Econtainer Student Living

SAINT-GOBAIN

ARCHITECTURE STUDENT CONTEST

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17TH INTERNATIONAL EDITION, WARSAW 2022

Project description

Our project integrates the most important factors from the context, climate, and environment as well as the essence of Warsaw, to create the most comfortable student housing project in Poland. We thought of how we could lower carbon emissions from the product stage by eliminating the need of raw material extraction as well as manufacturing all the way to the end of life stage. The container provides a modular design with the necessary measures to comply with the student residency program.

Project Location

Warsaw

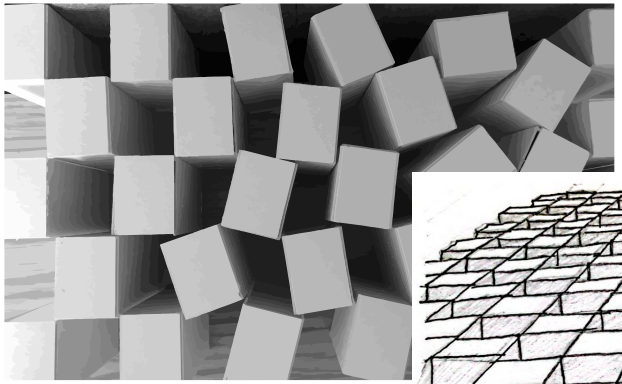
Praga-Południe

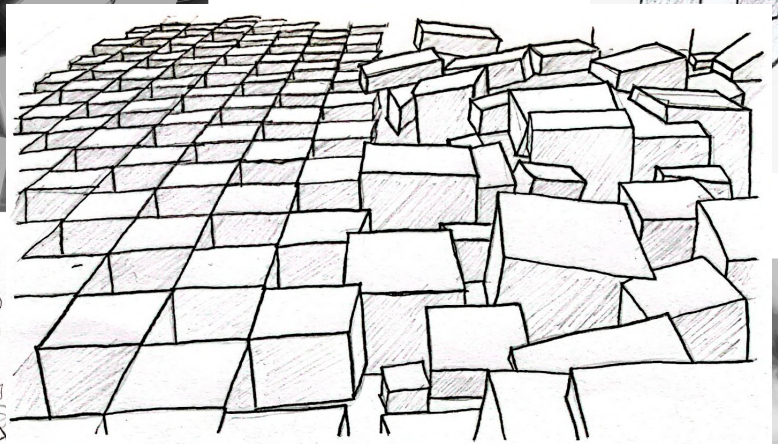
Kamionek

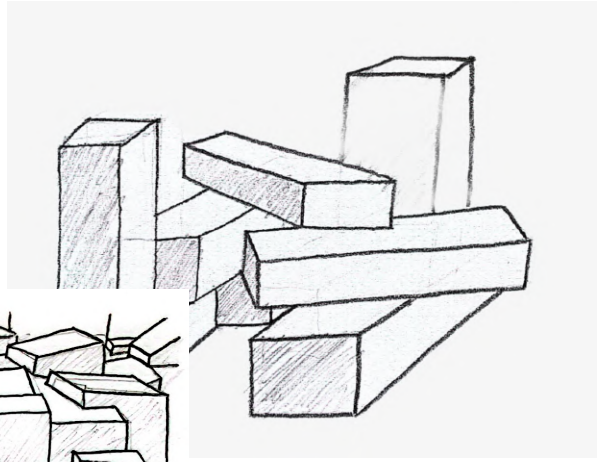
Project Site

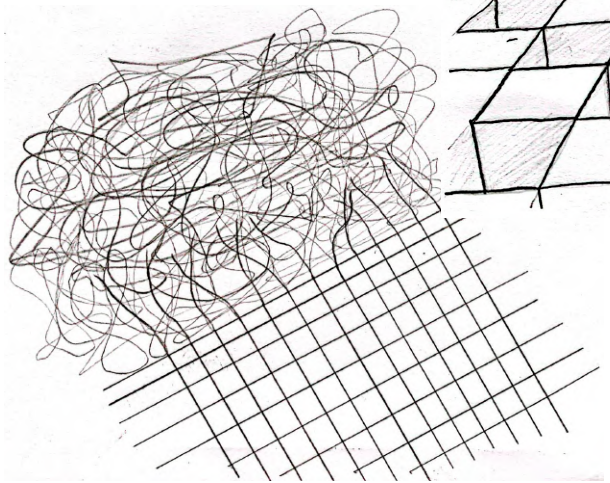
Concept

“Order within the Disorder”

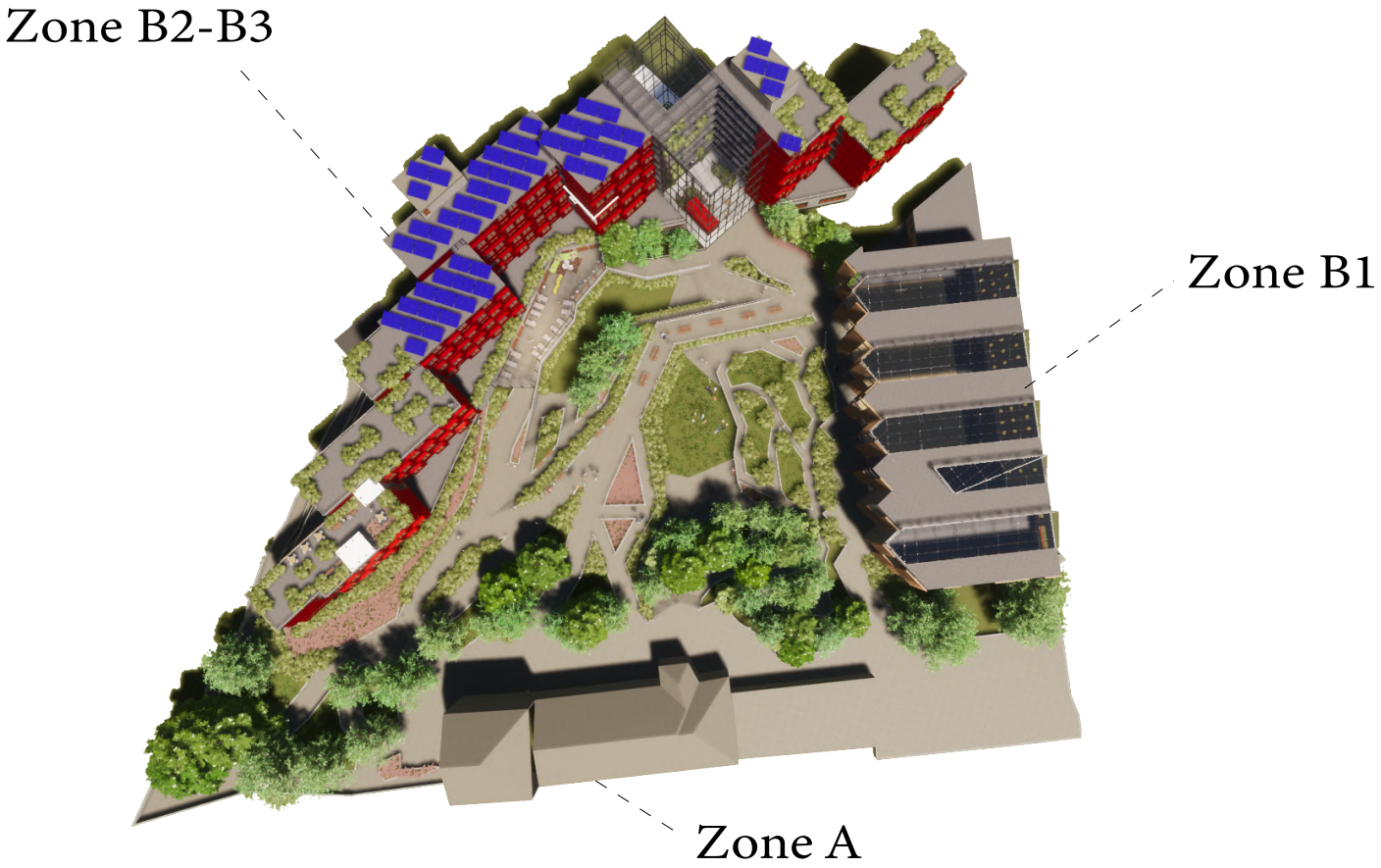




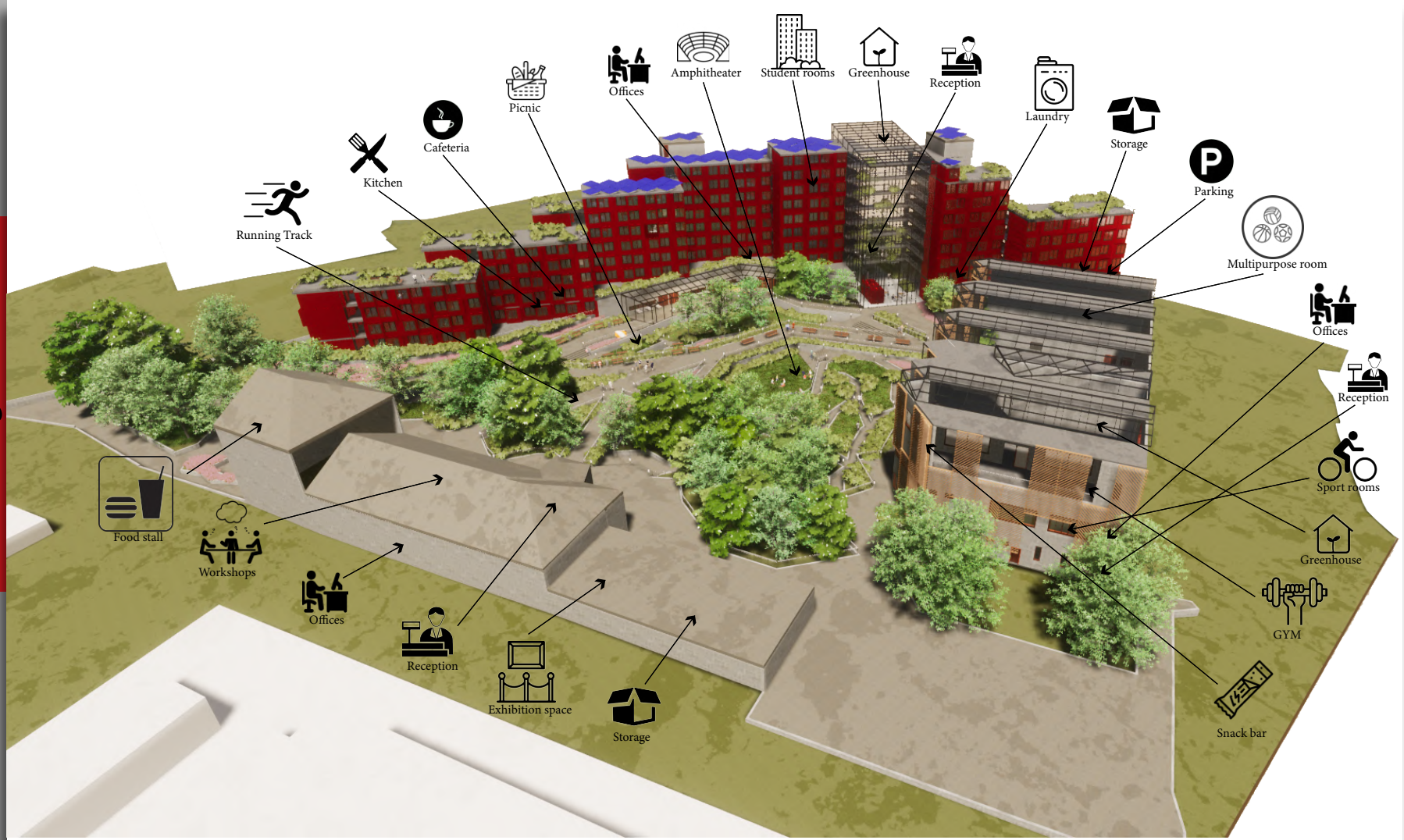




Master Plan



Program

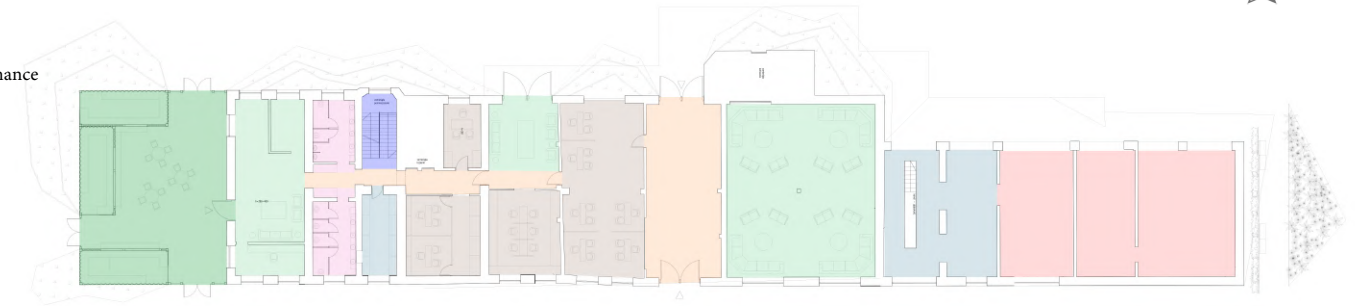

Offices
Amphitheater
Student rooms
Greenhouse
Reception
Laundry
Storage
Parking
Multipurpose room
Offices
Reception
Sport rooms
Greenhouse
GYM
Snack bar
Picnic
Cafeteria
Kitchen
Running Track
Food stall
Workshops
Offices
Reception
Exhibition space
Storage

Illustrated Plans

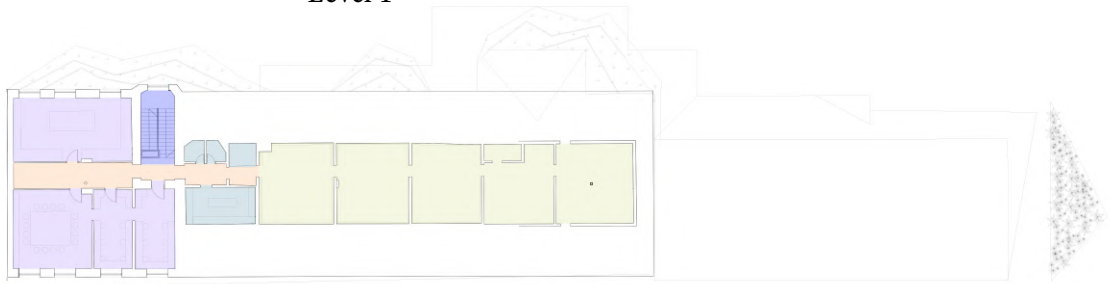
Zone A

Ground Floor

- Mechanical rooms/maintainance
- Circulation
- Reception/waiting rooms
- Food stalls/ Dining room
- Stairs
- Restrooms
- Reception area
- Storage rooms
- Exhibition spaces
- Workshops



Level 1

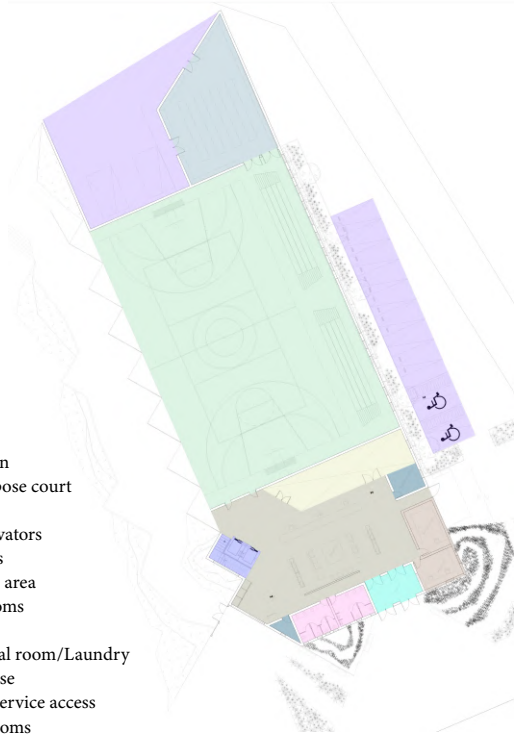


* To keep the historic atmosphere of the structure, it was decided to avoid demolition of the interior walls of the factory.

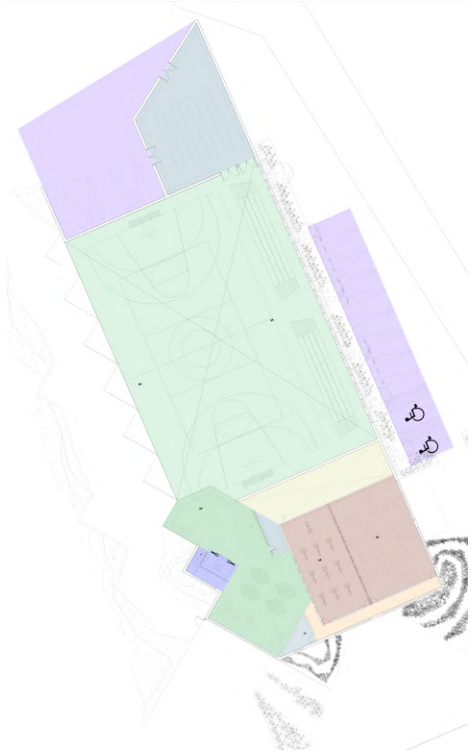
Illustrated Plans

Zone B1

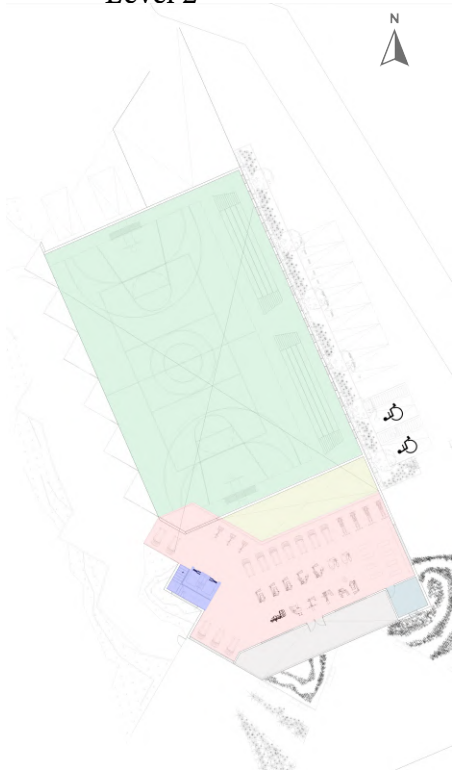
Ground Floor



Level 1

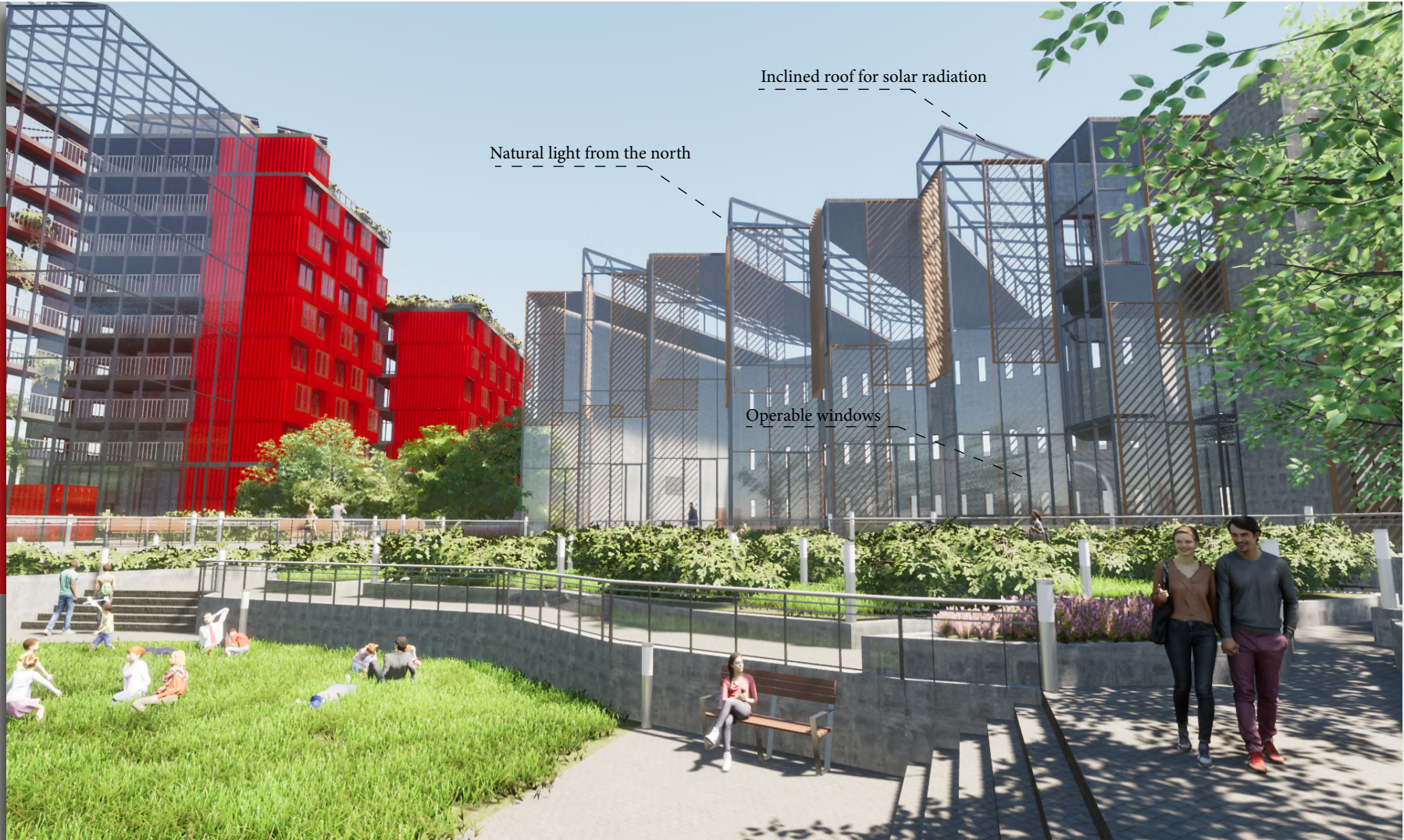


Level 2



- GYM
- Circulation
- Multipurpose court
- Snack bar
- Stairs/Elevators
- Restrooms
- Reception area
- Sports rooms
- Buffer
- Mechanical room/Laundry
- Greenhouse
- Parking/Service access
- Storage rooms

Sports complex view

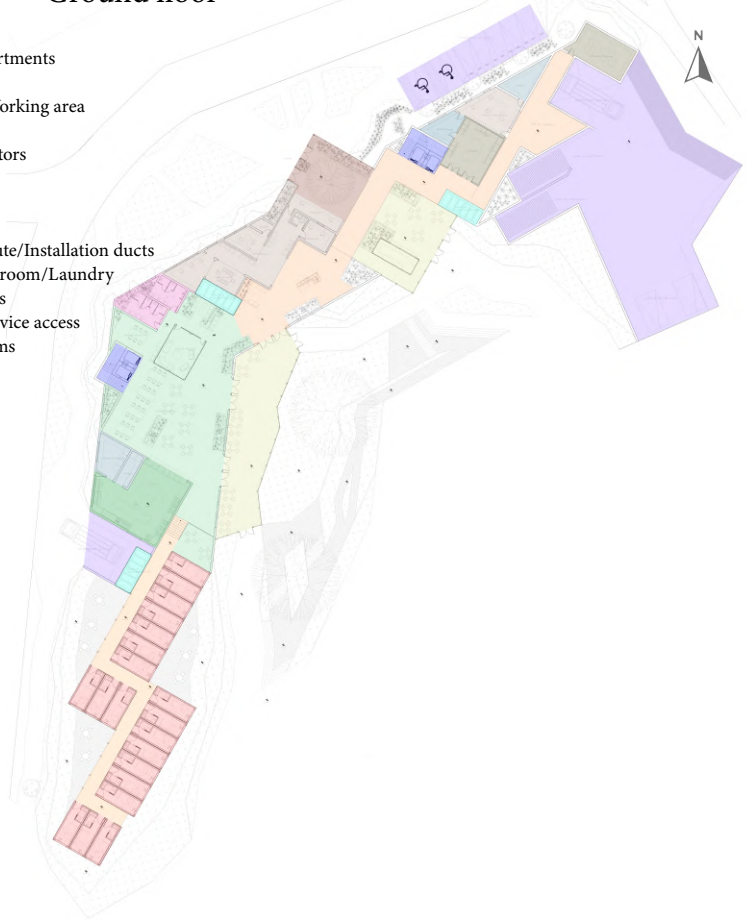


Illustrated Plans

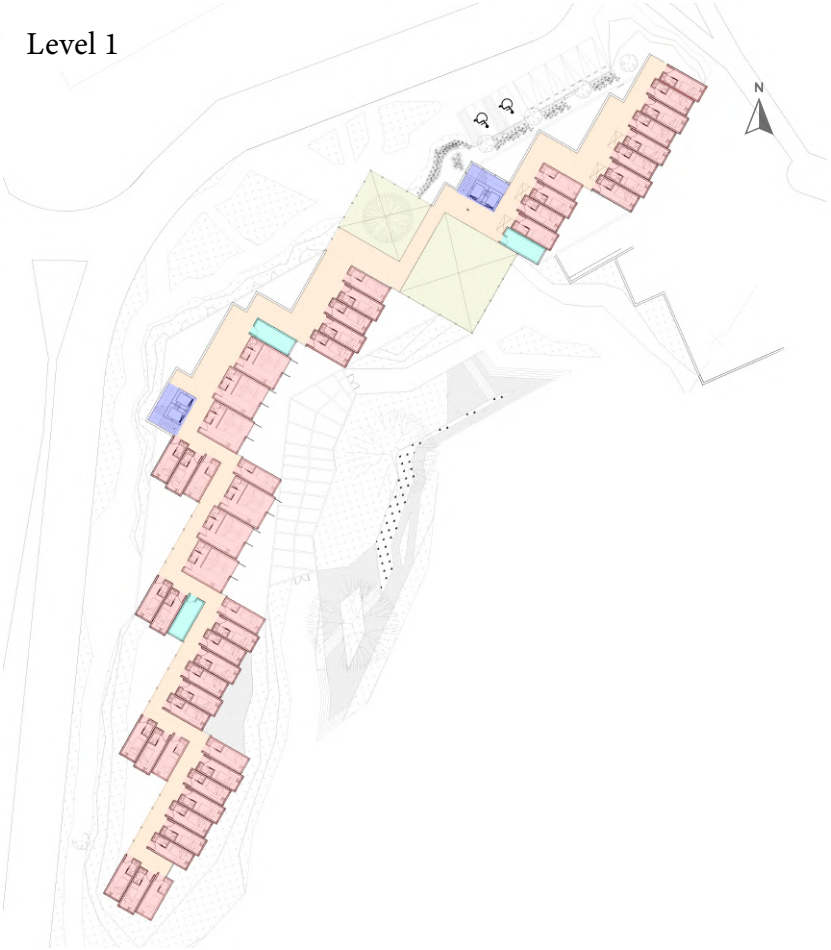
Zone B2-B3

Ground floor

- Student apartments
- Circulation
- Cafeteria/Working area
- Kitchen
- Stairs/Elevators
- Restrooms
- Offices
- Main access
- Garbage chute/Installation ducts
- Mechanical room/Laundry
- Greenhouses
- Parking/Service access
- Storage rooms

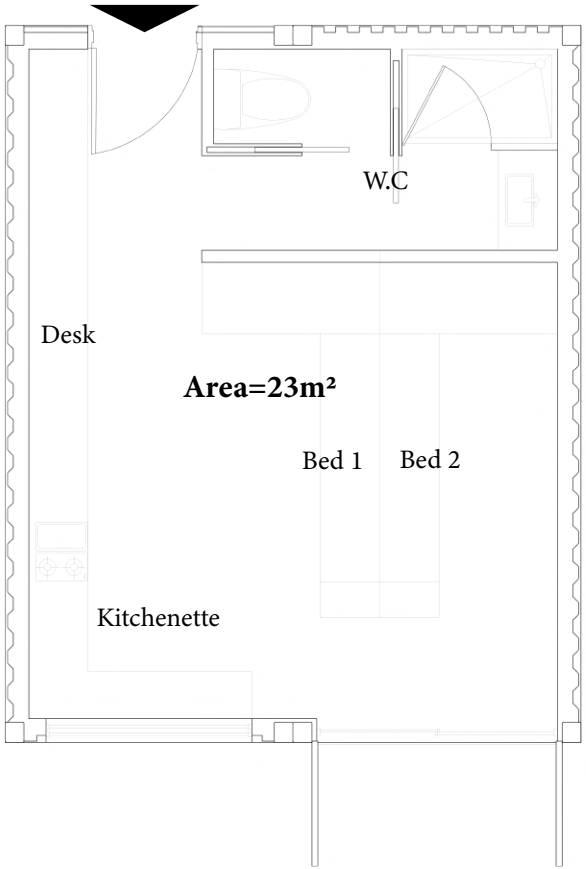


Level 1

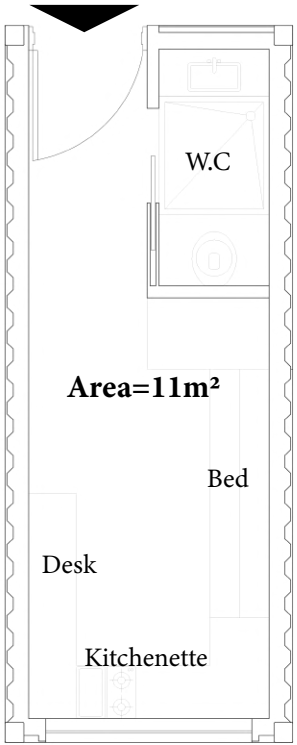


Room plans

Double room

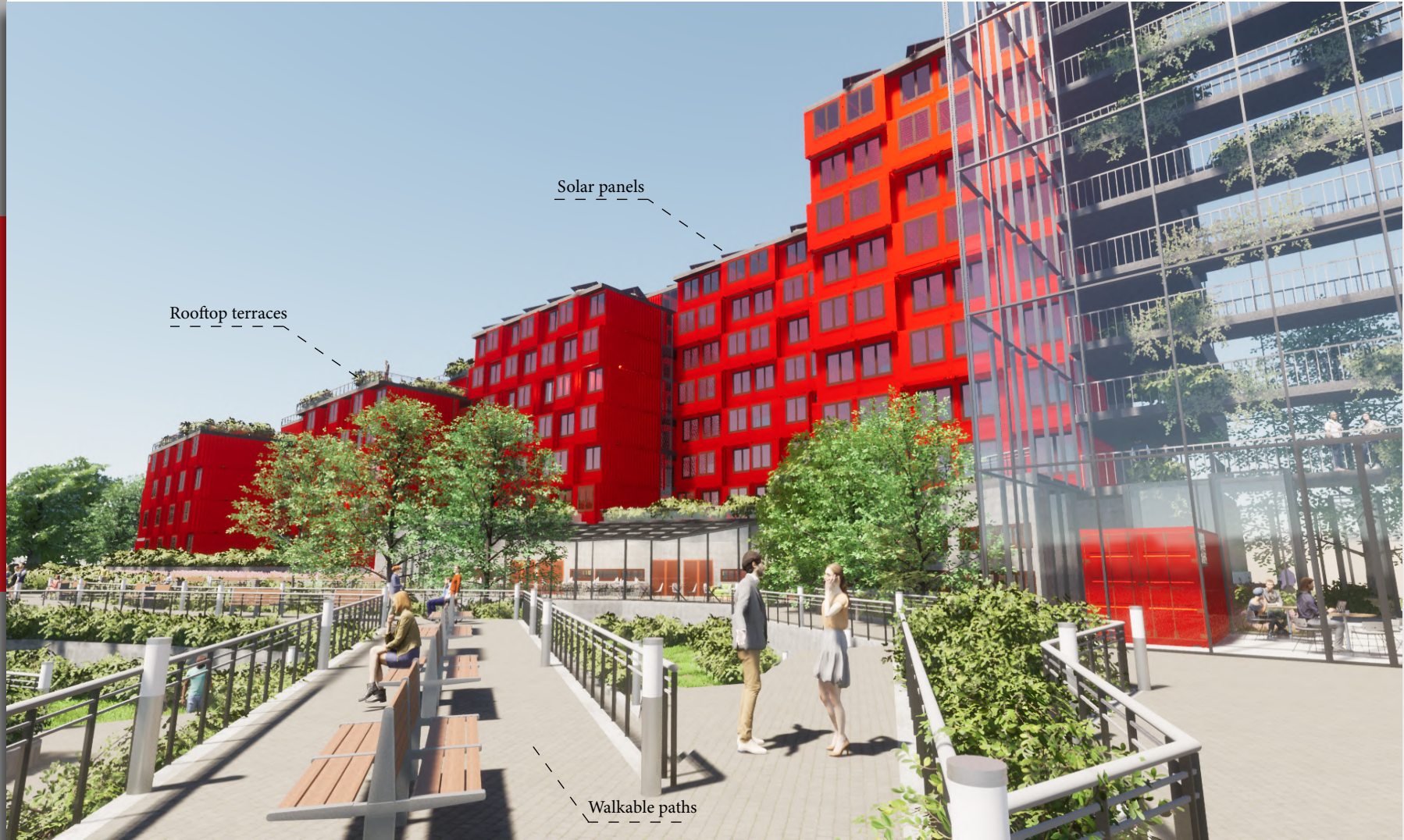


Single room

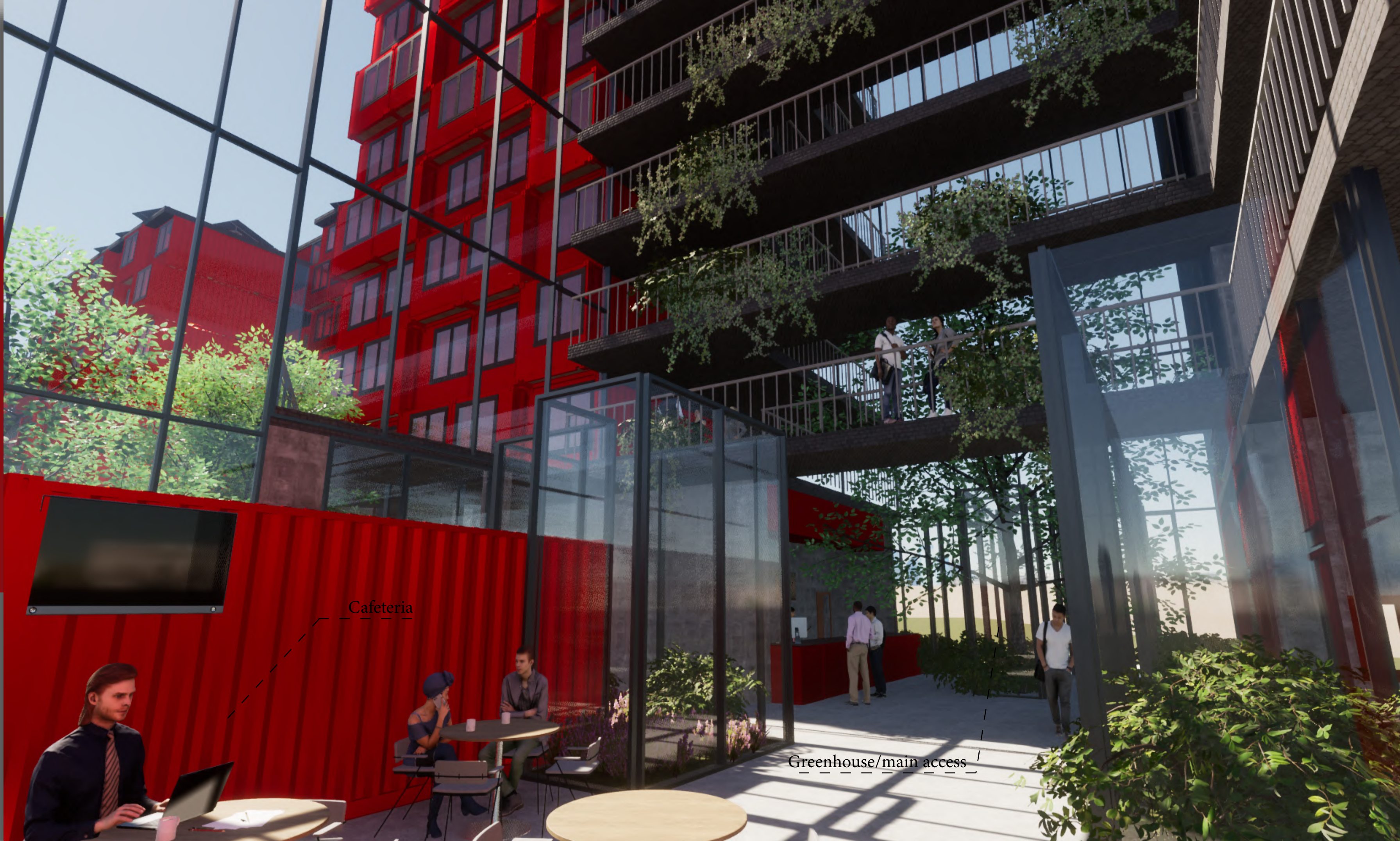


* Furniture (beds and desks) fold into walls for more space

Plaza view



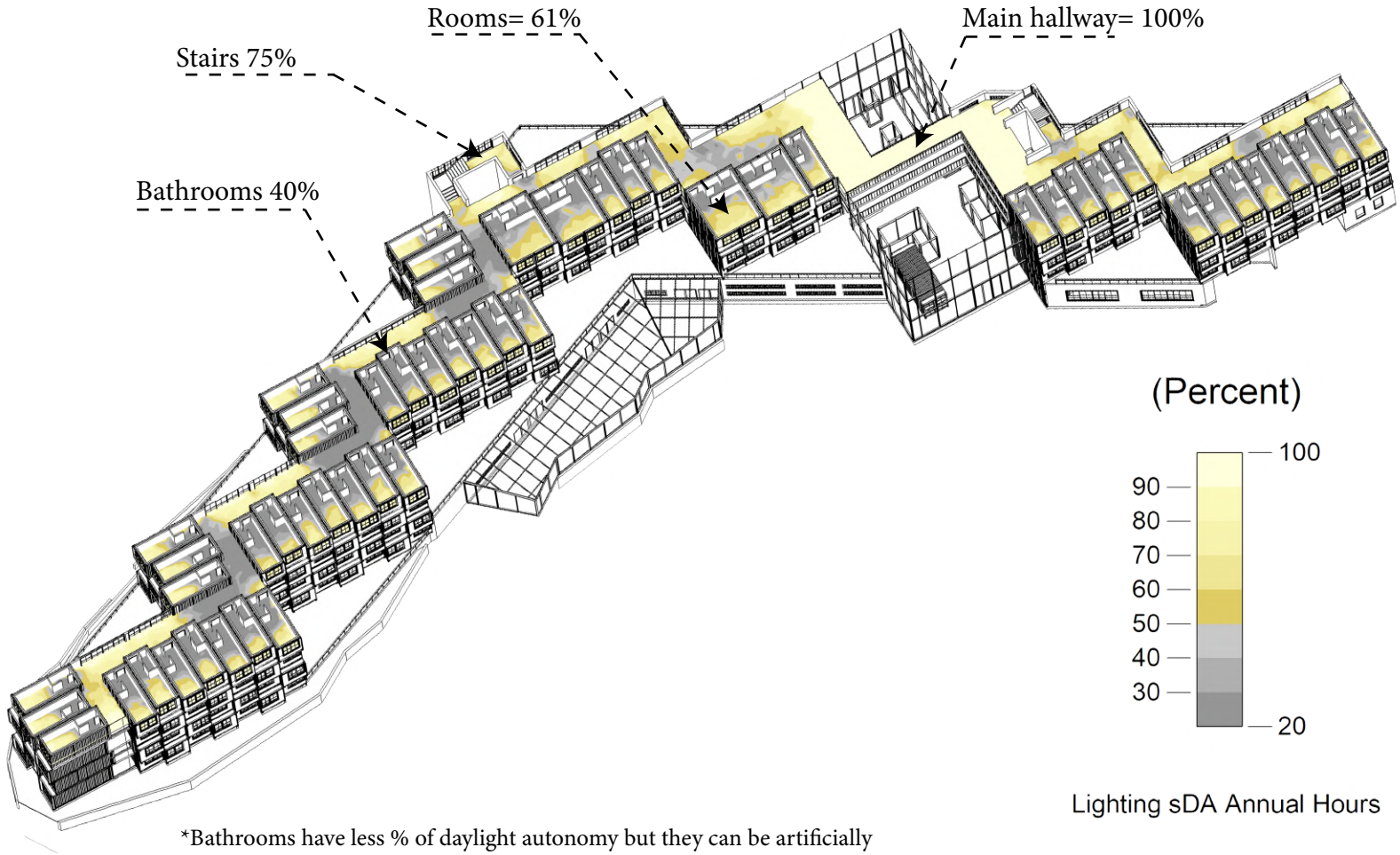
Greenhouse view



Dining room view

Rooftop view

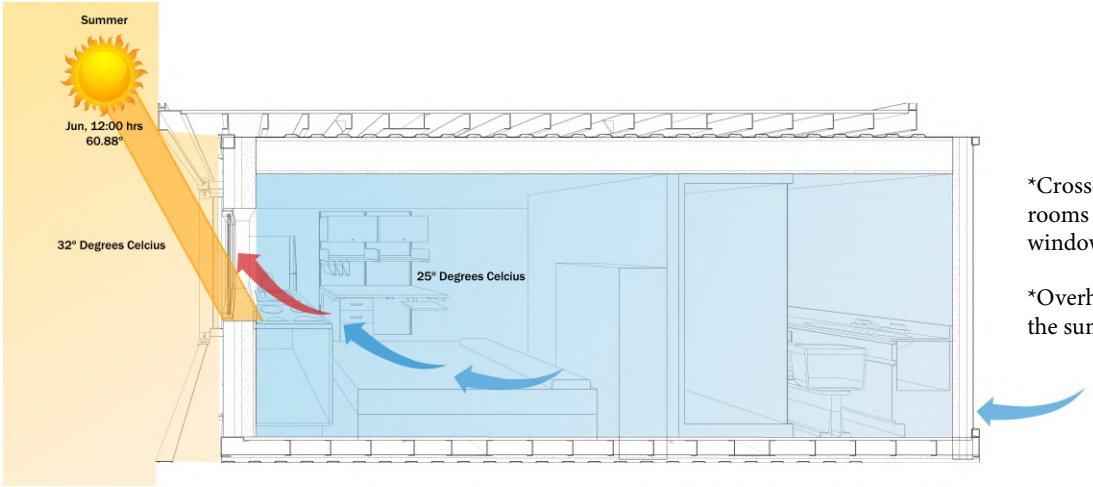
Natural daylight autonomy



*Bathrooms have less % of daylight autonomy but they can be artificially illuminated with the energy provided by the solar panels of the building

Summer confort analysis

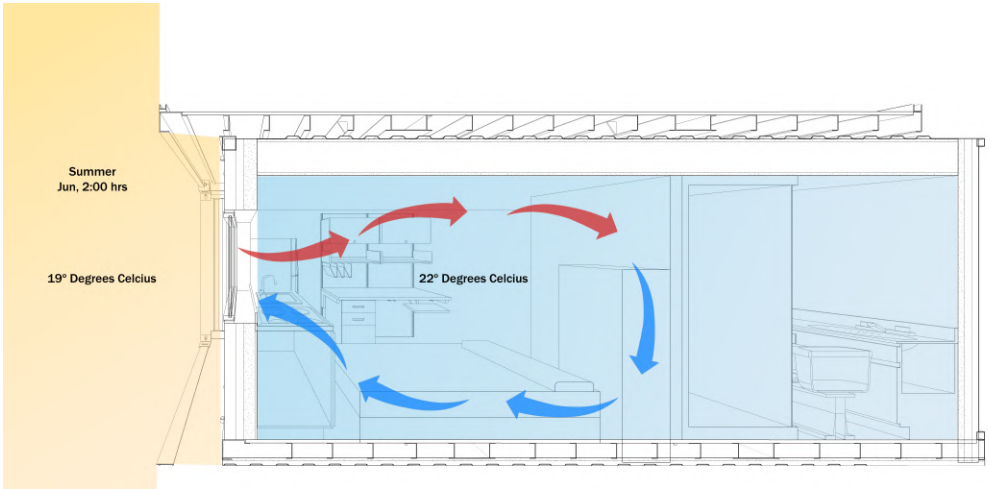
SUMMER (DAY)



*Cross-winds enter from the doors of the rooms and release the hot air out the windows

*Overhangs avoid the direct radiation from the summer sun

SUMMER (NIGHT)

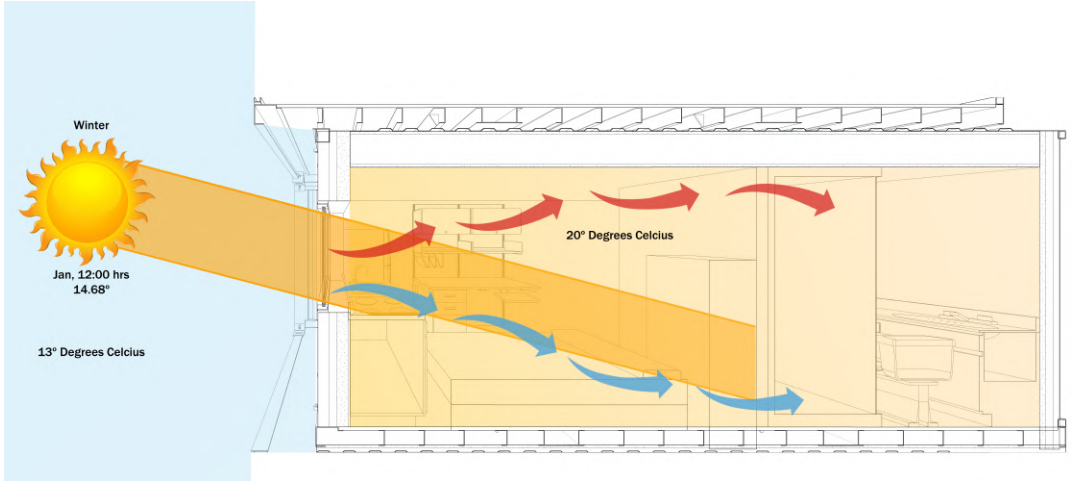


*When closing windows at night, hot air re-circulates inside the room

*Low height between floors and compact rooms help to keep the space warm

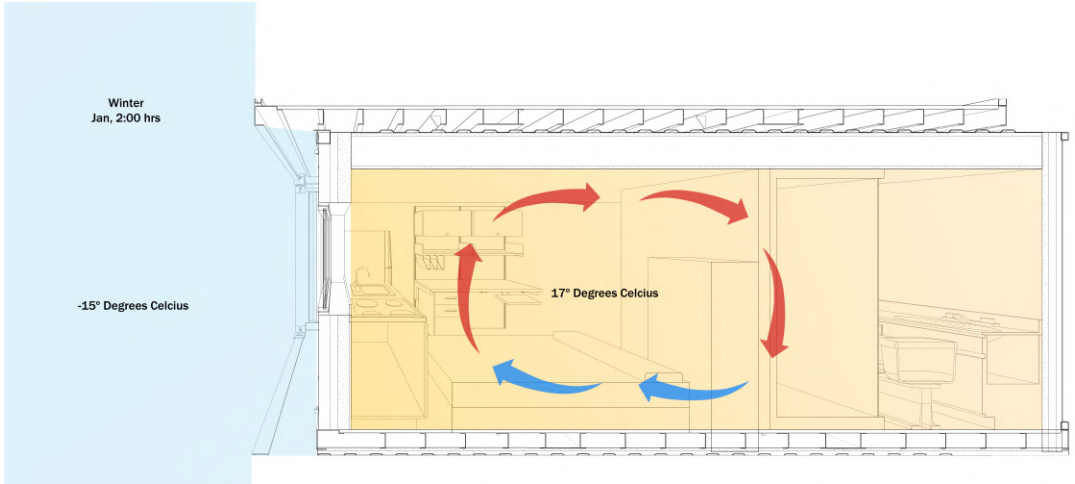
Winter confort analysis

WINTER (DAY)



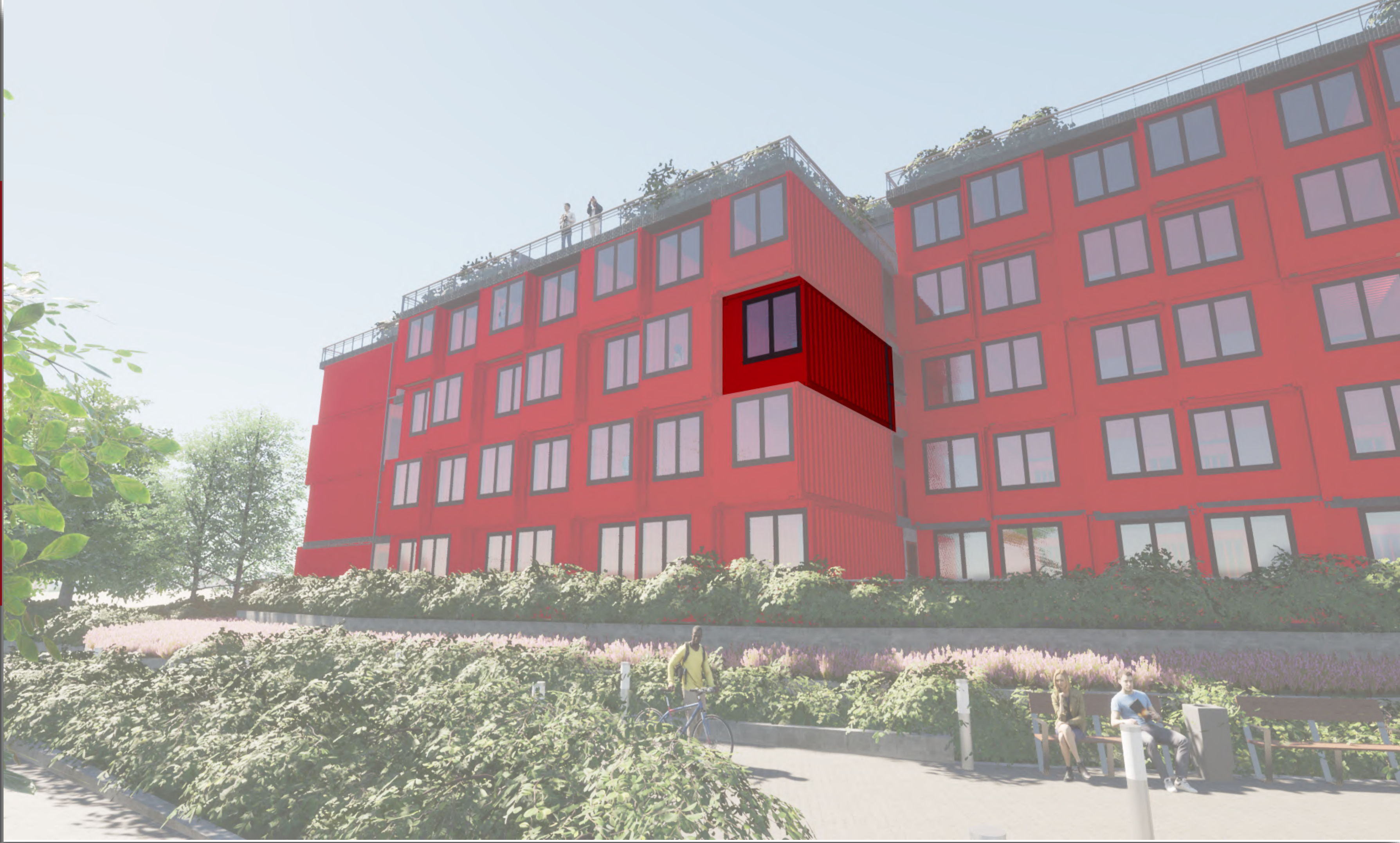
*The angle of the winter sun allows it to flood the room with radiation

WINTER(NIGHT)



*Materials like double windows and thermal isolation walls and floors keep the heat inside the room

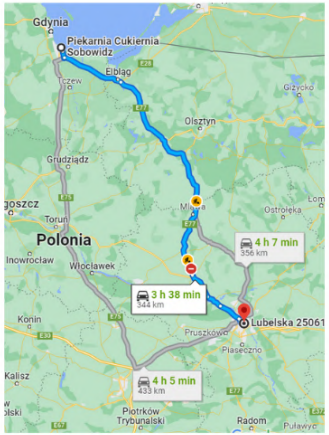
Container process

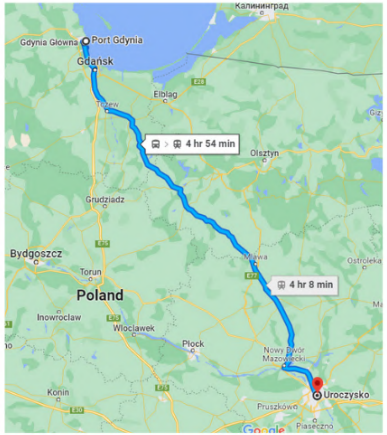


Transportation

Potential suppliers and container ports

Port of Gdansk and port of Gdynia
-3: 40 hr drive
-4:00 by train with accesibility and direct access to the project site





DIMENSIONS

Área: 13.80 m2

Assembly

Assembly benefits:

-Assembly would be possible by cranes in site
-Easy disassembly for reuse or reaccomodation
-Lower carbon emissions during construction stage than convensional structures
-Faster construction proccess

*B2-B3 zone during construction phase

Technical parameters

WALL

SATE facade cladding with ISOFEX Rock Wool and weber mortar
ISOFEX+Mortar weber Isover

Thickness= 0.25cm

Analytical Properties

Heat Transfer Coefficent (U)= 0.19 W (m2•K)

Thermal Resistance (R)= 5.10 (m2•K)/W

ROOF

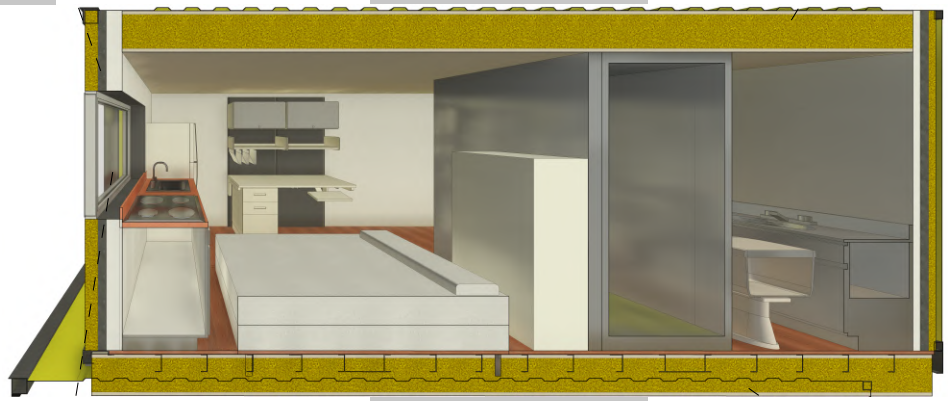
Screed PLACO FORCE FLOOR Placo Rigidur with PANEL SOLADO Isover 2

Thickness= 0.30cm

Analytical Properties

Heat Transfer Coefficent (U)= 0.14 W (m2•K)

Thermal Resistance (R)= 6.9 (m2•K)/W



Exterior glass 6 mm PLANITHERM HN (face 2) - wood interlayer 12 mm air - interior glass 6 mm PLANILUX 2

Analytical Properties

Heat Transfer Coefficent (U)= 0.30 W (m2•K)

Thermal Resistance (R)= 3.3 (m2•K)/W

Screed PLACO FORCE FLOOR Placo Rigidur with PANEL SOLADO Isover 2

Thikness: 0.15cm

Analytical Properties

Heat Transfer Coefficent (U)= 0.90 W (m2•K)

Thermal Resistance (R)= 1.1 (m2•K)/W

Double room

Single room

Room view

Irrigation System

SYSTEM:
-Precipitation goes down rainwater colection pipes
-Water storage tanks release water to irrigation sistem

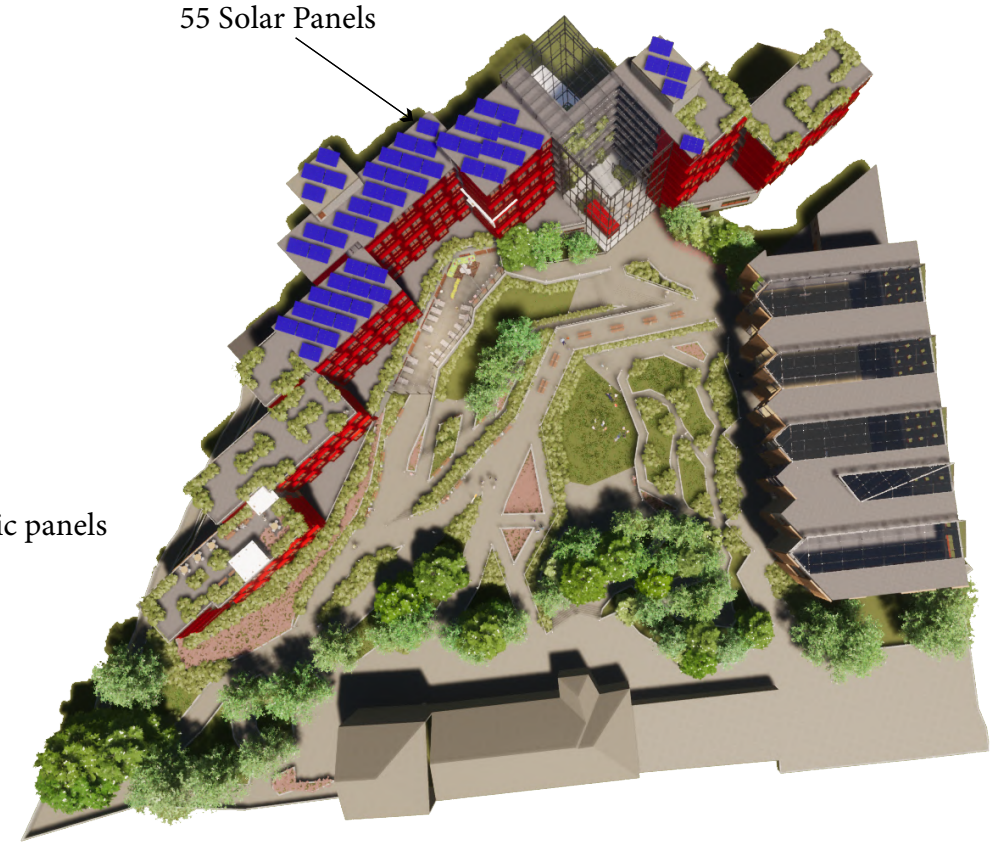
Solar Panel Analysis

Emissions avoided in 50 years by the use of photovoltaic panels

-10.65 Ton CO2

Emissions avoided in 1 year by the use of photovoltaic panels

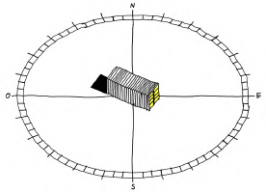
-0.213 Ton CO2



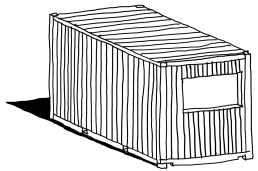
Reducing energy consumption

Step by step measures for reducing energy consumption

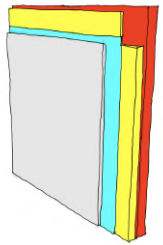
1. **Orientation (SE)-** This secion of the student rooms buiding is mostly oriented to the south-east, giving it more natural light and solar radiation, avoiding artificial lights and heating systems



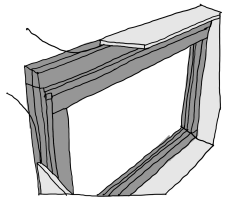
2. **Window to wall ratio= 30%** An appropriate window size for the rooms helps to reduce the energy loss from the inside, but also allows radiation to go inside the room



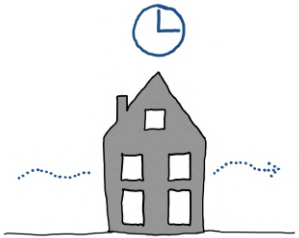
3. **Choosing the right materials-** Insulation materials for the walls, floors, and roofs help to keep the gained energy inside the building



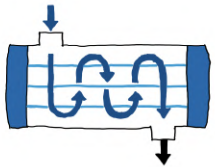
4. **Air tightness-** We reduced infiltration to avoid having a leaky building that results in the loss of accumulated heat



5. **Air changes-** We reduced air changes according to the ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) reccomendations



6. **Implementation of heat exchanger**- This allows the air to enter the rooms with higher temperature than the outside air, resulting in not needing extreme heating measures.



Annual energy demand comparison

Convensional concrete in-situ building

VS

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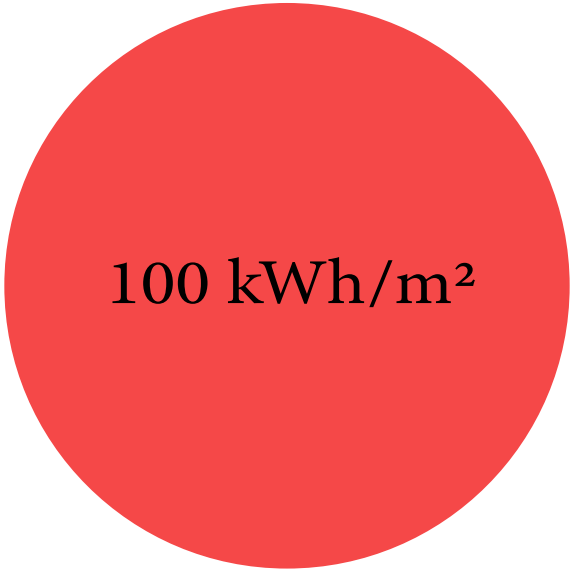
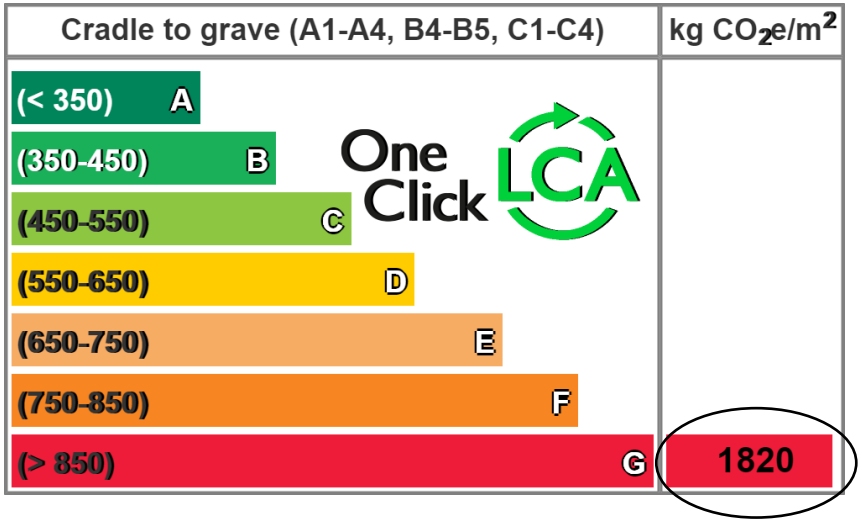


*200m2 analysis, 8 storey building

CO2 Footprint

Embodied carbon benchmark

Convensional concrete in-situ building



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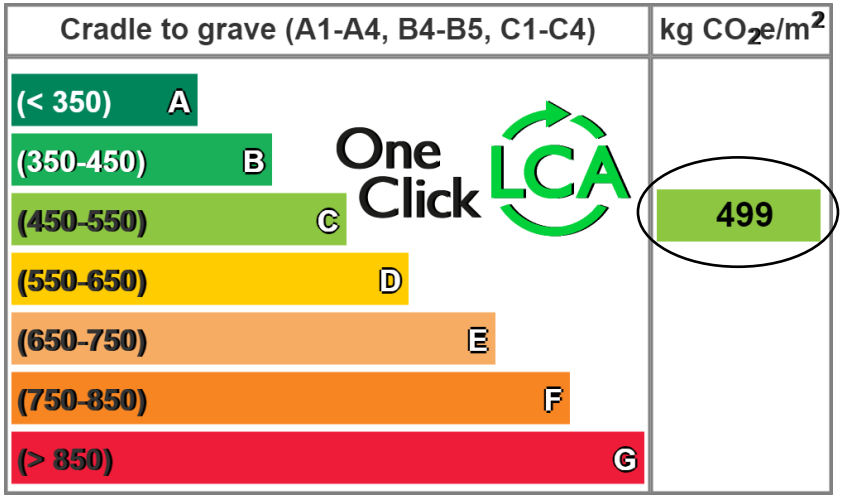
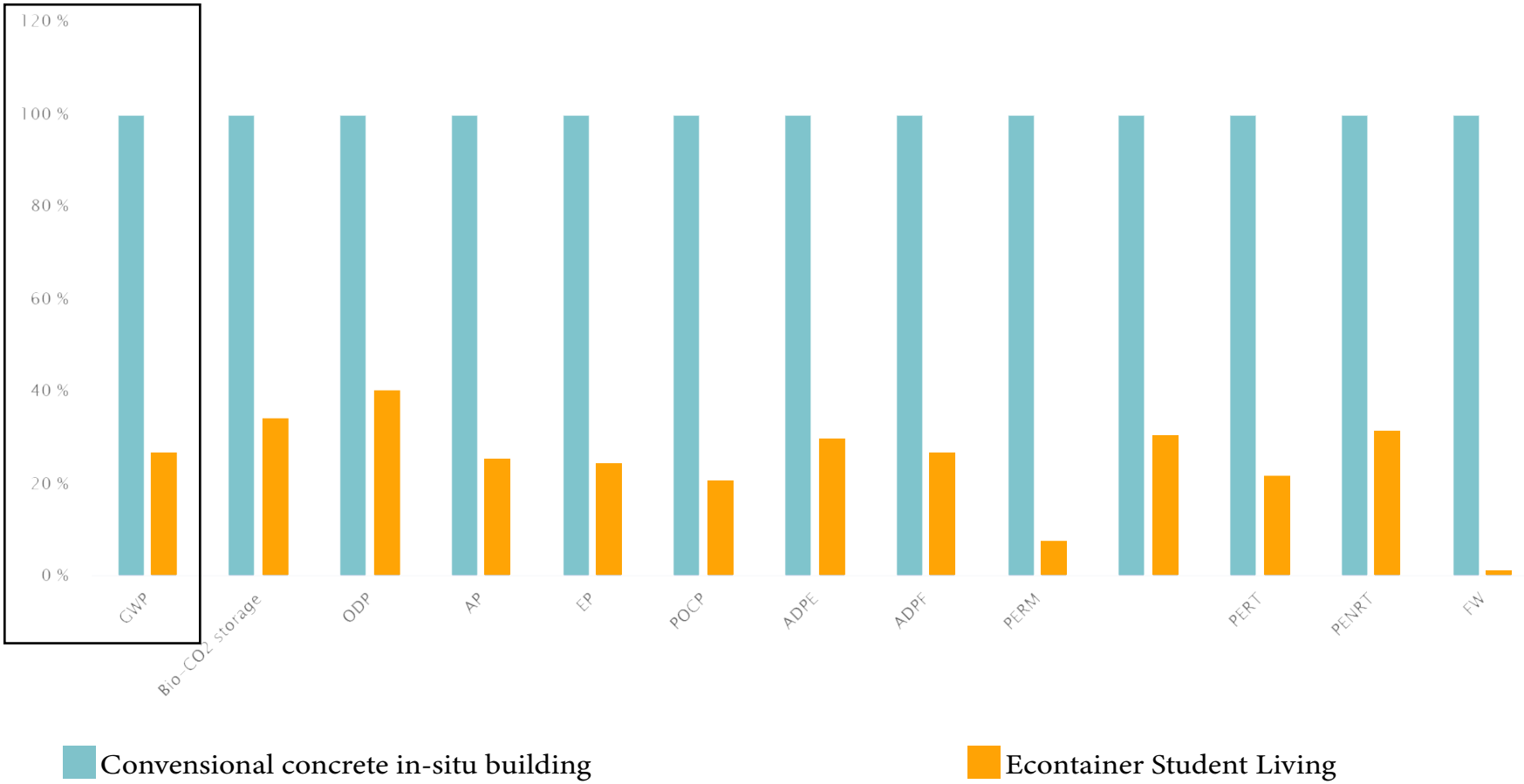


After running the analysis on OneClick with our materials, we compared our section of building which has a category C of carbon emissions with 499 CO2e/m2 vs a convensional building that has a category G and 820 CO2e/m2

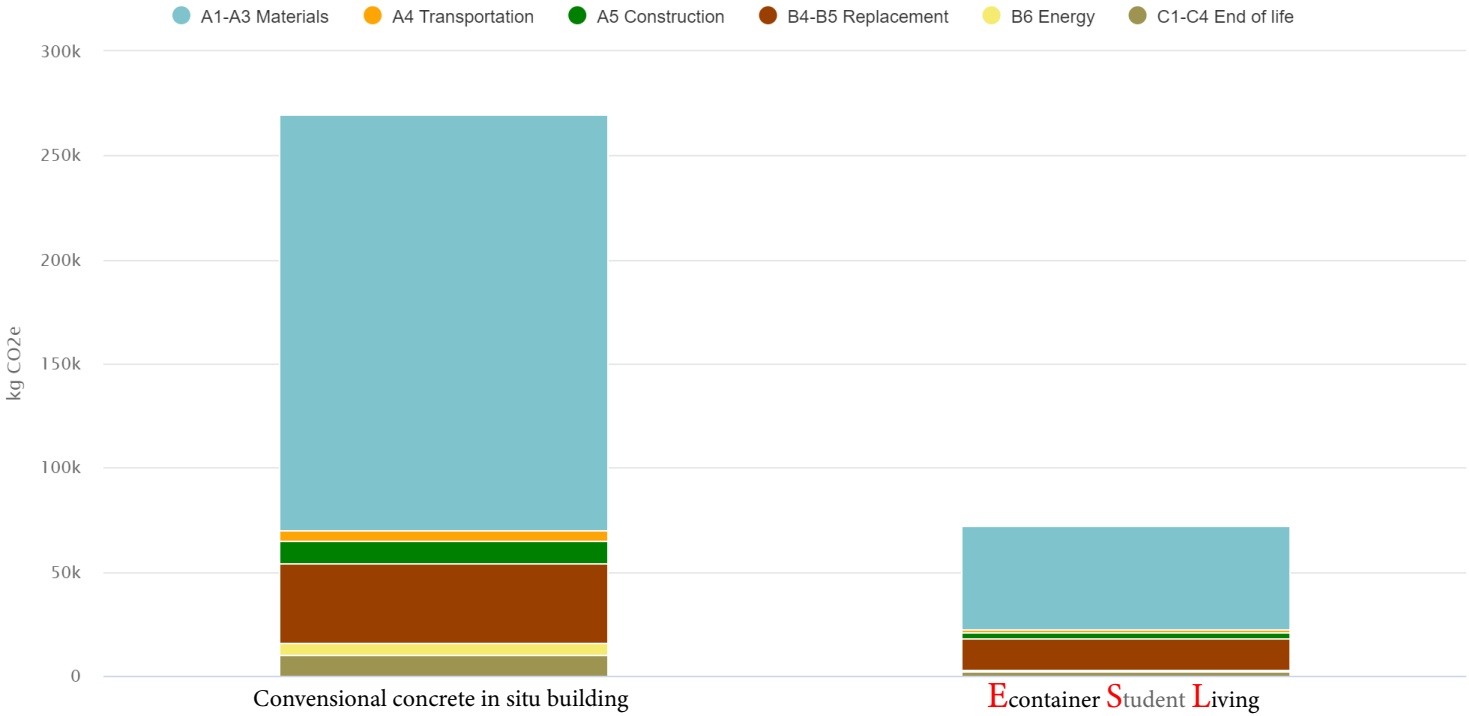
-Our project has 75% less Global Warming Potential than a convensional building

CO2 Footprint



CO2 Footprint

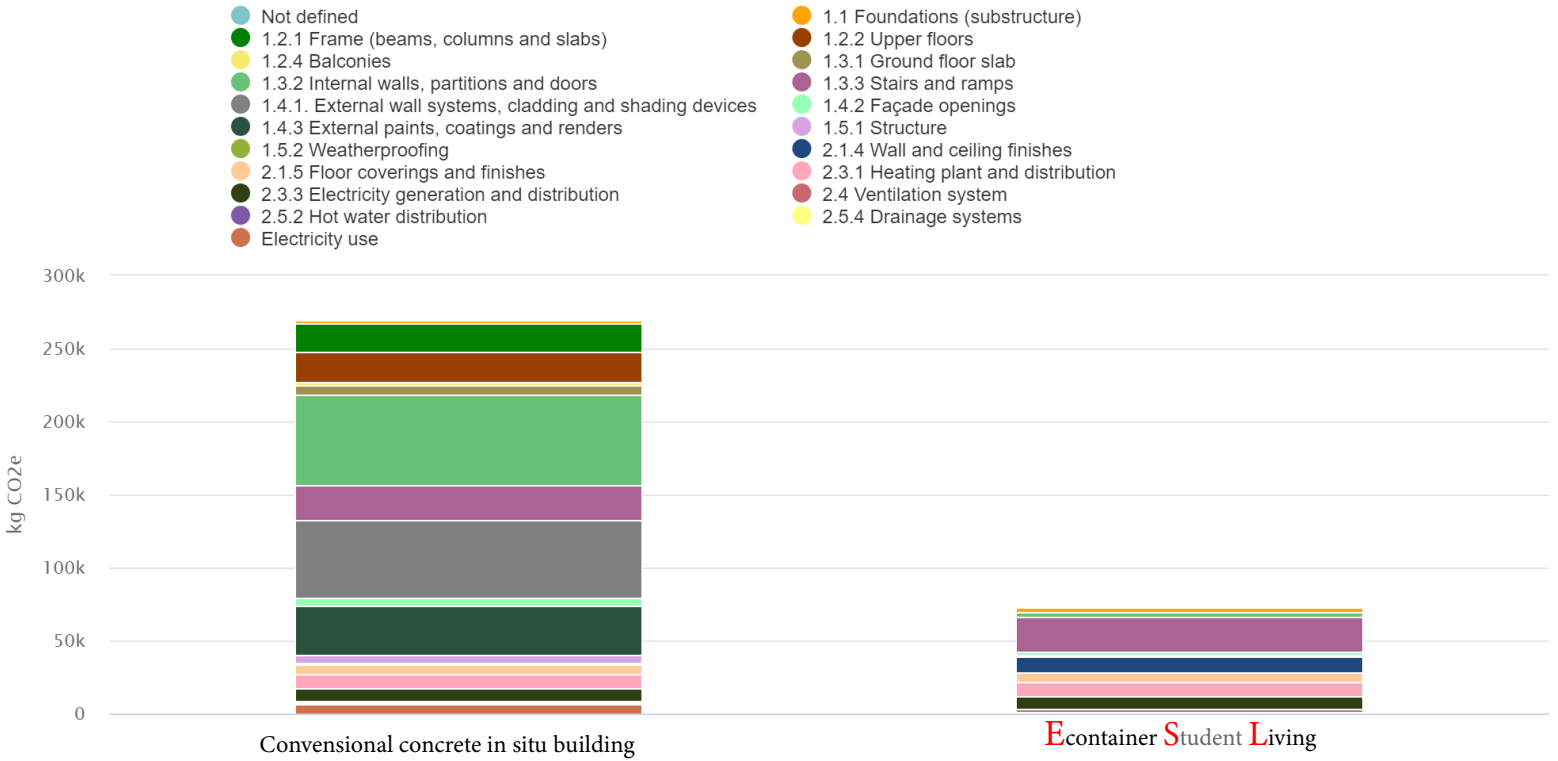
CO2 Emissions in each life stage



*Because we have a recycled container, the material stage has dramatical lower CO2 emissions, as well as the end of life stage

CO2 Footprint

CO2 emissions- elements



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