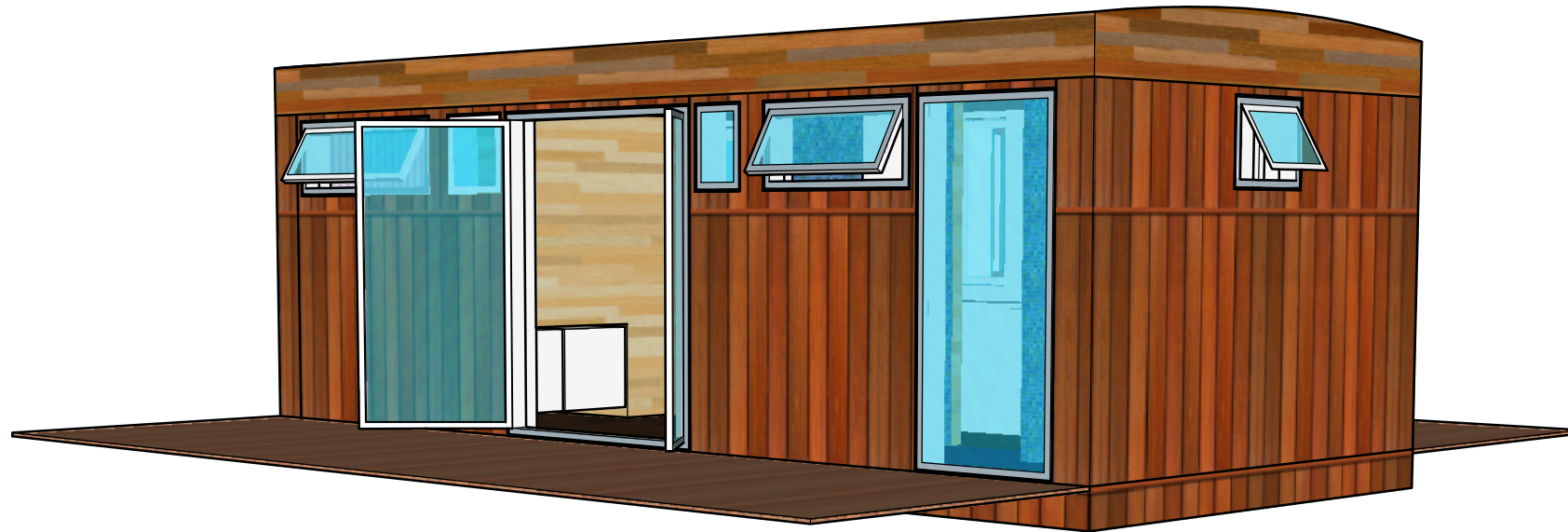
Background

The construction industry accounts for 40% of all energy-related climate impact and even craftsmen who want to take responsibility for their industry's climate impact, are often left with a lack of skills to make a difference.

2 years ago, a group of carpentry apprentices took the initiative to do something about this. This turned into a broad collaboration around the pilot project - Apprentices for sustainability, where it was investigated how the 17 world goals could be translated into action skills within the carpentry education in Copenhagen. This has been achieved to the extent that carpentry apprentices in the project now learn to build and act sustainably with methods developed in collaboration with technicians, knowledge centers, master craftsmen, manufacturers and researchers.

Acknowledgment

Project was recognized by the United Nation University as "Outstanding flagship project 2021" and was invited to present the results of the project at COP27 in Sham el Sheik 2022.



Sustainability

All biogenic building materials come from the FSE Register of Sustainable Forest Management and thereby support sustainable forest management in the region. In addition to FSE's requirements, biologists are employed to ensure diverse bird life in the forests.

CO₂ heavy and environmentally harmful products such as plastic, cement, toxic lime, stone wool, fiberglass have been replaced with wood products with the same or better properties in relation to the project's needs.

The youth housing are designed multifunctionally so that the home can be experienced luxuriously even though it is very few square meters. Thus, both price and environmental impact are minimized.

The project is designed as part of an integrated training programme in collaboration with over 100 apprentices.

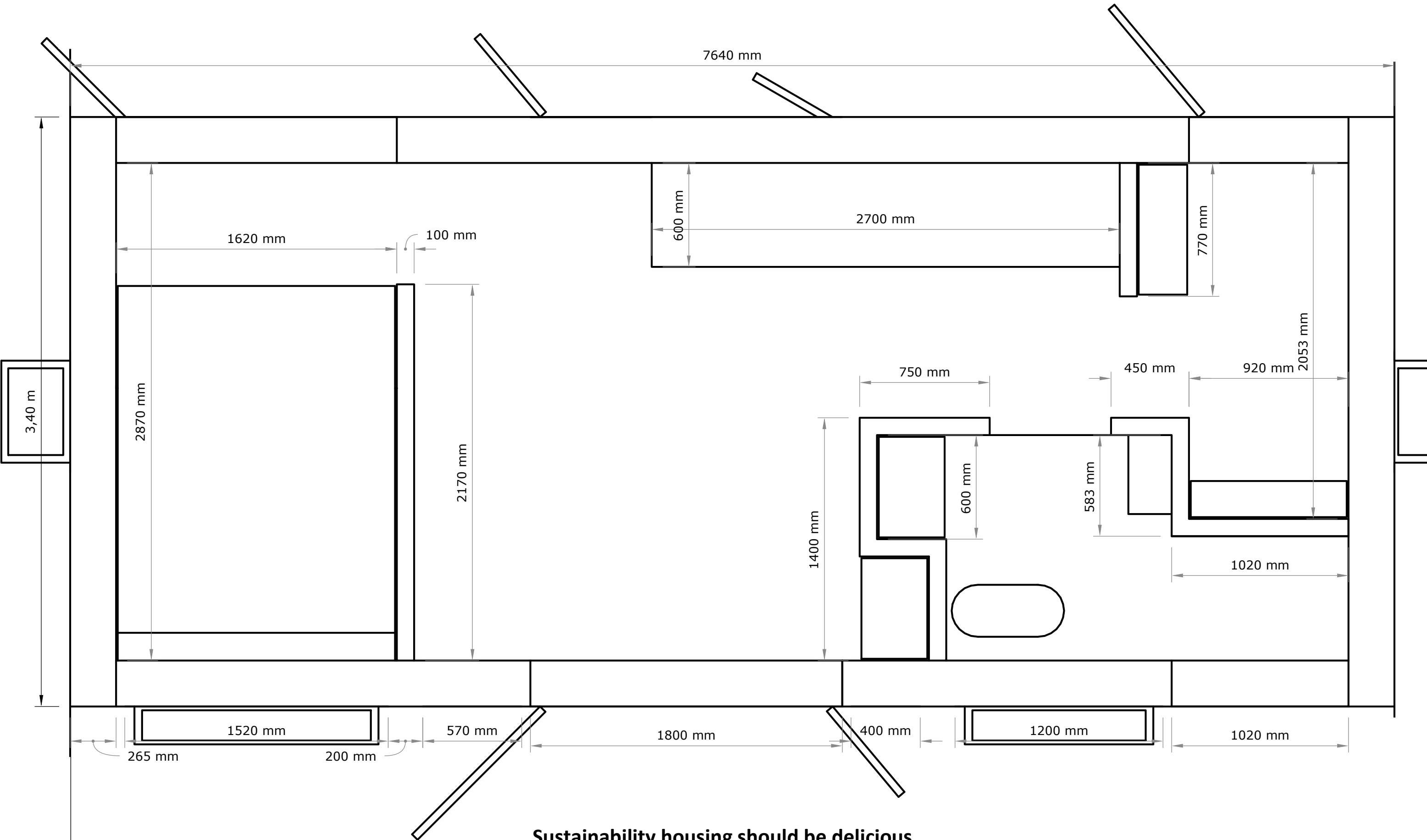
When the 25 m² home leaves production site, the stored CO₂ in the building materials is estimated to be 6,4 tons. In other words, a positive impact, where we can use the home as a CO₂ battery. In addition, a foundation on foundation screws with a negative environmental impact of 0.4 tons must be calculated, so that the total project is estimated, with site development and foundation for a storage of CO₂ of 6 tons.

Normally, a youth home with the same functions would be larger and made of materials that do not store but emit CO₂. Here, a youth housing with the same functions would typically be twice as large i.e. 50 m² and emit a total of 50 tons of CO₂

Methods

The methods center around a composition of biogenic products, all of which have in common that they are:

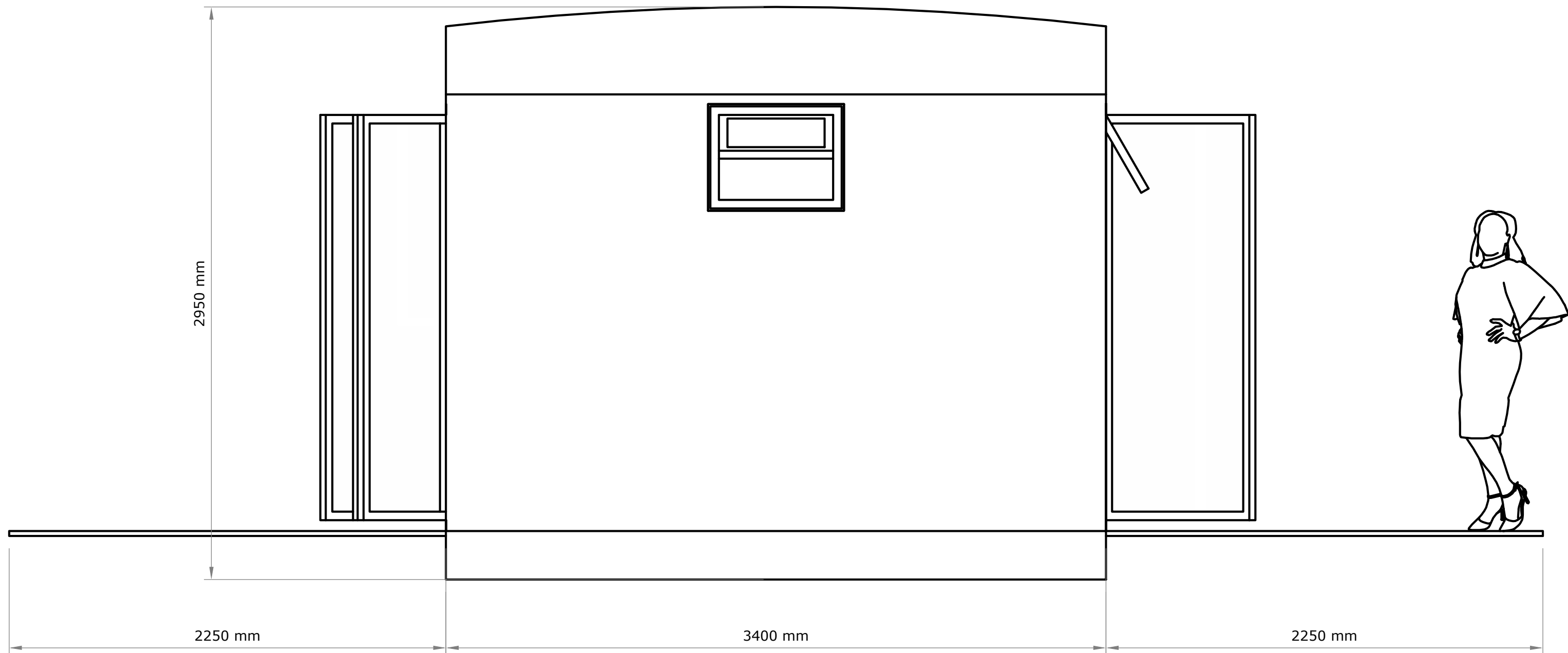
1. Available in Danish DIY stores
2. Buildable with recognizable methods
3. Store more CO₂ than their production and transport use
4. Manageable within Danish building legislation
5. Is of better or as good quality than usual
6. Emitting toxic particles again
7. Are breathable and ensure a better indoor climate than usual
8. Is between 5% cheaper to 20% more expensive as professional finished house price
9. Healthier for craftsmen to work with



Sustainability housing should be delicious

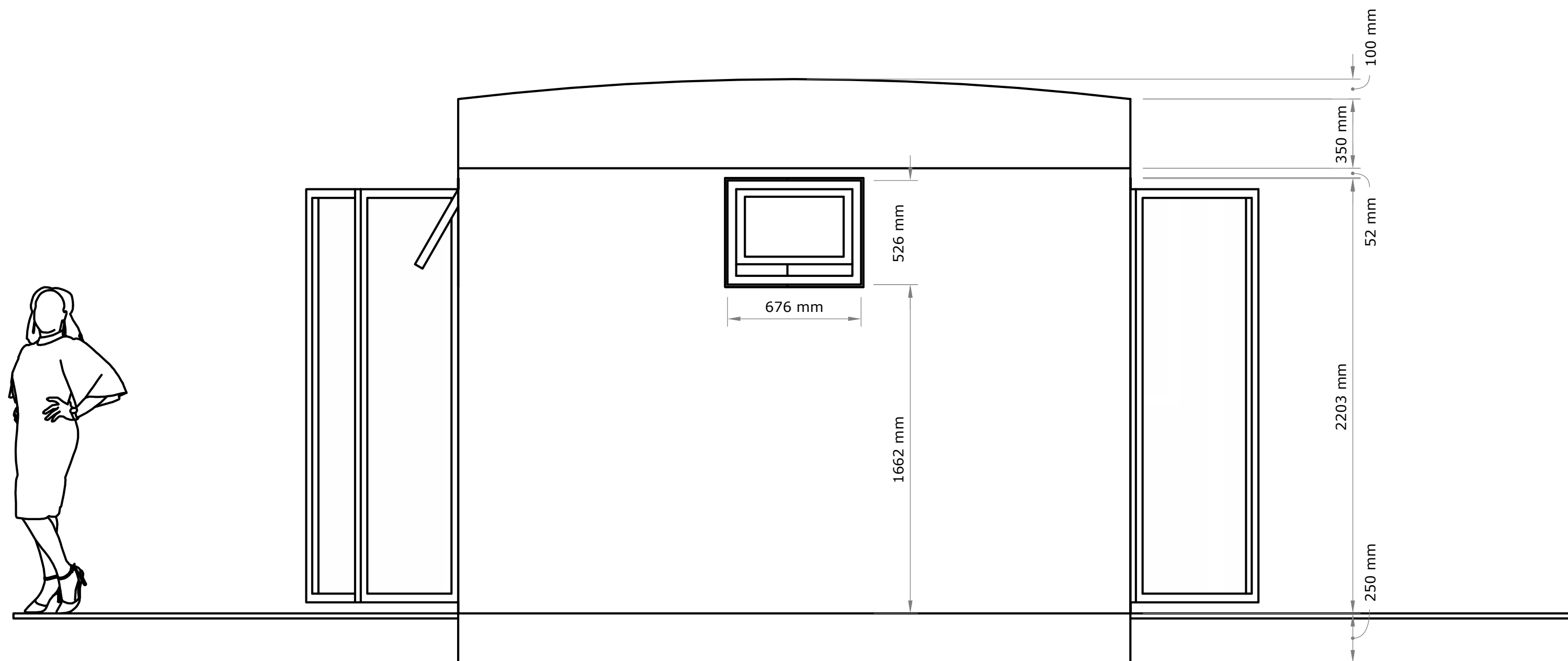
We see a Trend in the fact that sustainability is the new luxury. We can and must build in ways that have a much better environmental impact than the existing one. We believe that we can do this without reducing the lifequality, functions and deliciousness of the home. On the contrary.





Features of the dwelling

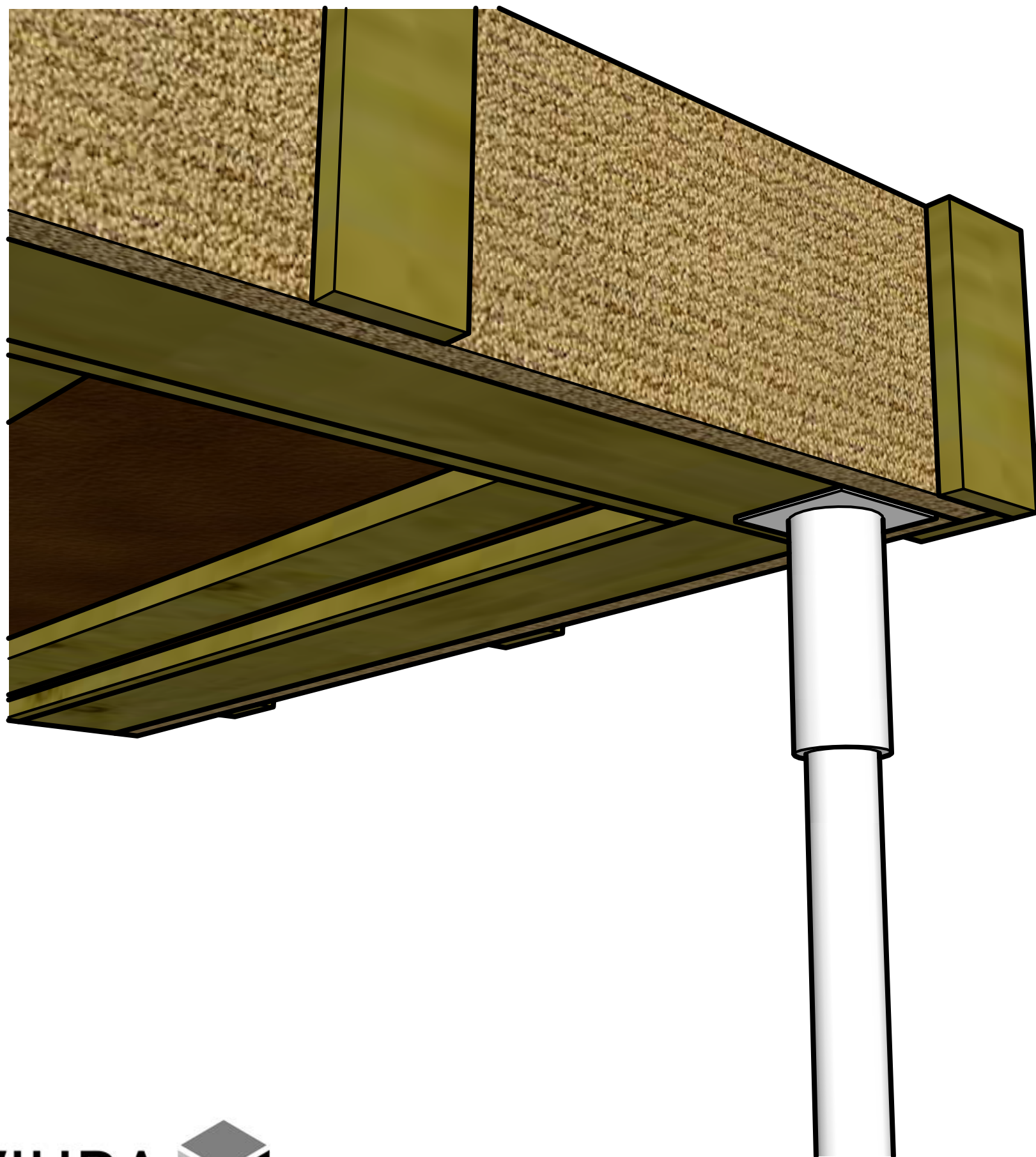
On 25 m² exist; Living room with corner sofa, and dining table with room for five. All in Nordic veneer. An entrance area with space for both residents' guests' outerwear. A hand-crafted kitchen in solid Nordic hardwood with dishwasher. Bathroom with washing machine, toilet and shower with water scoured smooth white-shimmering floors and wick. One bedroom for two, with wardrobe in solid coniferous wood and a work/guest room for one person. The floors are made of oak and the roof is a green roof where residents can choose which plants to hang down. The exterior cladding is a weather-illuminating wooden cladding.



The area outside

In addition to this, the transport protection folds down and becomes two large terraces on the long sides of the house of heat-treated wood from Nordic forests.

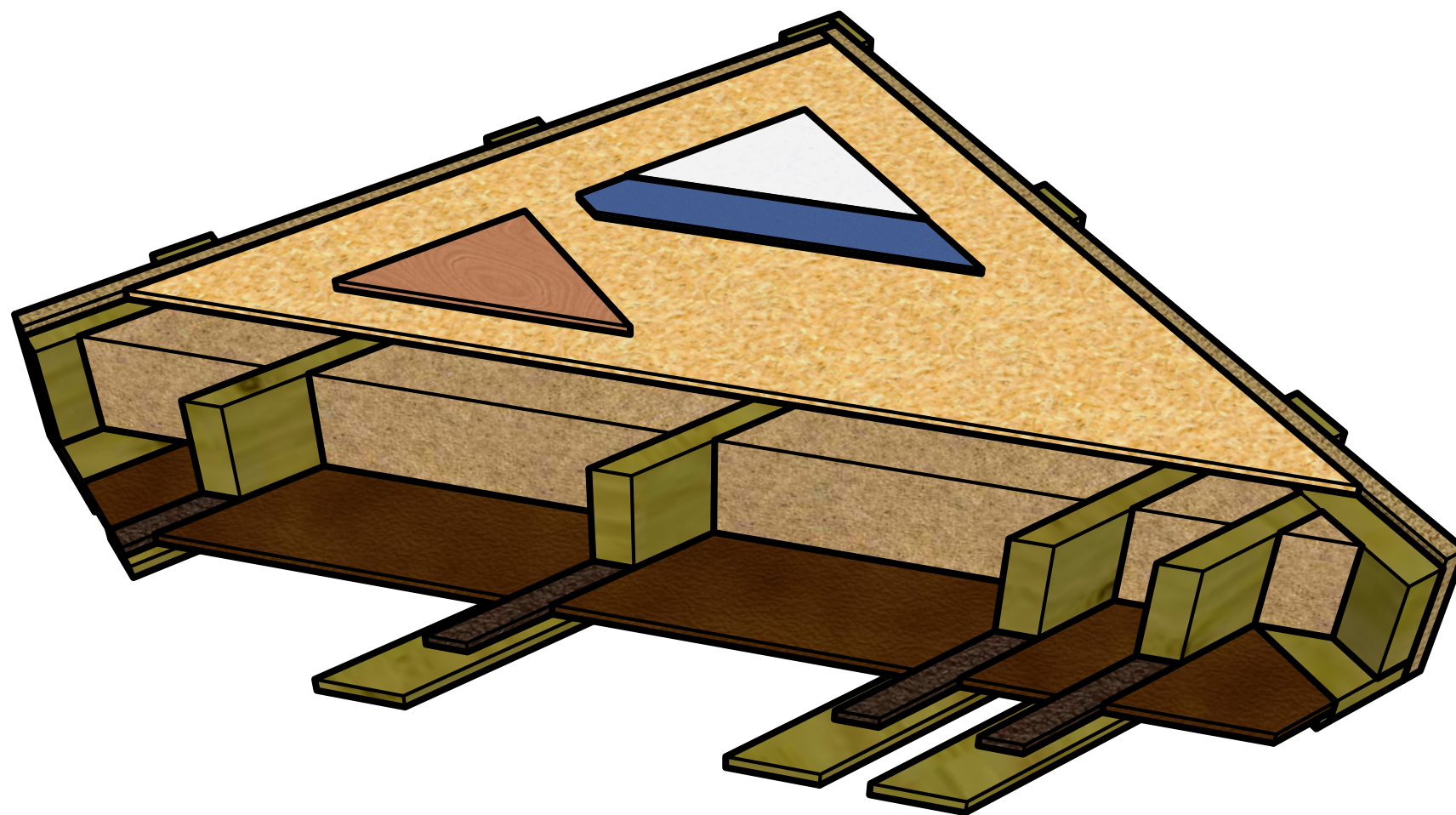
The roof can be used as an outdoor area if it is secured against falls. It can end up being used as a green hang out place, maybe a vegetable garden or just a nice place to share with the insects?



Project constructions

Foundation

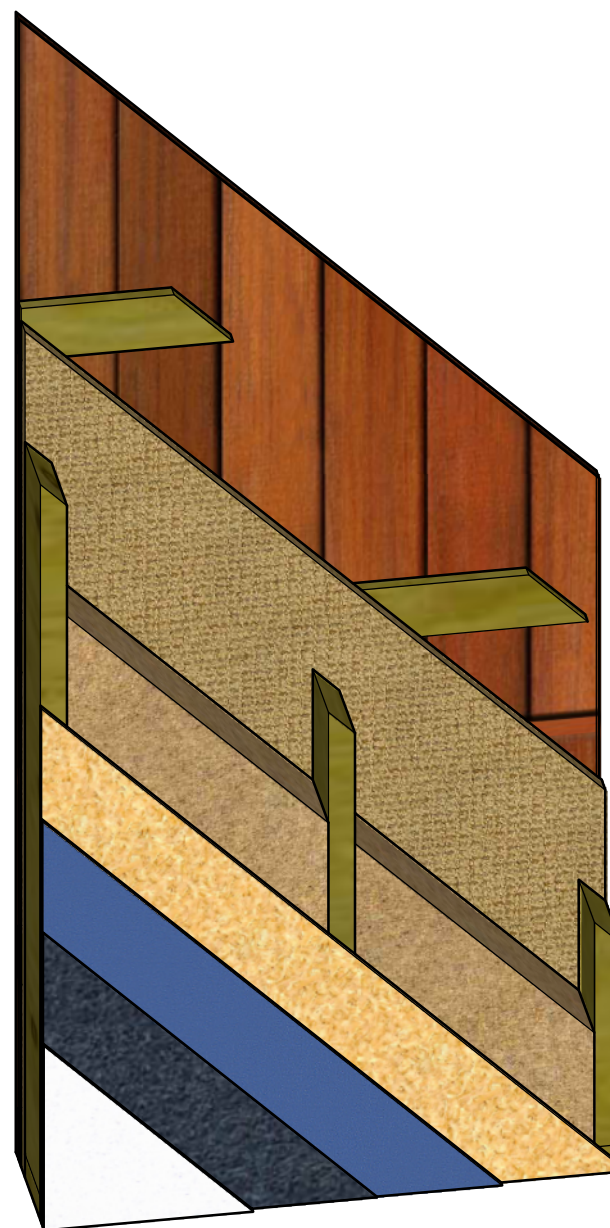
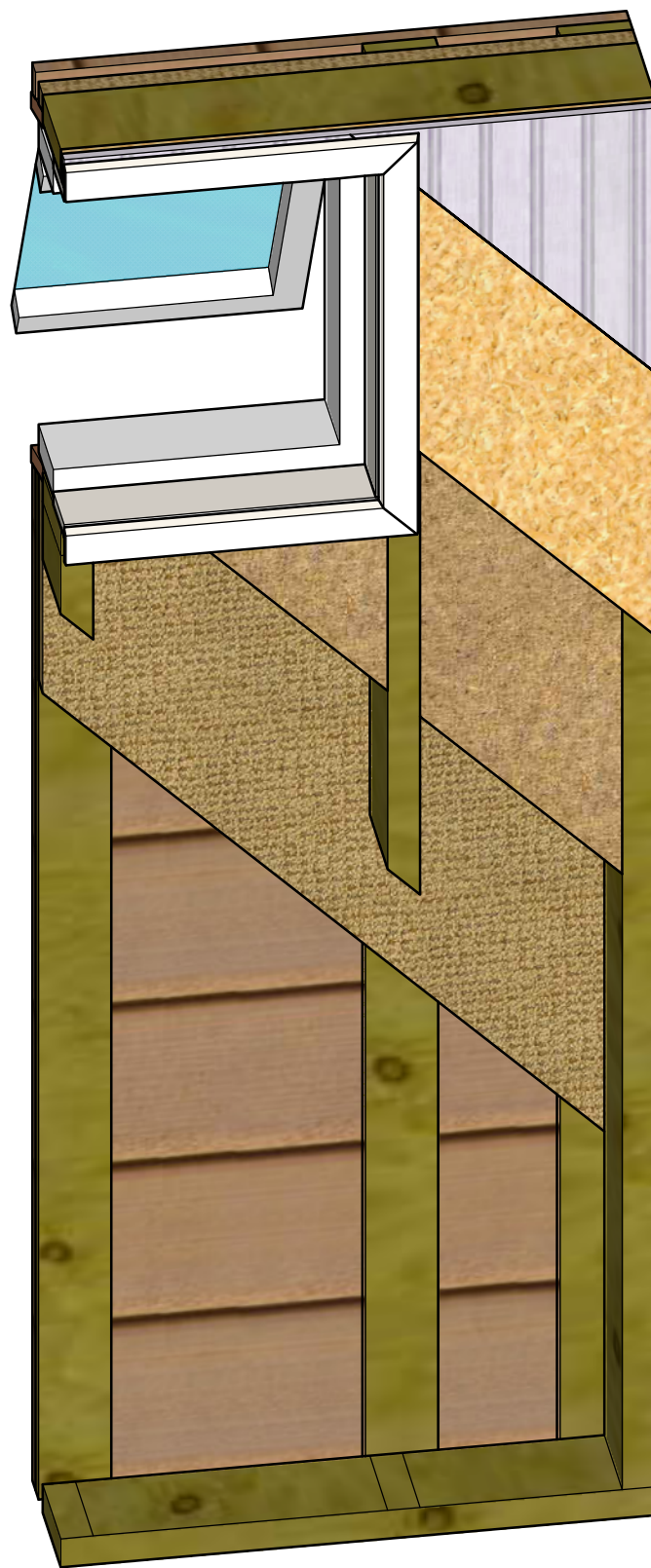
The home is planned to be placed on screw foundations with an estimated CO2 footprint of 0.4 tons



Floor construction

-0,62 ton co2 emission per m2 (-1,5 ton in all)

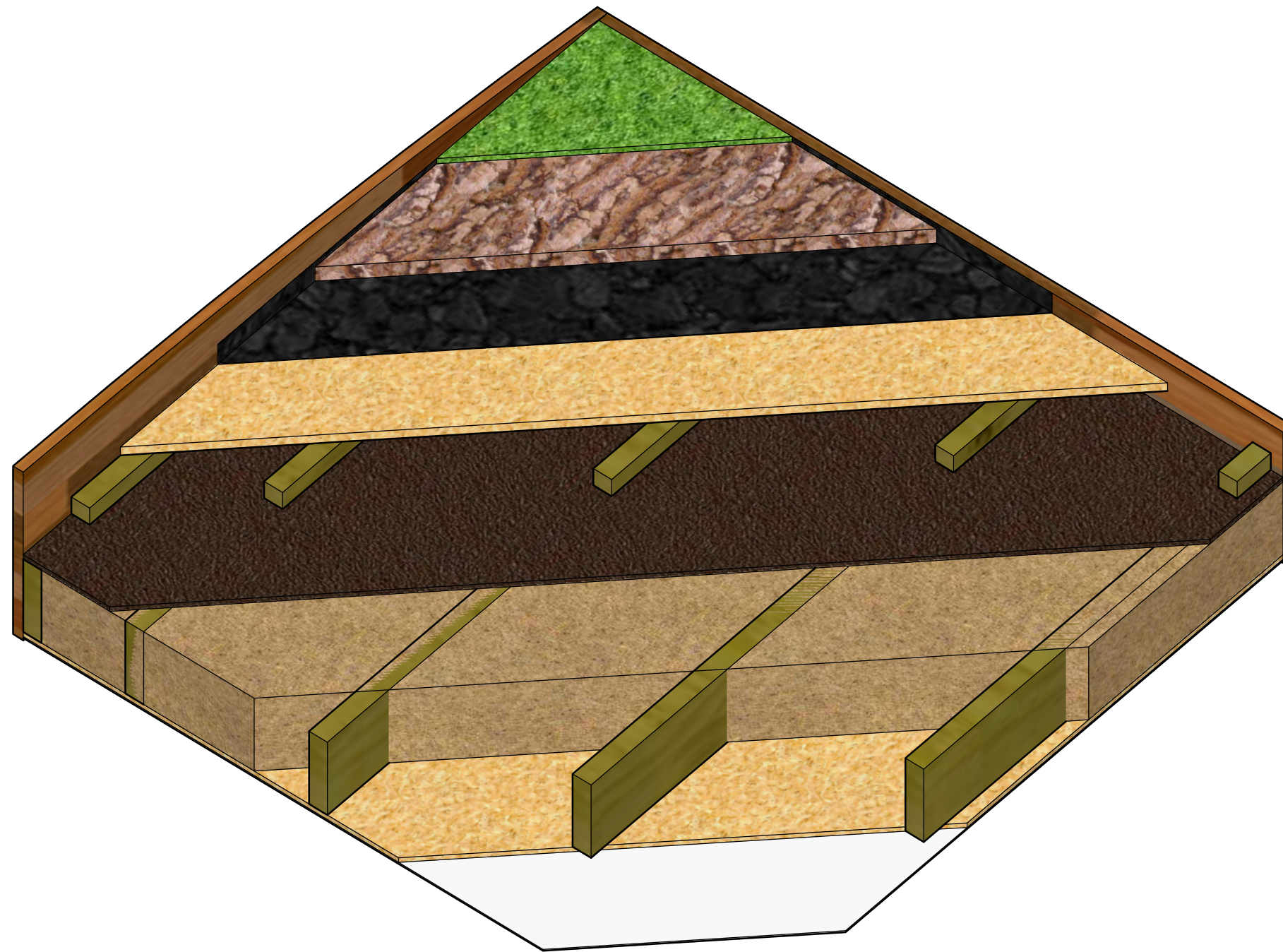
The floor straps are thought in 65x195 glulam timber with floor beams ad 45x195 rafter wood. The cavity is insulated with blown-in Danish-produced wood fiber insulation (Class II material) The underside is covered with 18 mm. tar-treated wood fiber wind barrier boards fine-meshed mussen, held in place by modified formwork boards. On the upper side are raw floor and moisture brake made with 18 mm. OSB T5 plate and a swimming floor of oak plank. In the bathroom, the oak plank floor has been replaced with a 12 fiber cement reinforced XPS wet room plate and cement plaster paint.



Outer walls

-0,038/-61,2 ton co2 emission per m2
(1,8 ton co2 all together)

The outer walls are made of 45x145 mm. rafter wood. The cavity is insulated with blown-in Danish-produced wood fibre insulation (Class II materials). Inside, the structure is stiffened and steam-proofed with the first layer of cladding of 12 mm. OSB T5. Joins are taped. The electrical work is carried out behind the skirting boards and along doorways. The inner cladding is made of lye-treated wood panels in the gables and white-painted 10mm. fiber gibs. In the bathroom it is made with a 12 fiber cement reinforced XPS wet room plate and cement-plaster paint. The wind barrier also forms part of the insulation and is made with 35 mm. wood fiber wind bulbs. On top of this, 25*100 modified nail boards with a Nordic cedar cladding on clinker are mounted



Roof construction

The construction is made with 65x195 mm. glulam along the walls. The roof trusses are made of 45x195 mm. rafter wood. The cavity is insulated with blown-in Danish-produced wood fiber insulation (Class II materials) the structure is wind-stiffened and vapor-proof with a 12 mm OSB T5 plate, which also forms the first layer of cladding. The ceiling covering is 10 mm. fibergibs, painted white with natural paint.

Above the insulation is a 12 mm. tar-treated wooden fiber wind barrier with 45-65 mm. spacers that make a slight slope for the roof boards. The roof is sealed with root-proof roofing felt, locally produced from recycled materials. The growth layer is made with 50 mm. growth medium with turf, to form the root system for the permanent succulent growths.



Doors and windows

Doors and windows are locally produced even ventilating and heat exchangers in heartwood.

Terrace

-0,018 ton co2 emission per m2 (0,6 ton co2 all together)

The protection of the home during transport folds down like two terraces in the full length and height of the home. These are made of weather vane modified Nordic coniferous wood.

Partitions and tires

-0,040 /-0,049 ton co2 emission per m2 (0,5 ton co2 all together)

Is made of a sandwich with 19 mm. lye-treated cross-glued spruce wood boards on the outside and hard wood fiber boards in the middle. In the bathroom, it is made with a 12 fiber cement reinforced XPS wet room plate and cement-plaster paint

Interior

-0,009 ton co2 emission per m2 (0,3 ton co2 all together)

Interiors are made from various compositions of plywood, furniture boards and solid boards from sustainable forestry in the region. They are coated with beeswax, lye and other natural products.