

15 DLUGA

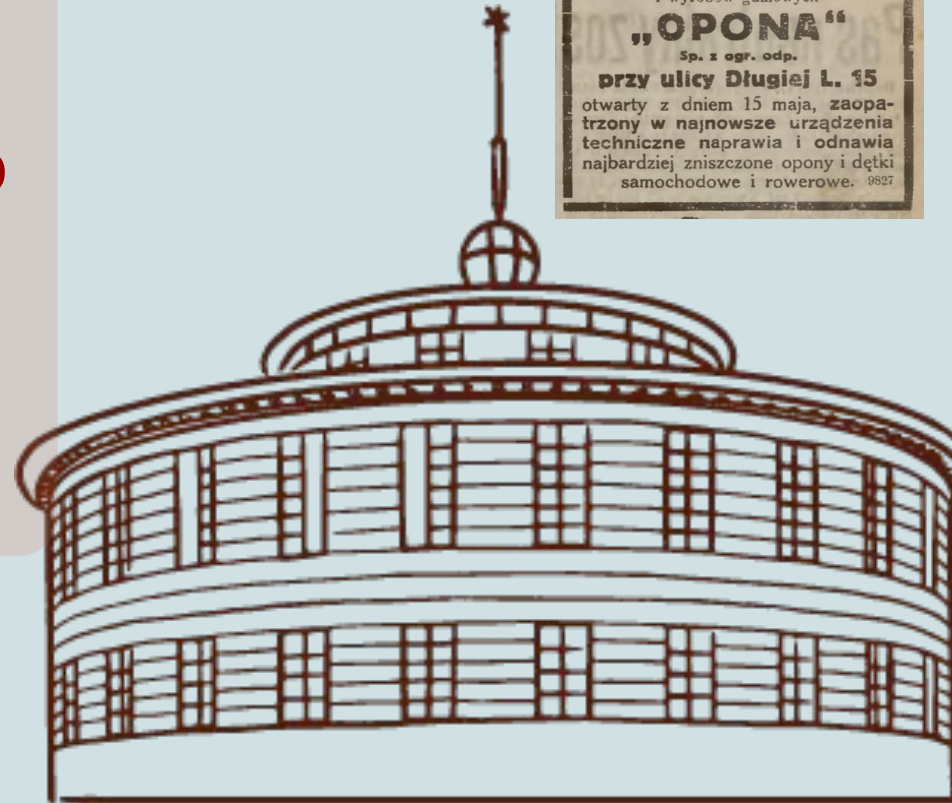
FuturHist Heritage Assessment workshop

Group 4

Aleena Majumdar
Bogna Drałus
Evi Coenen
Inna Klandorf
Lea Scholz



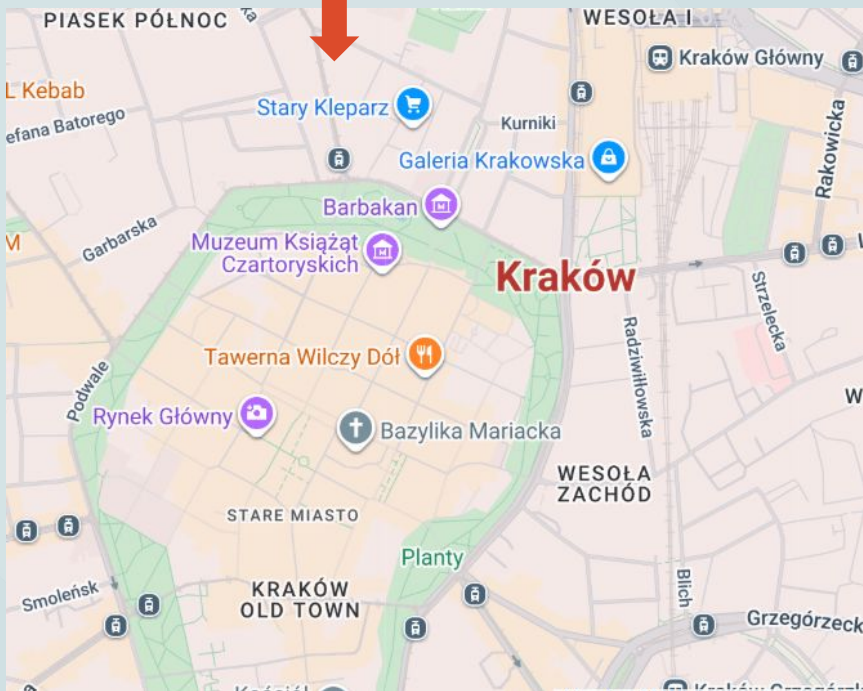
FuturHist 13.09.2026





CONTEXT

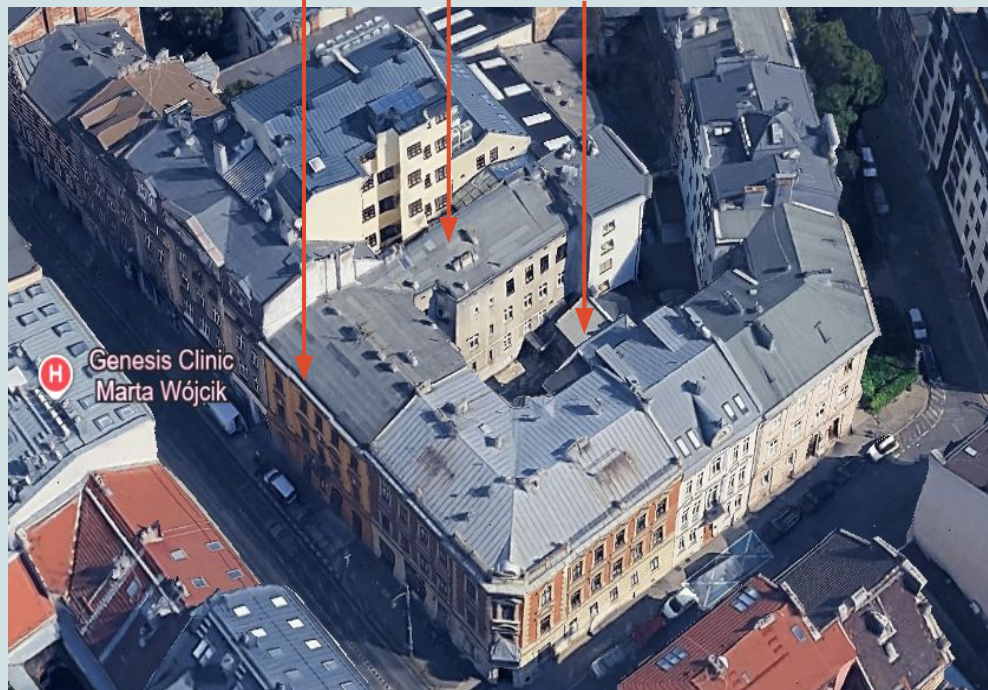
COMMERCIAL (1/2) & RESIDENTIAL (2-1/2),
BASEMENT & ATTIC, 8 UNITS, 20 OCCUPANTS



FRONT BUILDING - PUBLIC FACADE (CONSERVED 2022)

BACK BUILDING - PRIVATE COURTYARD SIDE

OUTHOUSE





CONTEXT

HISTORIC TENEMENT HOUSE
BUILT IN 1843,
(MAIN HISTORIC FACADE RENO. 2022)

HISTORICALLY A PLACE OF ACTIVITY
FOR VARIOUS CRAFTSMEN &
ENTERPRISES, WITH A VERY DIVERSE
SOCIAL CROSS SECTION

CENSUS FROM 1900, 1910, 1921
DESCRIBE IN RESIDENCE :

*A BAKER & APPRENTICE, A LAWYER,
COUNCILLOR OF THE SUPREME COURT,
RAILWAY OFFICIAL, A SECURITY CLERK, A
RETOUCHING PHOTOGRAPHER, A PIANO
TUNER, A TINSMITH, AN OWNER OF AN IRON
WAREHOUSE, A LABOURER & MAIDS*

** MUNICIPAL REGISTER OF MONUMENTS*





DECORATIVE DETAILS FEATURE NATIONAL & LOCAL LEGEND MOTIFS



Tadeusz Kościuszko, a Polish hero of the fight for independence, led the uprisings that returned Poland to the map of Europe after 123 years of absence.



Two polish kings. Zygmunt Stary i Jan III Sobieski. On the left, one of the last Jagiellonians; on the right, the king who won the Battle of Vienna in 1683



Console with acanthus leaf ornamentation, terminating in a dragon's head. Dragon is motive from local legend, which live under castles hill.



Feedback :

**75 yr old lady who grew up
@15 Długa :**

*High ceiling appreciated
No overheating issues or
marked cooling needs*

Natural ventilation sufficient

*Vibration from trams has
improved over time*

No district heating av.

*Would like to see the courtyard
improved*

*Would like the courtyard
balcony restored*

*An elevator would be
appreciated*

**Struggling with
high utility costs**

OCCUPANT COMFORT & NEEDS

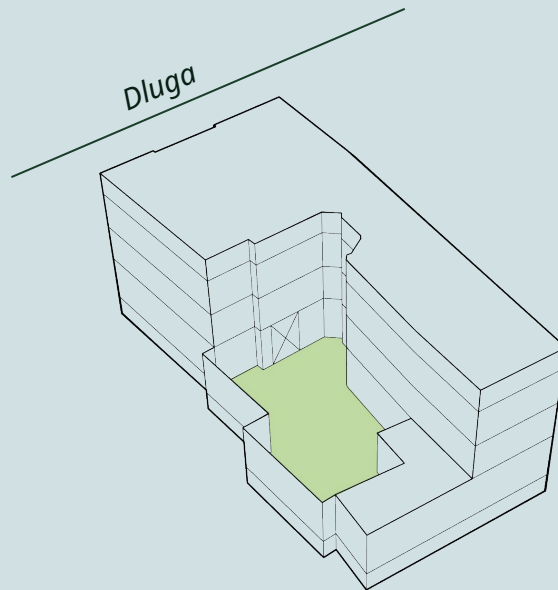
An elderly woman living in one of the apartments pays **800 PLN** for heating every two months throughout the year (this amount excludes other charges, such as those for water or electricity), totalling **4,800 PLN** annually.

For that same cost, one could heat an apartment of similar size in an energy efficient building for **2.5 years** while maintaining an average temperature of **22°C** within the rooms.



PRELIMINARY ENERGY REDUCTION STRATEGIES

REUSE + OPTIMISE + GENERATE



STRATEGIES :

PASSIVE

ROOF INSULATION

INTERIOR WALL
INSULATION

EXTERIOR WALL
INSULATION

BASEMENT / GROUND
FLOOR INSULATION

WINDOW RETROFIT

ACTIVE

HYBRID GAS / HEAT PUMP
(AVAIL FUTURE DISTRICT
HEATING)

PHOTOVOLTAIC PANELS

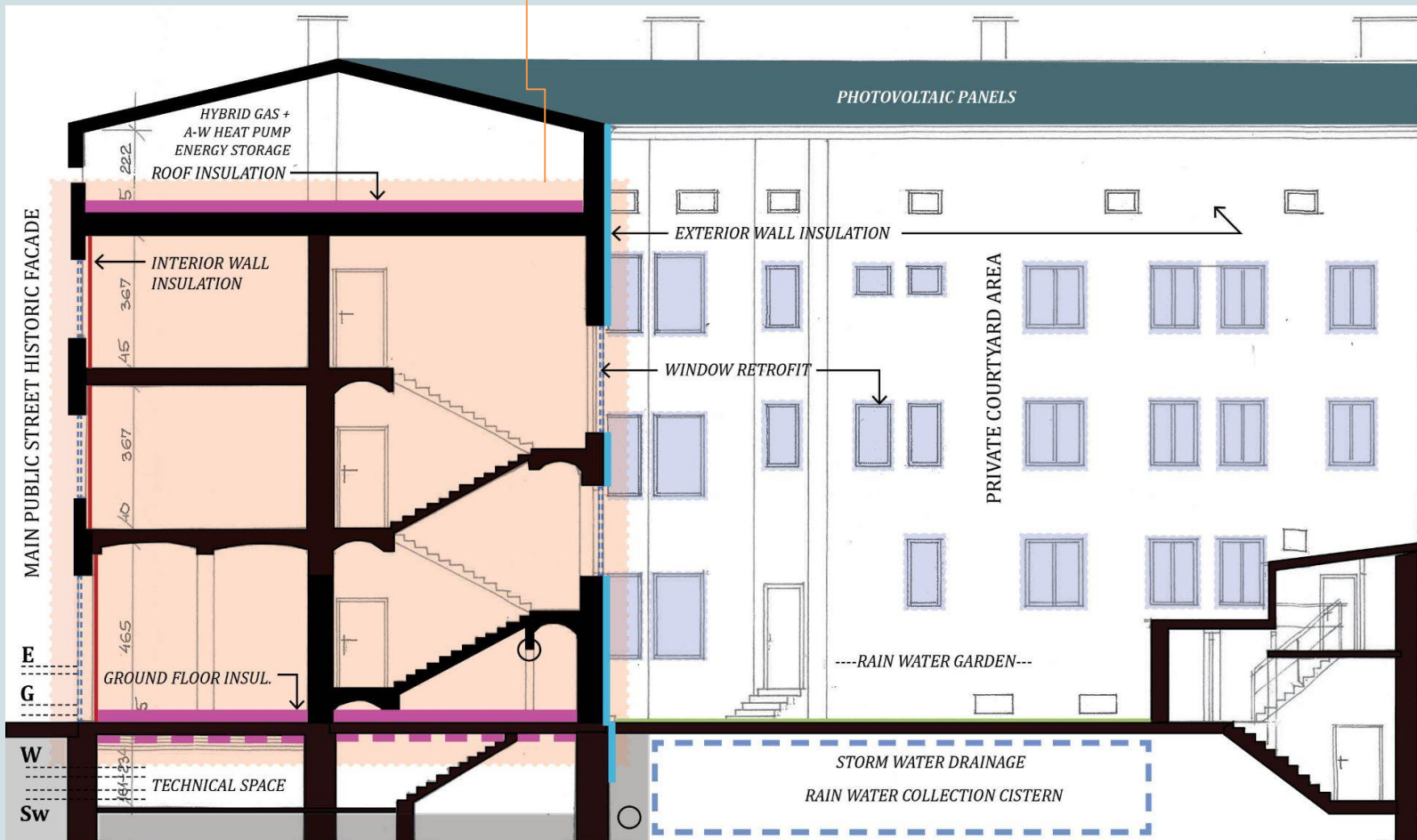
NATURE BASED

STORM WATER DRAINAGE

RAINWATER COLLECTION
HARVEST FOR GRAY WATER
SYSTEM

ECOLOGICAL INTEGRATION

PROPOSED THERMAL ENVELOPE



STRATEGIES :

ROOF INSULATION

INTERIOR WALL INSULATION

EXTERIOR WALL INSULATION

BASEMENT / GROUND FLOOR INSULATION

WINDOW RETROFIT

HYBRID GAS / HEAT PUMP

(AVAIL FUTURE DISTRICT HEATING)

PHOTOVOLTAIC PANELS

STORM WATER DRAINAGE

RAINWATER COLLECTION HARVEST FOR GRAY WATER SYSTEM

ECOLOGICAL INTEGRATION



ROOF INSULATION (ATTIC FLOOR)



BLOWN IN CELLULOSE



CLAY BOARD

5	Dachy, stropodachy i stropy pod nieogrzewanymi poddaszami lub nad przejazdami: a) przy $t_i \geq 16^\circ\text{C}$ b) przy $8^\circ\text{C} \leq t_i < 16^\circ\text{C}$ c) przy $t_i < 8^\circ\text{C}$	0,18 0,30 0,70	0,15 0,30 0,70
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OPPORTUNITIES

- CELLULOSE IS READILY AVAILABLE ON THE MARKET,
- CELLULOSE HAS A LOW U-VALUE,
- CELLULOSE IS RELATIVELY INEXPENSIVE

CONSTRAINTS

- CELLULOSE REQUIRES FIRE RATED PROTECTION AROUND SERVICE PENETRATIONS AND ACCESS PANELS
- CELLULOSE REQUIRES A PROTECTIVE MEMBRANE TO PREVENT DISPLACEMENT

SOLUTION OPTIONS	THERMAL CONDUCTIVITY	EMBODIED ENERGY	SERVICE LIFE	RECYCLABILITY	PREFABRICATION	REVERSIBILITY	COST
BLOWN IN CELLULOSE	0.037-0.041 W/mK	EE_01: <25 MJ/kg	SL_01: 25+ years	YES - R_Y	P_N	RV_Y	1- £
CLAY BOARDS	0.18-0.353 W/mK	EE_01: <25 MJ/kg	NA	YES - R_Y	P_N	RV_Y	3 - £££



EXTERIOR WALL INSULATION (PRIVATE COURTYARD FACADES)



HEMP BOARD INSULATION



PREFAB. MODULES WITH
CELLULOSE



CELLULOSE IN TIMBER
FRAME

		2017 r.	2020 r.
1	2	3	
1	Ściany zewnętrzne:		
	a) przy $t_i \geq 16^\circ\text{C}$	0,23	0,20
	b) przy $8^\circ\text{C} \leq t_i < 16^\circ\text{C}$	0,45	0,45
	c) przy $t_i < 8^\circ\text{C}$	0,90	0,90
2	Ściany wewnętrzne:		

OPPORTUNITIES

- HEMP HAS A LONGER SERVICE LIFE, POTENTIALLY LOWER λ AND BETTER SMOKE PROTECTION CLASS THAN CELLULOSE
- ALL OPTIONS ARE RECYCLABLE, HAVE LOW EMBODIED ENERGY, SEQUESTER CARBON & LOW COST

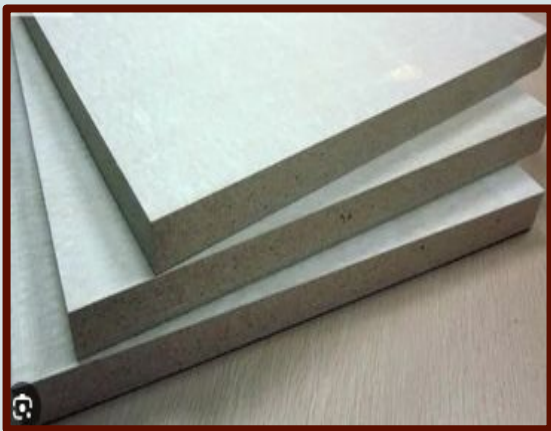
CONSTRAINTS

- HEMP REQUIRES A CLEAN, DRY AND FLAT SURFACE FOR INSTALLATION

SOLUTION OPTIONS	THERMAL CONDUCTIVITY	EMBODIED ENERGY	SERVICE LIFE	RECYCLABILITY	PREFAB.	REVERSIBILITY	COST	FIRE P.C.
HEMP BOARD	0.023-0.044 W/mK	EE_01: <25 MJ/kg	SL_03: 50+ years	YES - R_Y	P_N	RV_Y	1 - £	B-s1,d0
CELLULOSE (TIMBER FR.)	0.037-0.038 W/mK	EE_01: <25 MJ/kg	SL_01: 25+ years	YES - R_Y	P_N	RV_Y	1 - £	B-s2,d0
CELLULOSE MODULES	0.037-0.038 W/mK	EE_01: <25 MJ/kg	SL_01: 25+ years	YES - R_Y	P_Y	RV_Y	3 - £££	B-s2,d0



INTERIOR WALL INSULATION (AT MAIN STREET FACADE)



PERLITE BOARD INSULATION



AEROGEL INSULATION



CELLULOSE (WET APPLICATION)

		2011 t.	2020 t.
1	2	3	
1	Ściany zewnętrzne:		
	a) przy $t \geq 16^{\circ}\text{C}$	0,23	0,20
	b) przy $8^{\circ}\text{C} \leq t < 16^{\circ}\text{C}$	0,45	0,45
	c) przy $t < 8^{\circ}\text{C}$	0,90	0,90
2	Ściany wewnętrzne:		

OPPORTUNITIES

- **PERLITE BALANCES BOTH PERFORMANCE AND COST**
- SELECTED OPTIONS ARE VAPOR PERMEABLE & MADE OF NATURAL MATERIALS,
- PERLITE HAS THE HIGHEST FIRE RESISTANCE

CONSTRAINTS

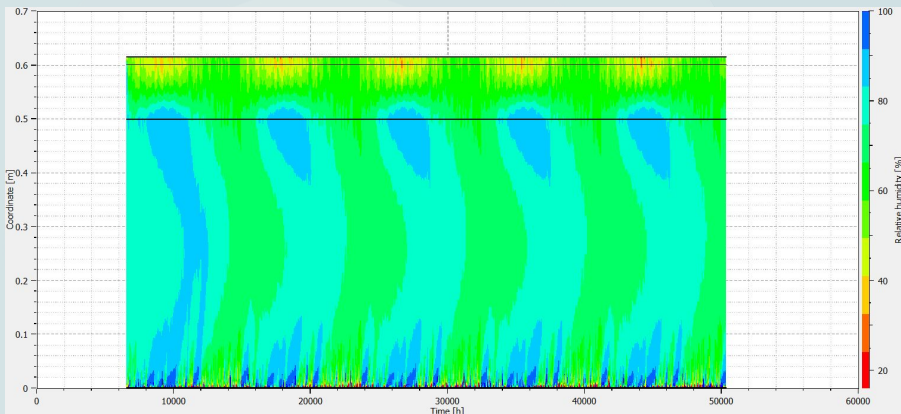
- AEROGEL HAS THE HIGHEST COST
- WET-SPRAY CELLULOSE INSTALLATION IS DIFFICULT TO REVERSE— A DISADVANTAGE FOR HISTORIC BUILDINGS,

SOLUTION OPTIONS	THERMAL CONDUCTIVITY	EMBODIED ENERGY	SERVICE LIFE	RECYCLABILITY	PREFAB.	REVERSIBILITY	COST	FIRE P.C.
PERLITE	0.045 W/mK	EE_01: <25 MJ/kg	SL_02: >25 years	YES - R_Y	P_N	RV_Y	2- ££	A-1
AEROGEL	0.013-0.025 W/mK	EE_03: <50 MJ/kg	SL_02: >25 years	YES - R_Y	P_N	RV_Y	3 - £££	A2-s1,d0 C-s1, d0
WOOD FIBER BOARDS	0.035 to 0.048 W/mk	EE_01: <25 MJ/kg	SL_03: >50 years	YES - R_Y	P_N	RV_Y	2- ££	B-s2,d0, E



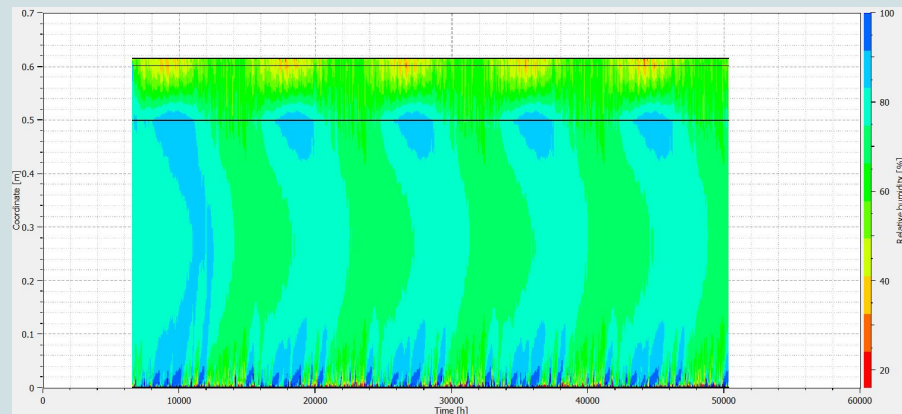


INTERIOR WALL INSULATION (COMPARISON WITH DELPHIN SIMULATION)



U-value: ~ 1,105 W/(m²K)

- + 100 mm **PERLITE** BOARD INSULATION
- + 15 mm CLAY PLASTER

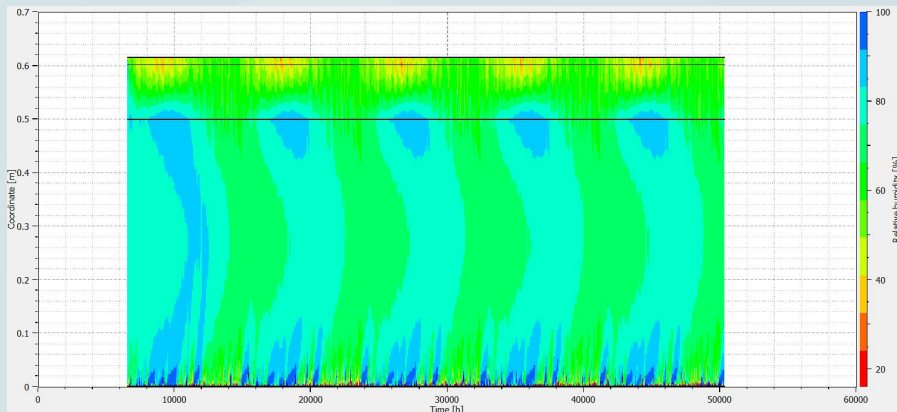


U-value: ~ 0,292 W/(m²K)

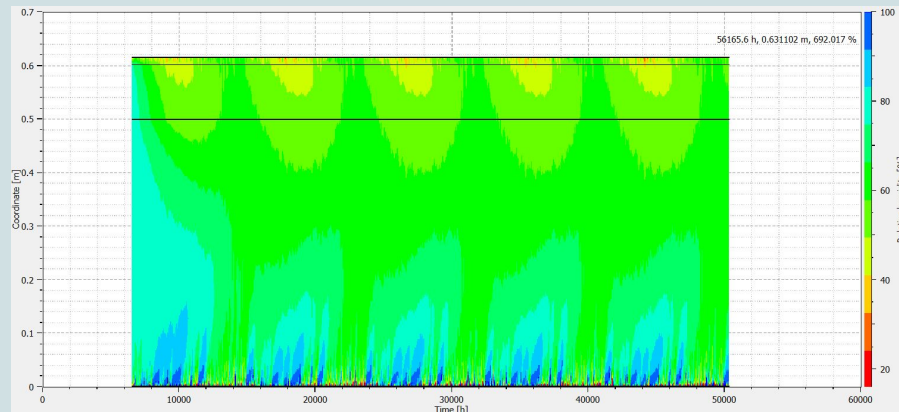
- + 100 mm **WOOD** FIBRE BOARDS raw density 160 kg/m³
- + 15 mm CLAY PLASTER



INTERIOR WALL INSULATION (COMPARISON WITH DELPHIN SIMULATION)



U-value: ~ 0,292 W/(m²K)



U-value: ~ 0,342 W/(m²K)

- + 100 mm WOOD FIBRE BOARDS (**raw density 160kg/m³**)
- + 15 mm CLAY PLASTER

- + 100 mm WOOD FIBRE BOARDS (**raw density 300 kg/m³**)
- + 15 mm CLAY PLASTER



BASEMENT INSULATION - 2 OPTIONS

(1- ABOVE vs. 2- BELOW THE GROUND FLOOR)

OPTION 1 - ABOVE

GROUND FLOOR

OPTION 2 - BELOW

- WE AIM TO CREATE AN **INSULATED ENVELOPE** WITHIN 15 DLUGA STREET, AS CONTINUOUSLY AS POSSIBLE, TO **MINIMISE ENERGY LOSS AND THERMAL BRIDGES**.
- **VAPOUR OPEN** INSULATION NEEDED TO PROMOTE BREATHABILITY AND PREVENT MOISTURE ISSUES
- **REVERSIBILITY** OF MATERIAL INSTALLATION IS IMPORTANT WITHIN HISTORIC BUILDING ENVIRONMENTS

OPT 1



OPT 2 - CONSIDER SPRAY ON CLAY PLASTER

		Therm. conductivity of insulation layer [W/mK]	Embodied energy	Service life	Recyclability	Prefabrication	Reversibility	Cost	
		value	EE_01: <25 MJ/kg EE_02: 25-50 MJ/kg EE_03: <50 MJ/kg	SL_01: 25+ years SL_02: >25; max 50 years SL_03: 50+	R_Y: recyclable R_N: Non-recyclable P_P: Partially recyclable	PF_Y: prefabricated PF_N: Not prefabricated PF_P: Partially prefabricated	RV_Y: reversible RV_N: Not reversible RV_P: Partially reversible	C_01: € C_01: €€ C_03: €€€	info
Code	Solution name	Therm. conductivity of insulation layer	EE	SL	R	PF	RV	C	Fire protection class
BFI-2	Blown-in cellulose	0.037-0.041 W/mK	EE_01	SL_01	R_Y	PF_N	RV_Y	C_01	B-s2,d0
BFI-8	Lightweight expanded clay insulation on the floor	0.08-0.13 W/mK	EE_01	SL_03	R_Y	PF_N	RV_Y	C_02	A1
BFI-11	Mineral wool between beams/joists	0.030-0.033 W/mK	EE_02	SL_01	R_Y	PF_N	RV_Y	C_02	A1 A2-s1,d0
BFI-12	Mineral wool on the floor	0.032-0.040 W/mK	EE_02	SL_01	R_Y	PF_N	RV_Y	C_02	A1 A2-s1,d0
BFI-13	Mineral wool under the ceiling	0.033-0.038 W/mK	EE_02	SL_01	R_Y	PF_N	RV_Y	C_02	A1
BFI-17	Wood insulation on the floor	0.038-0.050 W/mK	EE_01	SL_03	R_Y	PF_N	RV_Y	C_03	E



BASEMENT INSULATION - 2 OPTIONS

(1- **ABOVE** vs. 2- **BELOW** THE GROUND FLOOR)

OPTION 1 - BLOWN IN CELLULOSE ABOVE

OPPORTUNITIES

- REDUCES THERMAL BRIDGES
- MAYBE EASIER TO INSTALL

CONSTRAINTS

- MAXIMUM DISRUPTION TO COMMERCIAL BUSINESSES AND TENANTS
- NEED FOR EFFICIENT PHASING & DECANTING STRATEGY
- NEED FURTHER INFORMATION ON FLOORING MATERIAL BUILD UP & CAVITY DEPTH



OPTION 2 - SPRAY ON CLAY PLASTER BELOW

OPPORTUNITIES

- LEAST DISRUPTION TO TENANTS/ BUSINESS
- ABLE TO FOLLOW THE SHAPE OF THE HISTORICAL BARREL VAULT WITHOUT COMPROMISING ITS INTEGRITY.
- SPEED OF APPLICATION

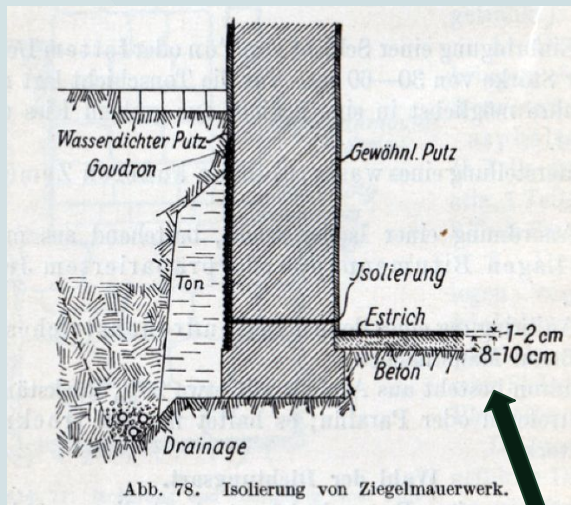
CONSTRAINTS

- MAY MINIMALLY LOWER THE CEILING HEIGHT
- INCREASES RISK FROM THERMAL BRIDGES





BASEMENT MOISTURE ISSUES



BASEMENT PROGRAMME :

APARTMENT STORAGE +
MUNICIPAL WATER & SEWER CONNECTIONS

OBSERVATION:

- RUSTED ENTRY DOOR
- PEELING PAINT
- RISING DAMP
- DAMP AIR AFFECTING AIR QUALITY
- DETERIORATING MORTAR BED

CONCERN:

- RISING DAMP MAY COMPROMISE HISTORIC FABRIC
- RECOMMEND FURTHER SURVEY +
- IMPROVED STORMWATER DRAINAGE
- CLAY + GRAVEL + PERFORATED DRAIN AROUND BUILDING (IMPROVED FRENCH DRAIN DETAIL)

NOTE: COULD BE UNDERTAKEN WHEN COURTYARD IS UNSEALED AND/OR DISTRICT HEATING IS CONNECTED.

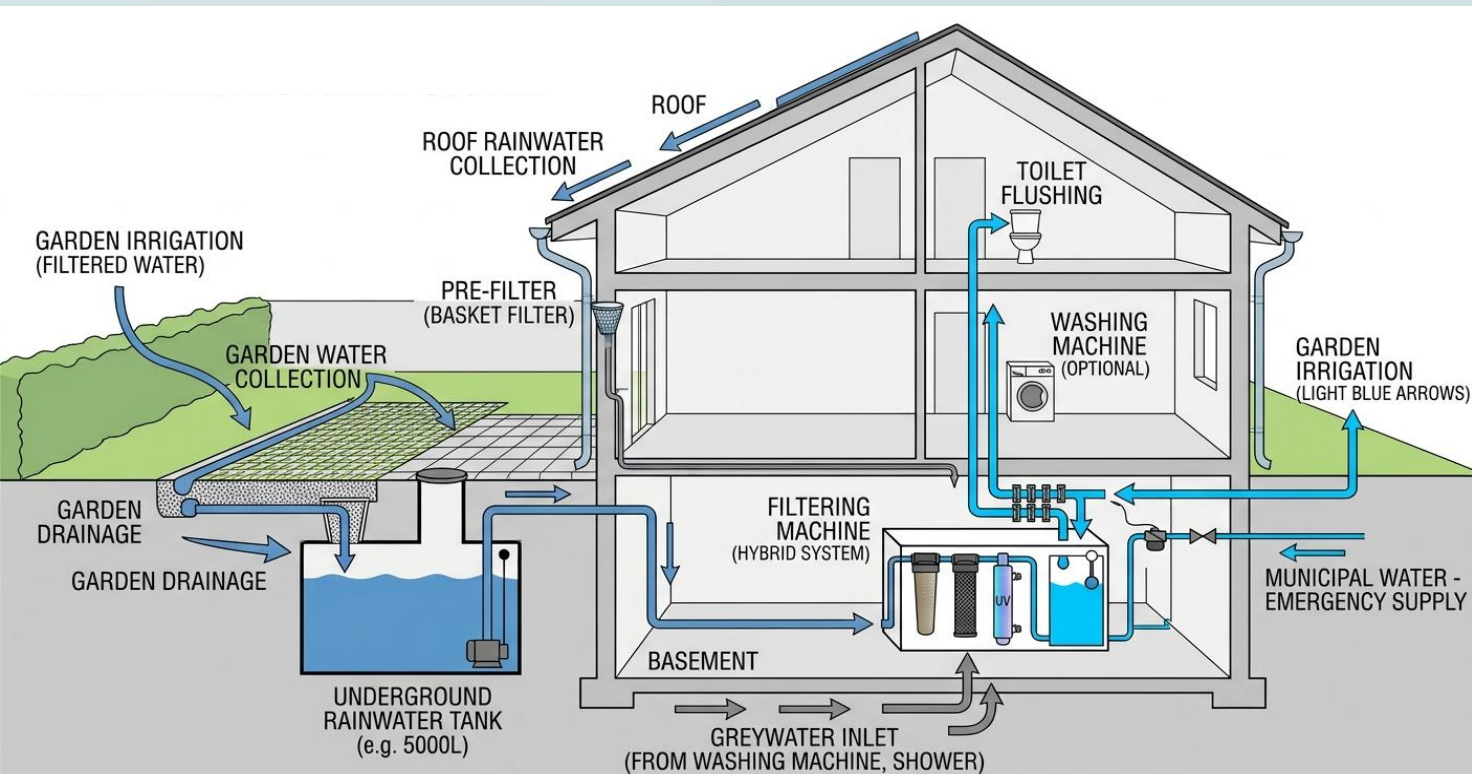
ADDITIONAL MEASURE: ADD **FOAM GLASS** UNDER THE BASEMENT FLOOR TO FACILITATE A CAPILLARY BREAKING LAYER



FUTURE RAIN GARDEN CREATES SYNERGIES

RAIN WATER GARDEN COULD BE INTEGRATED WITH A GREY WATER SYSTEM

EXISTING COURTYARD



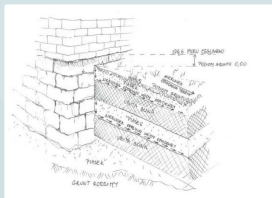


FUTURE RAIN GARDEN CREATES SYNERGIES (CONT.)

PROPOSED COURTYARD (W)

A RAINWATER GARDEN COULD PROVIDE PASSIVE COOLING THROUGH MICROCLIMATIC EFFECTS, REDUCING SUMMER COOLING LOADS IF ACTIVE COOLING IS INSTALLED.

ADDITIONALLY, IT MAY SUPPORT WELLBEING BY PROVIDING RESIDENTS WITH A PLACE TO RELAX AND CONNECT SOCIALLY.



IMPROVES STORM WATER DRAINAGE AWAY FROM HISTORIC FABRIC

NATIVE PLANTS IMPROVE BIODIVERSITY & MICROCLIMATE

WATER PERMEABLE SURFACES

UNDERGROUND RAINWATER COLLECTION CISTERN BENEATH

COULD CONNECT TO A GREYWATER SYSTEM FOR NON-POTABLE USES AND/OR ACTIVE SYSTEMS, SUCH AS AIR-TO-WATER HEAT PUMPS AND HEAT RECOVERY.

CLIMATE CHANGE ADAPTATION & FLOOD WATER MANAGEMENT

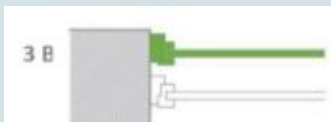
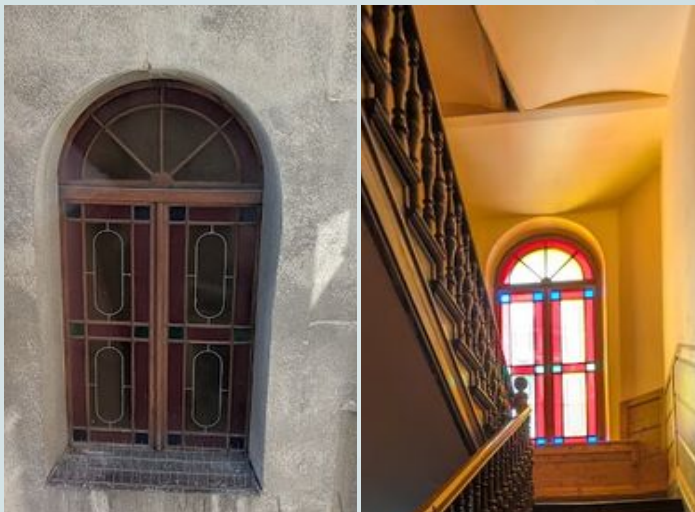
PROPOSED COURTYARD (E)





WINDOW ENERGY IMPROVEMENTS

TYPE 1 - STAIN GLASS WINDOW



STRATEGY TYPE 1:
ADD SECONDARY VACUUM
GLAZING TO THE OUTSIDE FACE
OF THE STAIN GLASS WINDOW

EXISTING U VALUE : **4.8 - 5.7** W/m².K

IMPROVED U VALUE : **1.0 - 1.6** W/m².K

TYPE 2 - BOX TYPE WINDOW



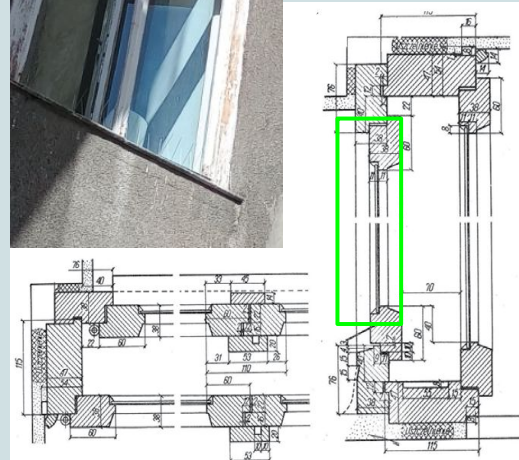
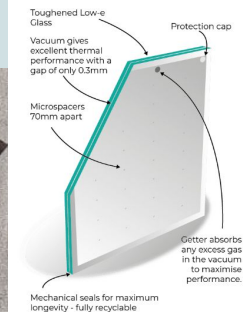
STRATEGY TYPE 2:
REPLACE GL. PANELS OF THE
INNER WINDOW WITH THIN
PROFILE VACUUM INSULATING
GLASS.

EXISTING U VALUE : **2.4** W/m².K

IMPROVED U VALUE : **0.6 - 1.1** W/m².K



Vacuum Glazing

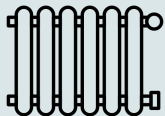




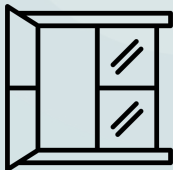
Active Solutions | HVAC



Gas



HT-radiators



Natural ventilation

CURRENT

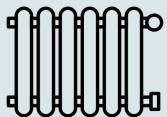




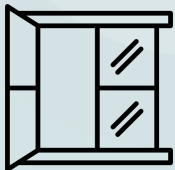
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Gas



HT-radiators

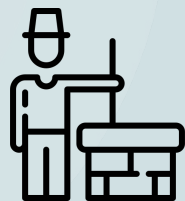


Natural ventilation

CURRENT



Maintenance



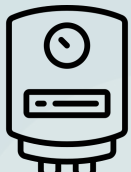
Inspection and cleaning

SHORT-TERM

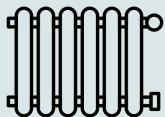




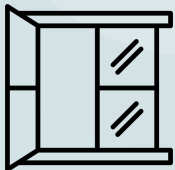
Active Solutions | HVAC



Gas



HT-radiators



Natural ventilation

CURRENT

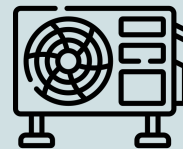


Maintenance



Inspection and cleaning

SHORT-TERM

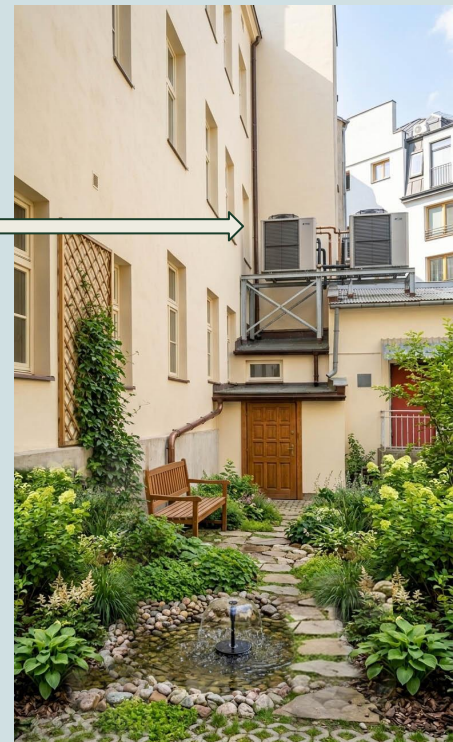
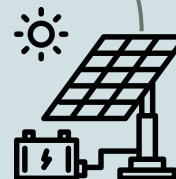


Hybrid (+ heat pump)



Mechanical ventilation + PV

MID-TERM

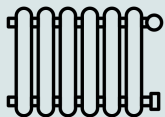




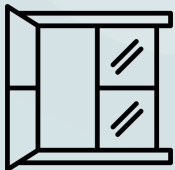
Active Solutions | HVAC



Gas



HT-radiators

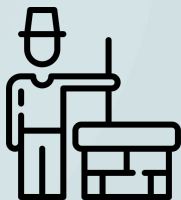


Natural ventilation

CURRENT

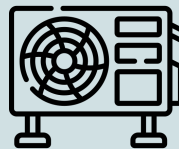


Maintenance



Inspection and cleaning

SHORT-TERM

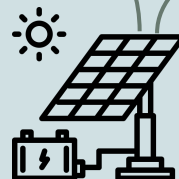


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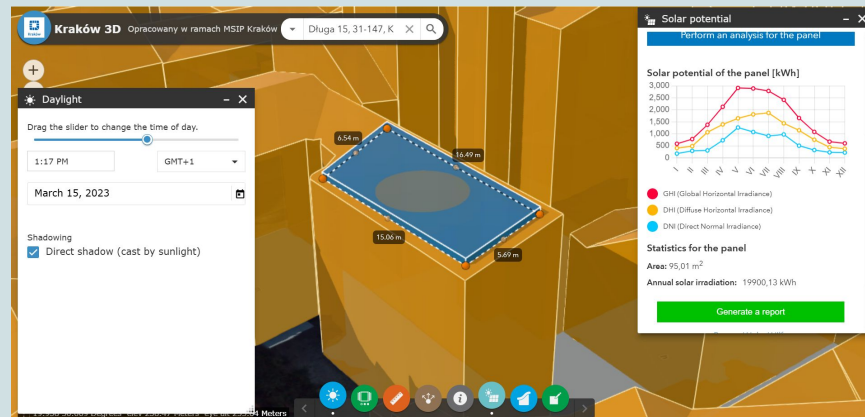
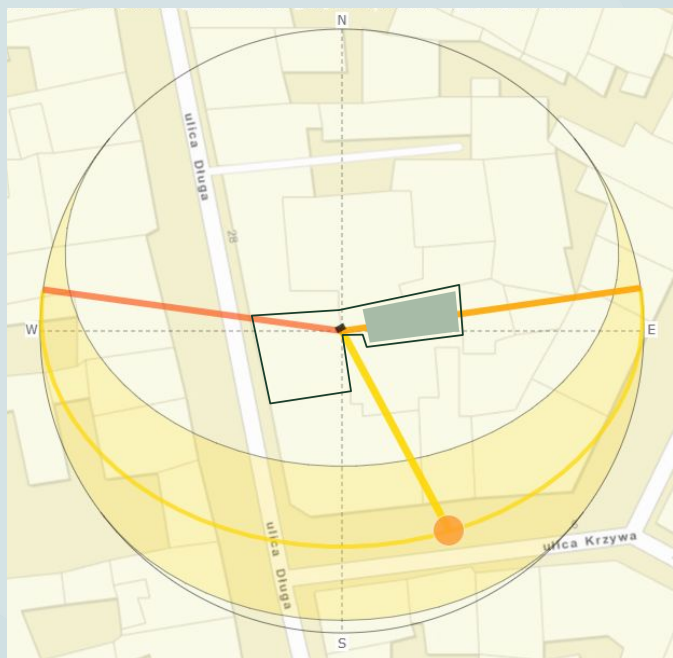


District heating

LONG-TERM

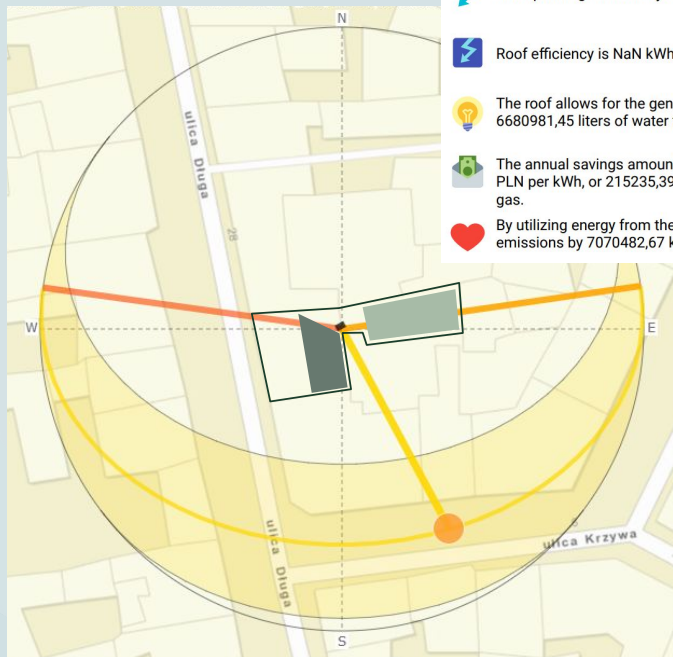


Active Solutions | PV





Active Solutions | PV



Descriptive Information



Total power generated by the roof surface: 372130,67 kWh.



Roof efficiency is NaN kWh/m².



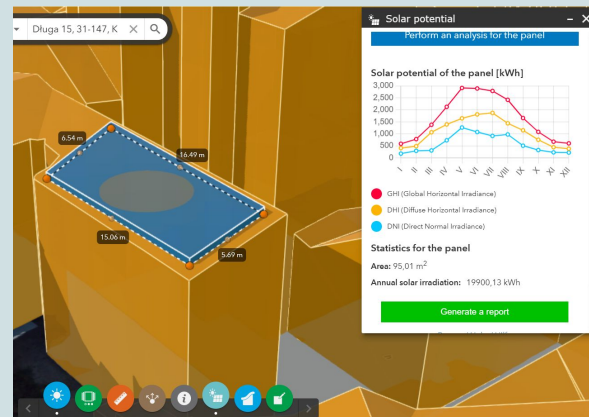
The roof allows for the generation of 372130,67 kWh of electrical energy or heating 6680981,45 liters of water to a temperature of 55°C.



The annual savings amount to 286540,61 PLN when considering an average price of 0,77 PLN per kWh, or 215235,39 PLN when considering a price of 3.80 PLN per liter of LPG gas.



By utilizing energy from the installation, you contribute to a reduction in carbon dioxide emissions by 7070482,67 kg.



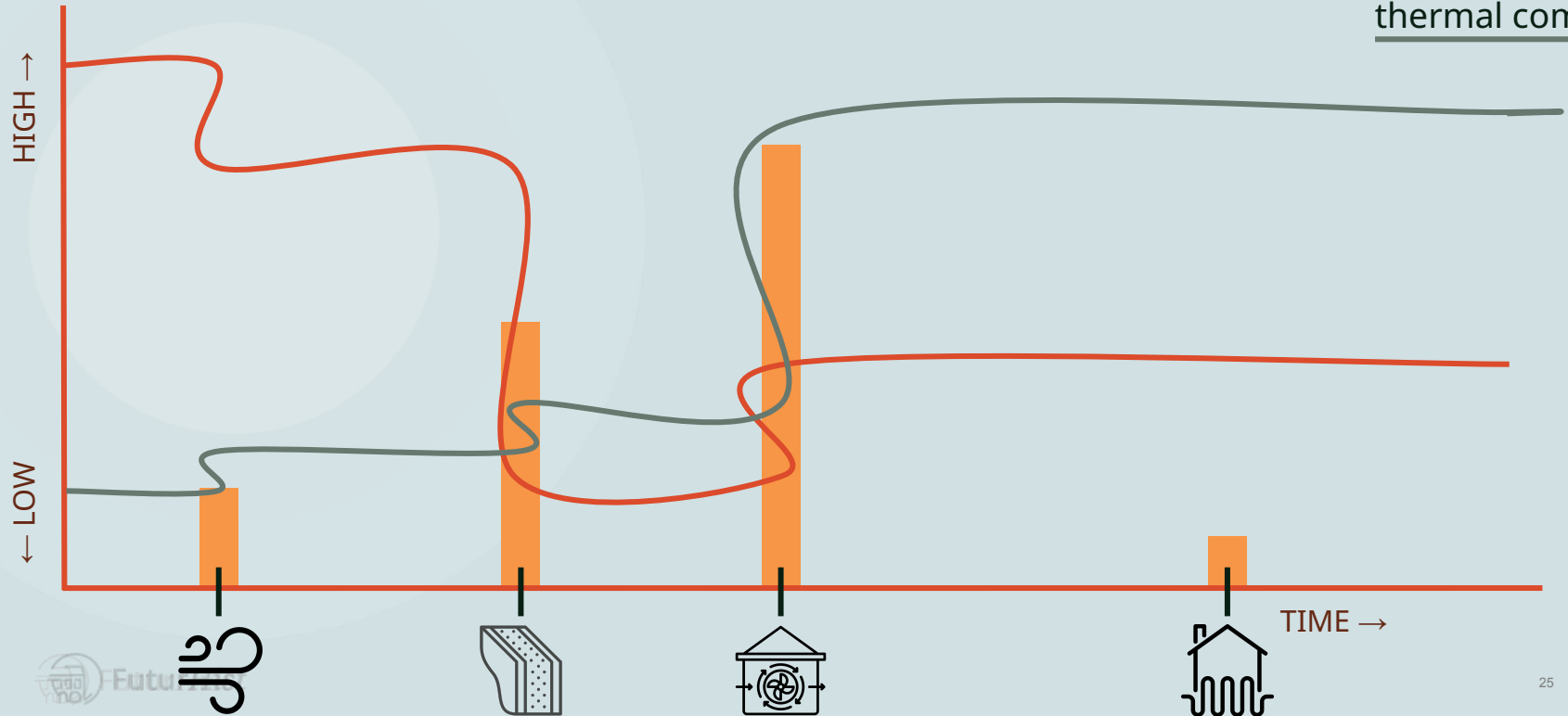


Integrated approach

investment cost

energy demand

thermal comfort





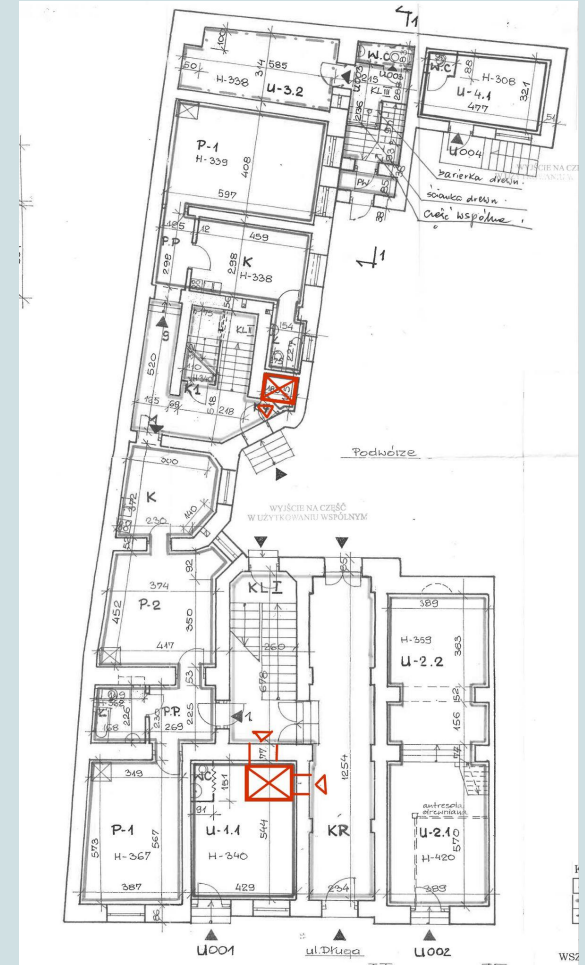
PEOPLE FIRST *ACCESSIBILITY*

“Buildings are for people; not people for buildings”

*Source - George Richards, quoted in John Layng, “The Heart of the City,”
Journal of the Royal Architectural Institute of Canada, Vol. 30, No. 6, p. 180.*



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*Thank you for
joining us!*

PROJECT
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