



University of Nottingham United Kingdom



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TEAM 14







DESIGN CONSIDERATIONS



2 Form Factor

Orientation

(1)

The Form Factor is a useful measure of the compactness of a building used in Passivhaus and high-performance design.



Range of 0.5 and 5, with a lower number indicating a more compact building.









EVEN AFTER THE WAR, THE CITY OF WARSAW REMAINS STANDING AND RISES OUT OF THE RUBBLE.



"I have seen many towns destroyed, but nowhere have I been faced with such destruction." - General

Dwight Eisenhower said after his visit in the capital of Poland after the end of Second World War.

LEGEND

A. Students' flats

SOUTH VIEW

- B. Commercial area
- C. Viewpoint to Varsula Rivera

Ρ

- D. Biodiverse green roof
- E. Green podium
- F. Sport area
- G. Public Square
- H. Community area
- Restaurant/bar
 - Work and Play hub

Bike lane Drop off area

J.

C

- K. Courtyard for art/music exhibitions
- L. Exterior Gym
- M. Accessible Parking
- N. Bike Parking
- O. Ramp to underground car parking

ULIUM

K

0%

- P. Pedestrian raised crossing
- Q. Chess Plaza

NORTH VIEW

LEGEND

- A. Students' flats
- B. Commercial area
- C. Viewpoint to Varsula Rivera
- D. Biodiverse green roof

172 110

- E. Green podium
- F. Sport area

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- G. Public Square
- H. Community area
 - Restaurant/bar
 - Work and Play hub

Bike lane

Ι.

J.

Ρ.

- Drop off area
- K. Courtyard for art/music exhibitions

ALL TRUE IN

A

- L. Exterior Gym
- M. Accessible Parking
- N. Bike Parking
- O. Ramp to underground car parking
 - Pedestrian raised crossing
- Q. Chess Plaza

A social courtyard for everyone, where all students are integrated and carry out different activities together.

A TANKA

EXISTING BUILDING

RESTAURACIA

"Warsaw is a testimony of remarkable heroism, commitment and national pride"



GROUND FLOOR PLAN



ROOM LEGEND

Α.	Restaurant	F.	Toilets	К.	Reception
В.	Stairs	G.	Private dinning	L.	Books area
C.	Bar	Н.	Balcony	М.	Play area
D.	Storage	I.	Meeting room	N.	Lounge
Ε.	Kitchen	J.	Work/study area	0.	Cinema

FIRST FLOOR PLAN



SECTION- RESTAURANT & BAR

Neon lights to create a youth space

Low maintenance – existing materials

EET I

Conservation of existing walls

Restoration of concrete floor

Restoration of interior painting



SHADING DEVICES OVER ENTRANCES



RESIDENTIAL BUILDING

"...it would be advisable, in accordance with the provisions of the local land use plan, to design the development in such a way as to make it an elegant, modern background for the historic building of the former factory"

TUUU

N







SOCIAL AREAS





TOP FLOOR PLAN

N

ROOMS LEGEND

Α.	Social area	Ε.	Viewpoint terrace
Β.	Double rooms	F.	Biodiverse green
C.	Single rooms		root
D.	Lift/stairs		



Modern rooftop design with a great view to the Vistula River and surroundings.

ROOM DESIGN Layout & Distribution





Typical Floor plan – 12 m² North & South



Typical Floor plan – 24 m² Double room



Typical Floor plan – 24 m² Universal / Accessible room

Typical Floor plan – 12 m² East & West



GENERAL STRUCTURE

Cross Laminated Timber (CLT)







*U-Value = 0.1211W/m2K Thickness = 258 mm

Thickness = 420 mm

BUILD-UP MODULE

Additional elements

Suppliers:











Independent Balconies

(Thermal Bridge free) Metallic Structure





NATURAL LIGHTING Daylight Factor



2.50 2.43 2.36 2.29 2.22 2.15

2.08 1.93 1.86 1.79 1.72 1.65 1.57 1.50 1.43 1.36 1.22 1.14 1.00 0.93 0.86 0.79 0.64 0.57 0.50 0.43 0.36 0.29 0.21

The room Achieves 4.0 % of Daylight Factor. Good range: 2 -10%

The balconies are designed as a solar control overhang to block the summer sun but allow the winter sun to come through.





Typical Bedroom Design

PASSIVE VENTILATION

Stack effect – Atrium - Summer



Average indoor temperature: 23°C



Average indoor velocity: 0.6m/s





EMERGENCY EXIT





SOLAR & GEOTHERMAL ENERGY

Photovoltaic Panels + Ground Source Heat Pumps

Solar Photovoltaic

Area = 1289m2 Usable Area = 1050m2 (allowing for walkways)

Average Annual Radiation = 1,082KWh/m2 (GHI) 1050 x 1,082 = 1,136MWh 1,136,100 x 22% = 249,942KWh 223,068 x 85% (system losses)

Annual Solar PV Generation = 212.5MWh

Ground Source Heat Pump

COP = 3.5 Pipe lay orientation = Horizontal Area = 3,100m2

Estimated System Sizing and Specification: **10 x 75KW** Kensa Plant Room Heat Pumps



JEWSON

SUNPOWER \overrightarrow{b} 6 kW \overrightarrow{b} 15x \overrightarrow{b} 400 W **Product: SunPower Maxeon 6** Efficiency, n = 22% Area = 2.47m2 Quantity = 425 Panels **Operation**









			 Final Results Heating Cooling Lighting Equipment Heat Recovery Fans Total Site Energy Per m2 (Bating & Cooling Per m2) 	173GJ OGJ 364GJ 288GJ 100GJ 40GJ 967GJ = 202 MJ/m2 = 11 KWh/m2 *
COMPARIS				2
	Initial Simula End Use Total End Use Total Shortfall After PV Total Site Energy Per m ² Heating & Cooling Per m ²	ation 4,930GJ 1,369MWh 1,157MWh (boiler/chiller) 1,182MJ/m ² 172KWh/m ²	Final Si End Use Total End Use Total Shortfall After PV Shortfall After PV Total Site Energy Heating & Coolin	mulation 967GJ 269MWh 57MWh (boiler/chiller) -20MWh (GSHP COP 3.5) Per m ² 202 MJ/m ² g Per m ² 11 KWh/m ²
ZERO	NO Resivence	s X NO	ZERO EMISSION YES	rust YES

RESOURCES & CIRCULARITY

Life Cycle Analysis

376 kg

Kilograms of carbon dioxide

equivalent per metre squared

CO₂e/m²

145,734 € social cost of carbon Social cost set at a rate

Social cost set at a rate of 50€/ton

2,915 t

CO2e Total carbon dioxide equivalent emissions in tons

Carbon Heroes Benchmark



Foundation Modular Construction **High Quality Windows Recycled Cross** Pref-fab Green Saint- Gobain Products Laminated Timber Concrete 1000 800 600 400 200 0 Foundation, sub-External walls and Internal walls and Floor slabs. Windows and Other structures Site electricity Site district surface, basement facade non-bearing ceilings, roofing and materials doors consumption heating and retaining walls structures decks, beams and consumption roof Global warming (GWP) grouped by classification breakdown

A4 Transportation
 A5 Construction
 1 Ready mix concr...
 4 Steel (A1-A3)
 7 Glass (A1-A3)
 8 Insulation (A1-...



Strategies



