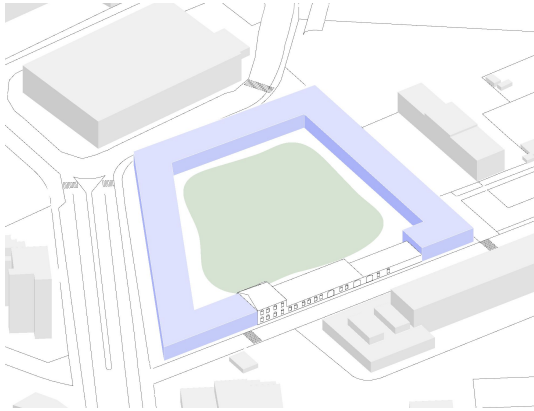




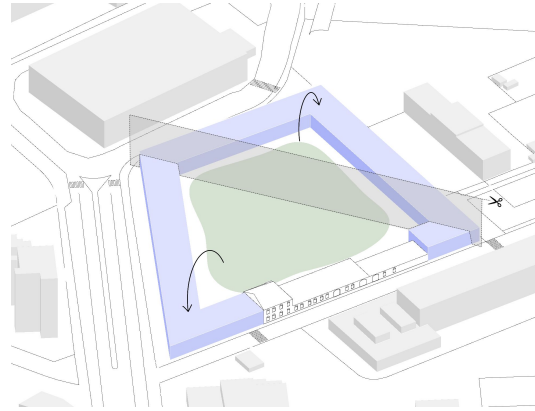
# ARCHITECTURE STUDENT CONTEST

17<sup>th</sup> INTERNATIONAL EDITION, WARSAW 2022

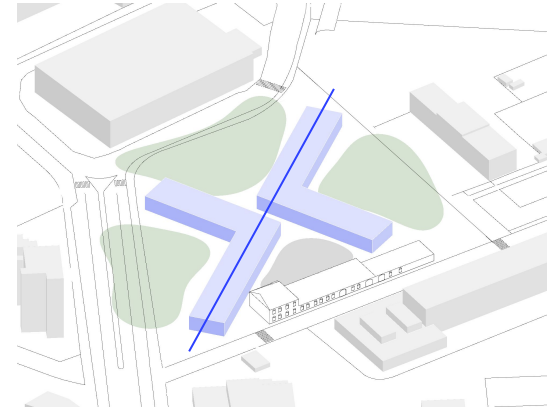
# TARAS Student housing



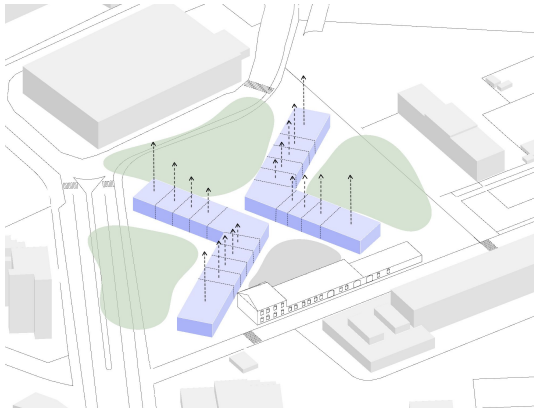
Courtyard



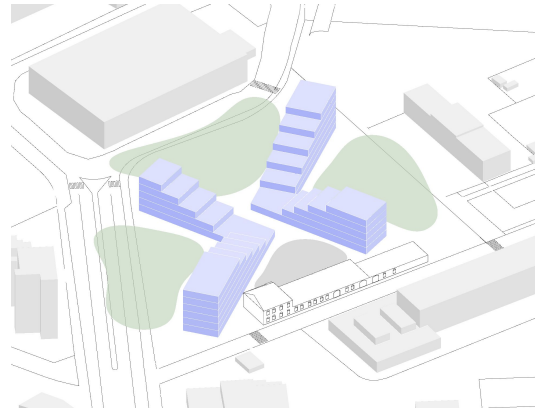
Cut and flip



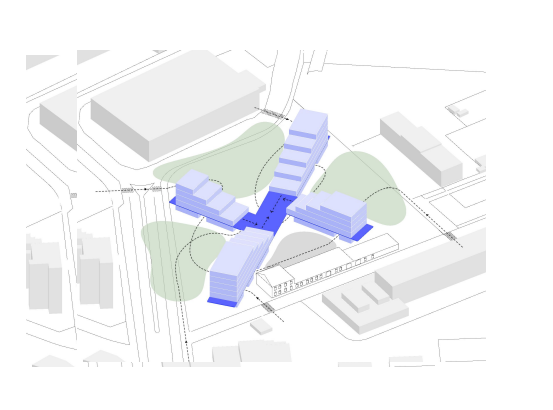
2 buildings + 4 atmospheres



Elevate levels



Terraces



Connecting base + passage ways



# OUTDOOR SPACES & TERRACES



# GROUND LEVEL & SITE PLAN



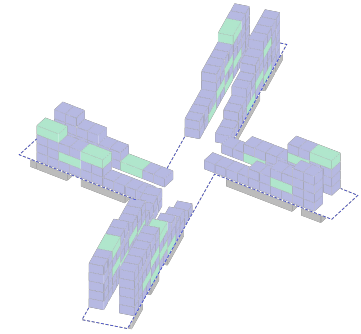
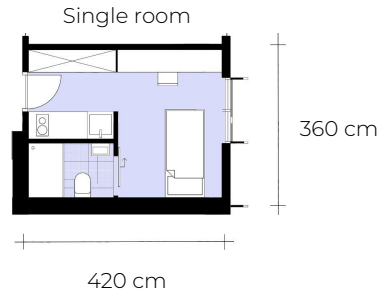
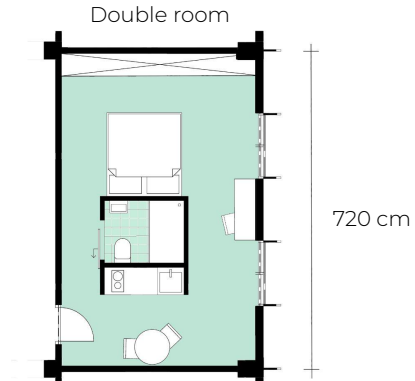
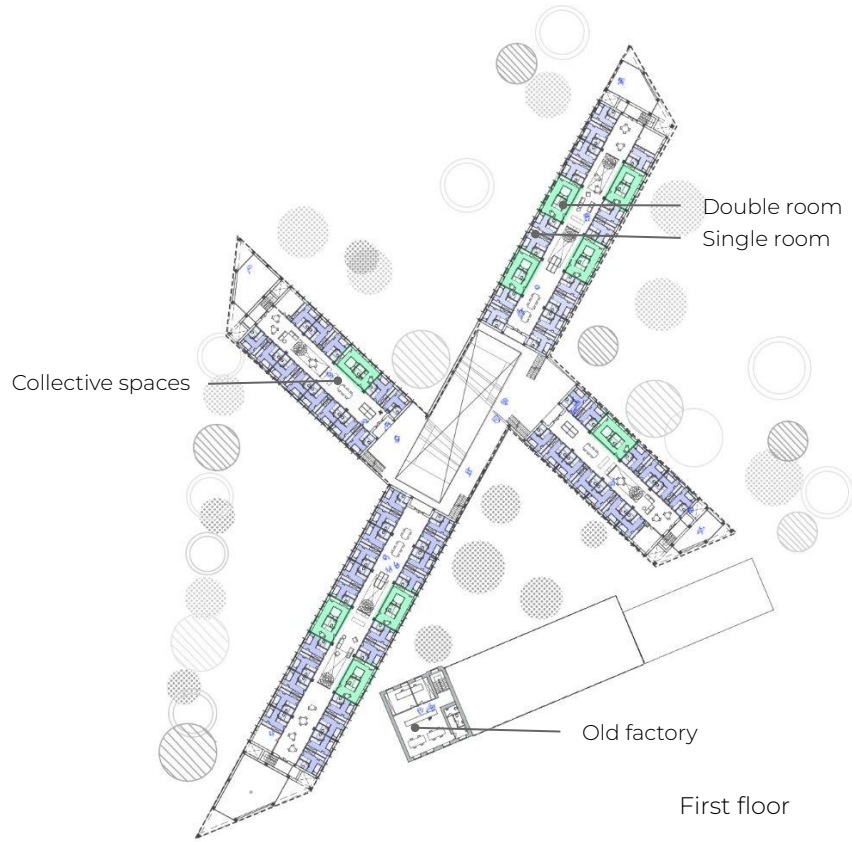
Ground floor



Site plan



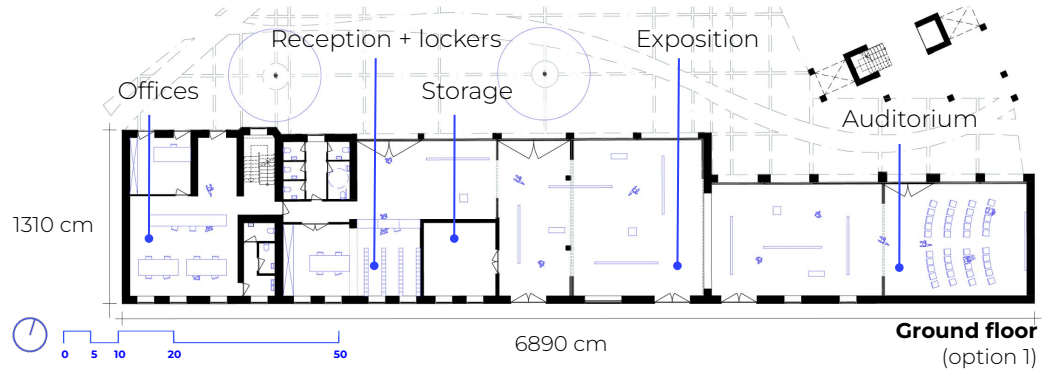
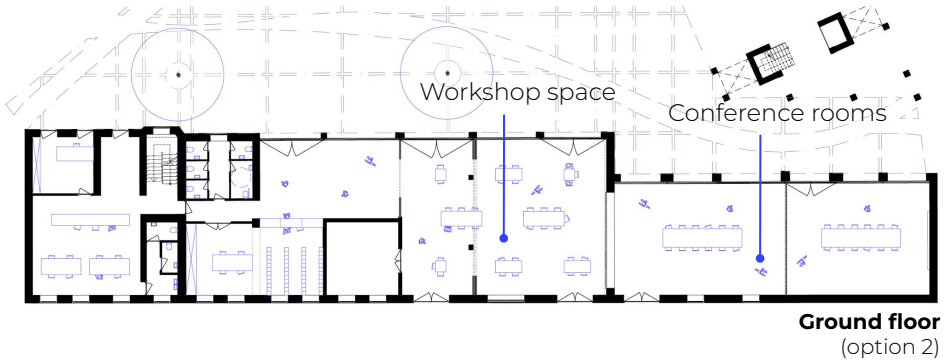
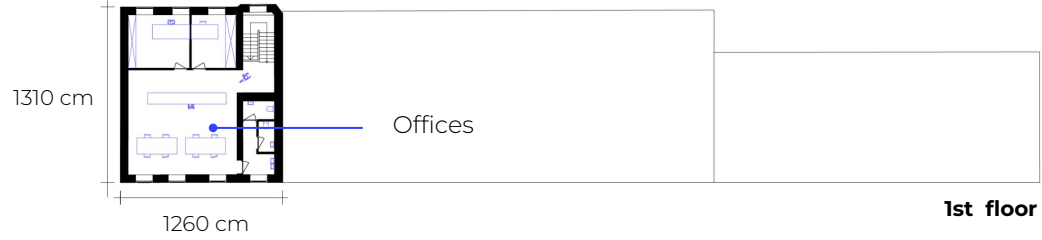
# FIRST LEVEL & UNITS DISTRIBUTION



- 220x single room
- 30x double room



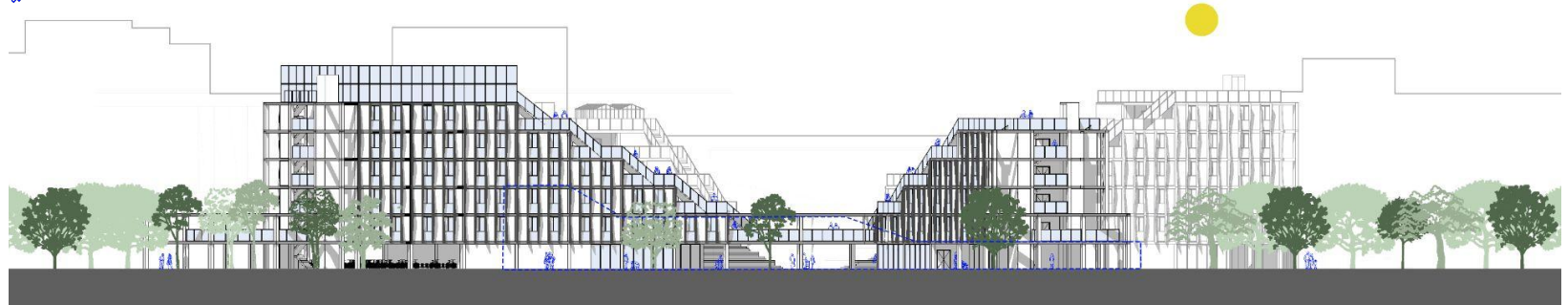
# REHABILITATION OLD FACTORY



# SECTION AND ELEVATION



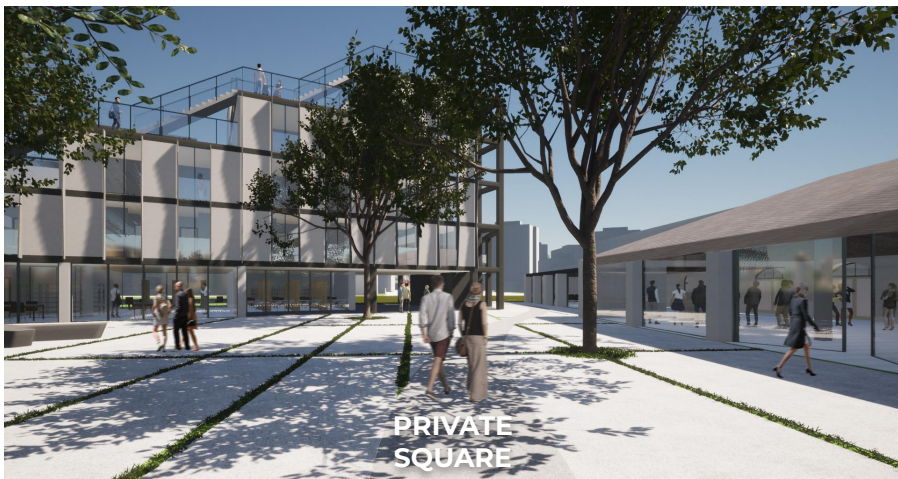
Section



Elevation



# DIFFERENT ATMOSPHERES





## DIFFERENT ATMOSPHERES



# VENTILATION, system C+

Rooms (single room)	Surface area (m2)	Air supply	Air disposal
Open kitchen	3,1	/	11,2 → <b>75</b>
Bathroom	2,4	/	8,6 → <b>50</b>
Bedroom	8,2	29,5	/

Rooms (dubble room)	Surface area (m2)	Air supply	Air disposal
Open kitchen	6	/	21,6 → <b>75</b>
Bathroom	2,4	/	8,6 → <b>50</b>
Bedroom	16,5	59,4	/

Renson Invisivent air high  
(Flow rate: 42,4 m<sup>3</sup>/h/m)

Ventilation window

Bedroom windows: 0,7 m → 29,7 m<sup>3</sup>/h



Air disposal pipe diameter

**50 m<sup>3</sup>/h**

$V=v \times A$

$A=V/v=0,014/1,5=0,009\text{m}^2$

$v=1,5\text{ m/s}$

$V=50\text{m}^3/\text{h} \rightarrow 0,14\text{m}^3/\text{s}$

$A=R^2 \times \pi$

$R=\sqrt{(A/\pi)}=\sqrt{(0,009/\pi)}=0,054\text{m} \rightarrow 5,43\text{cm}$

**D=10,86cm**

**75 m<sup>3</sup>/h**

$V=v \times A$

$A=V/v=0,021/1,5=0,009\text{m}^2$

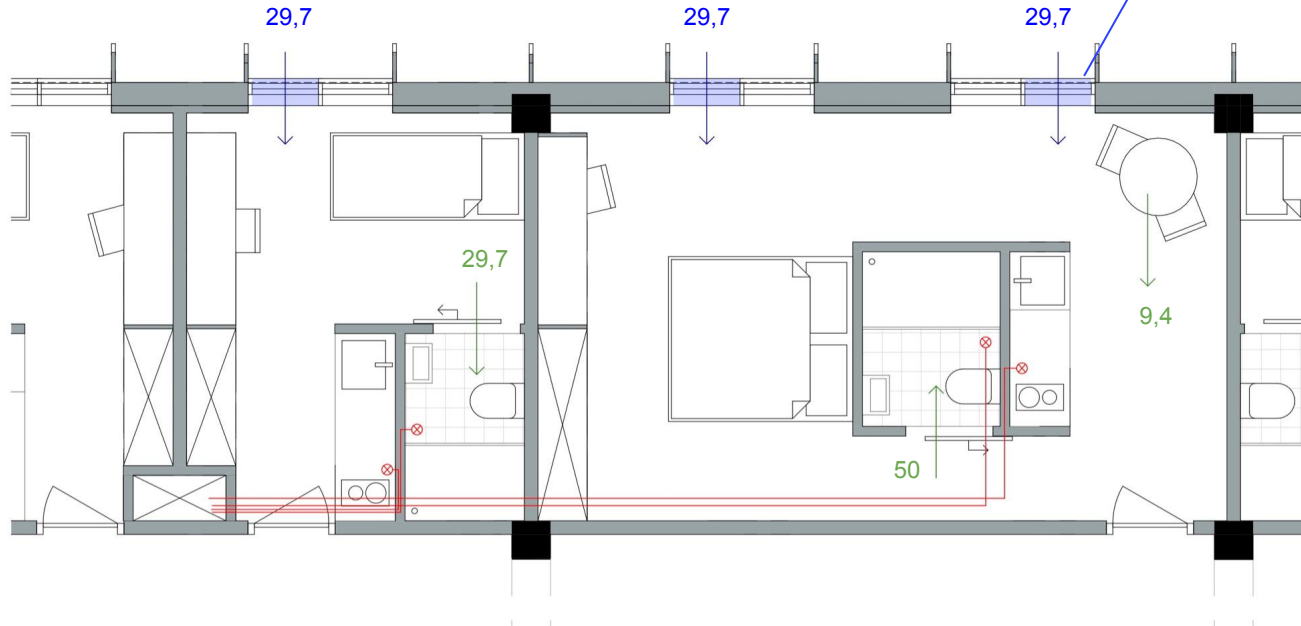
$v=1,5\text{m/s}$

$V=75\text{m}^3/\text{h} \rightarrow 0,021\text{m}^3/\text{s}$

$A=R^2 \times \pi$

$R=\sqrt{(A/\pi)}=\sqrt{(0,014/\pi)}=0,0667\text{m} \rightarrow 6,68\text{cm}$

**D=13,36cm**



# Total Heat Demand / Geothermal energy / Rainwater collection / Solar panels

## Total Heat Demand

$$\begin{aligned}U_m &= \sum (U \cdot A^*) / \sum A \\ &= 2.137,63 \text{ W} / 7.189 \text{ m}^2\text{K} \\ &= 0,297 \text{ W/m}^2\text{K}\end{aligned}$$

$$\begin{aligned}\Phi_h &= \Phi_t + \Phi_v + \Phi_{rm} \\ \Phi_t &= \sum (U_x \cdot A) \\ &= U_m \cdot A_r \cdot \Delta\Phi \\ &= 0,297 \text{ W/m}^2\text{K} \cdot 7.189 \text{ m}^2 \cdot (20 - (-9^\circ\text{C})) \\ &= 61,919 \text{ kW}\end{aligned}$$

$$\begin{aligned}\Phi_v &= m \cdot V \cdot C \text{ air} \\ &= 1 \text{ h}^{-1} \cdot 19.419,6 \text{ m}^3 \cdot 0,297 \text{ Wh/m}^2\text{K} \cdot (20 - (-9^\circ\text{C})) \\ &= 167,26 \text{ kW}\end{aligned}$$

$$\text{Total Heat Demand} = \Phi_t + \Phi_v = 61,919 + 167,26 = \mathbf{229,179 \text{ kW (229.179 W)}}$$

	Surface area (m <sup>2</sup> )	U- value (W/m <sup>2</sup> K)	A*U*1 (W/K)
Roofs	2.677	0,101	270,38
Facades	4.082	0,143	583,73
(Ground) floor	1.110	0,142	157,62
Windows	1.125,9	1,0	1125,9
Total			<b>2.137,63 W/K</b>

## Geothermal energy

Assumption: sandy soil (capacity = 10-15 W/m<sup>2</sup>)  
Total Heat Demand = 229,179 kW = 229.179 W  
= 229.179 W / 15 W/m<sup>2</sup>  
= 15.278,6 m

geothermal drilling = 15.278,6 m

## Rainwater collection

Surface area roof: 2415 m<sup>2</sup> → 60.982 l

6x 10.000 l (Rainwater collector)

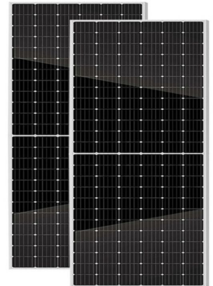
## Solar panels

Energy consumption 1 person = 500 kW \* 220 (units)  
Energy consumption 2 persons = 1050 kW \* 30 (units)  
Total energy consumption = 141.500 kW

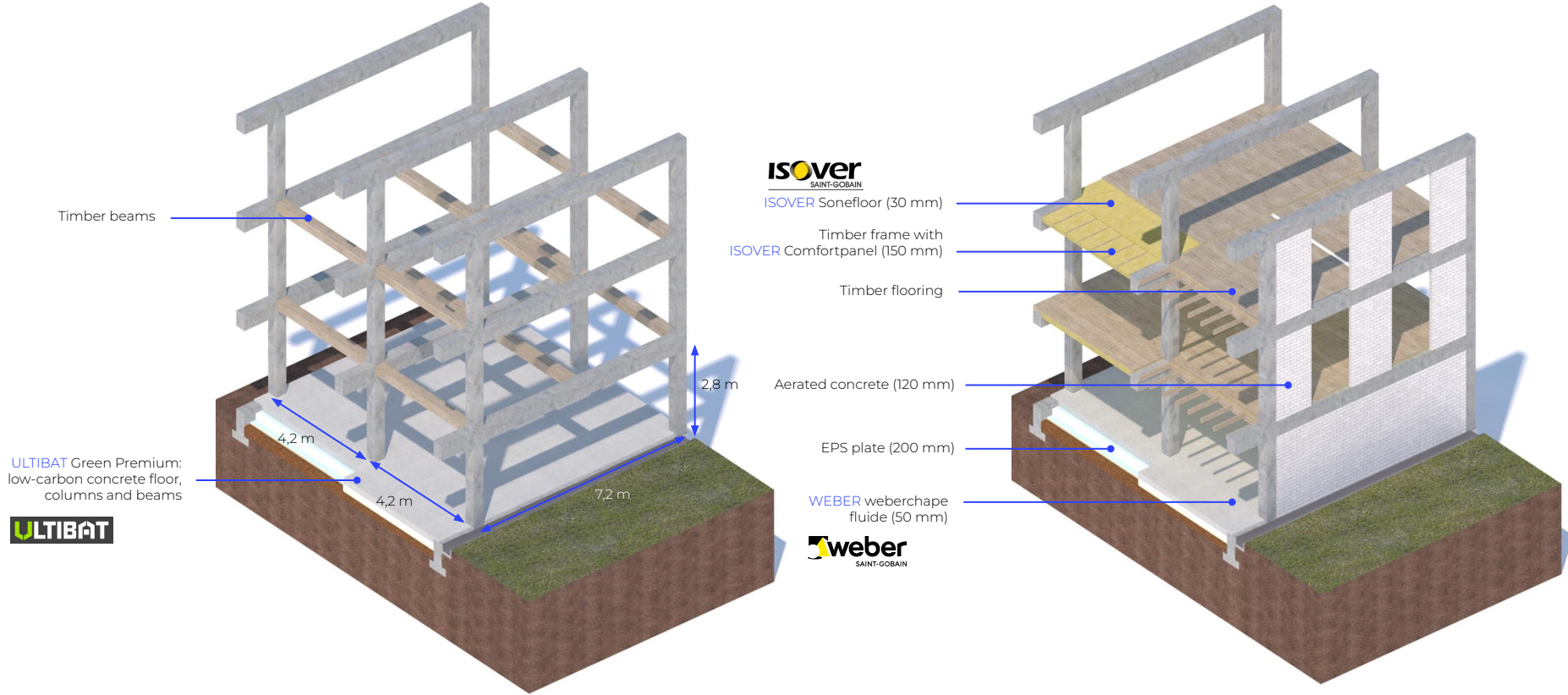
Solar panel Power Output: 550 kW

141 500 / 550 kw = 257 panels

2m<sup>2</sup> (surface area panel) \* 257 panels = 514 m<sup>2</sup>



# STRUCTURE



# STRUCTURE

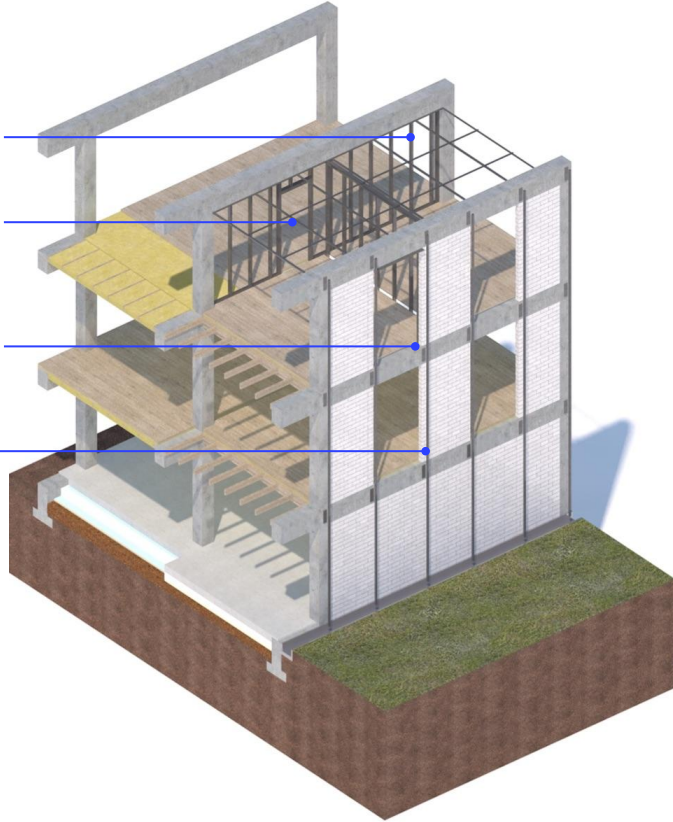


Metal frames for inner walls with GYPROC Metal Stud® profiles (MSV75)

GYPROC Plagyp® D profiles

GYPROC Metal Stud® retaining wall profiles (75 mm)

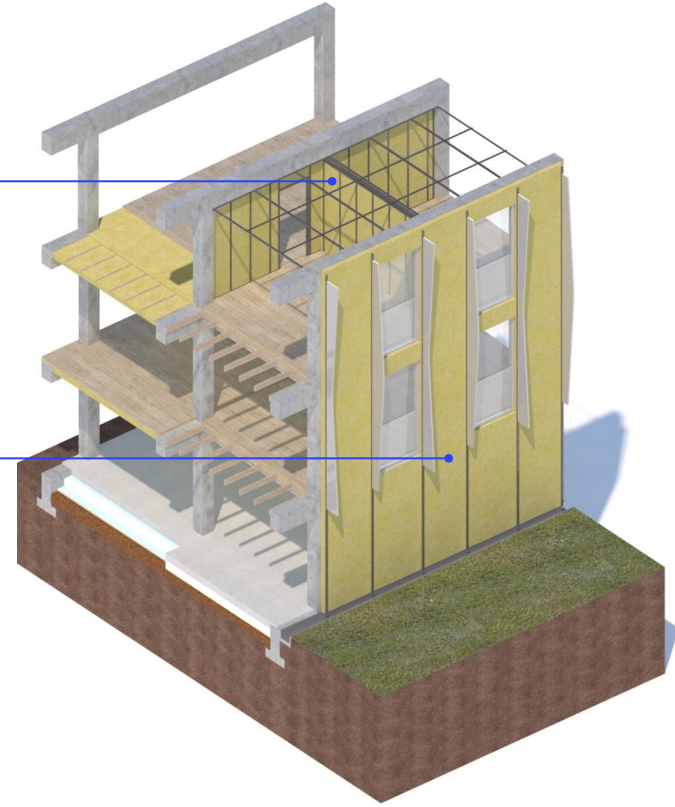
ISOVER Mupan façade structure



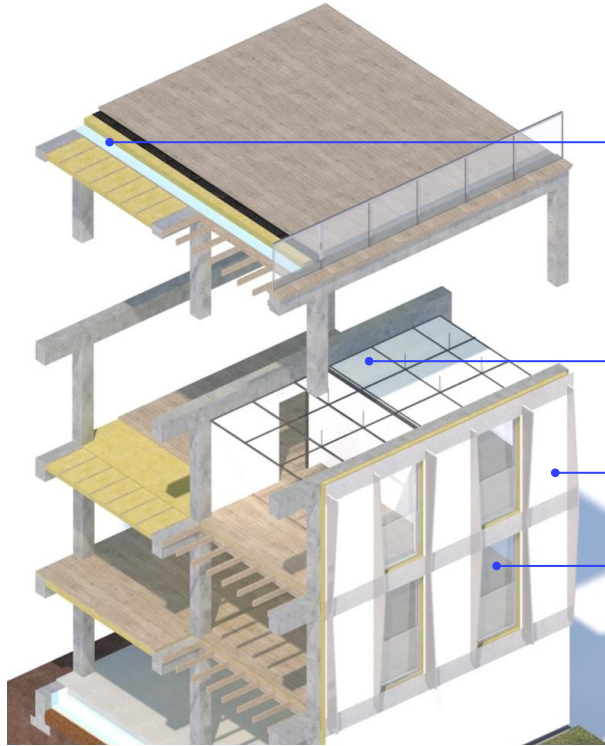
ISOVER Sonepanel (75 mm)



ISOVER Mupan façade structure (120 mm) with aluminium sun shading attached to structure



# STRUCTURE



ISOVER Ultimate ZRF-031 (200 mm) with Vario<sup>®</sup> KM Duplex UV as vapor barrier



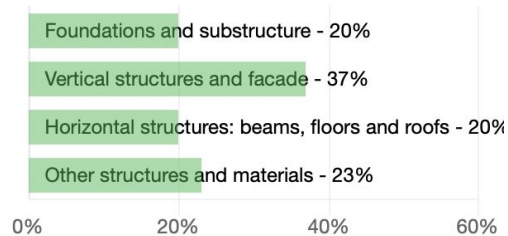
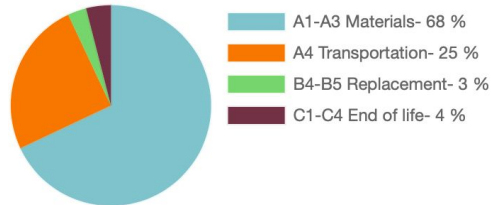
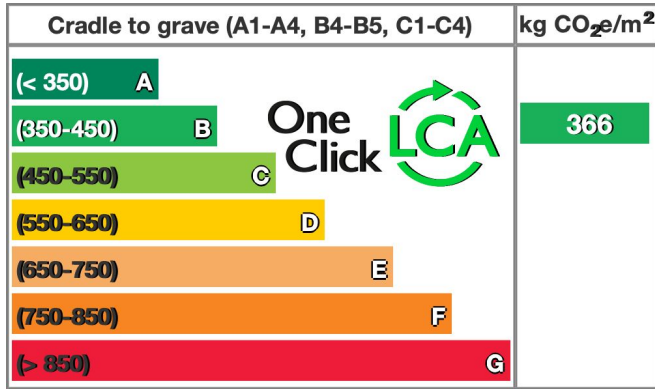
CYPROC Habito<sup>®</sup> board (12,5 mm)



Fiber cement board

SGG Cool-lite XTREME 61/29, Triple glazing (east/south/west)  
Eclaz one, triple glazing (north)





## Passive House Verification

Photo or Drawing

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Building: **Taras Student Housing**

Location and Climate: **Poland** Standard Germany

Street: **Lubelska**

Postcode/City: **00-001 Warsaw**

Country: **Poland**

Building Type: **Mixed use/Student housing**

Home Owner(s) / Client(s):

Street:

Postcode/City:

Architect:

Street:

Postcode/City:

Mechanical System:

Street:

Postcode/City:

Year of Construction: **2022**

Number of Dwelling Units: **250**

Enclosed Volume V<sub>e</sub>: **19419,6** m<sup>3</sup>

Number of Occupants: **651,0**

Interior Temperature: **20,0** °C

Internal Heat Gains: **2,1** W/m<sup>2</sup>

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**Specific Demands with Reference to the Treated Floor Area**

Treated Floor Area: **22786,0** m<sup>2</sup>

Applied:	Monthly Method	PH Certificate:	Fulfilled?
Specific Space Heat Demand:	<b>23 kWh/(m<sup>2</sup>a)</b>	15 kWh/(m <sup>2</sup> a)	<b>No</b>
Pressurization Test Result:	<b>0,2 h<sup>-1</sup></b>	0,6 h <sup>-1</sup>	<b>Yes</b>
Specific Primary Energy Demand (DHW, Heating, Cooling, Auxiliary and Household Electricity):	<b>82 kWh/(m<sup>2</sup>a)</b>	120 kWh/(m <sup>2</sup> a)	<b>Yes</b>
Specific Primary Energy Demand (DHW, Heating and Auxiliary Electricity):	<b>50 kWh/(m<sup>2</sup>a)</b>		
Specific Primary Energy Demand Energy Conservation by Solar Electricity:	<b>kWh/(m<sup>2</sup>a)</b>		
Heating Load:	<b>6 W/m<sup>2</sup></b>		
Frequency of Overheating:	<b>71 %</b>	over <b>25</b> °C	
Specific Useful Cooling Energy Demand:	<b>kWh/(m<sup>2</sup>a)</b>	15 kWh/(m <sup>2</sup> a)	
Cooling Load:	<b>3 W/m<sup>2</sup></b>		

