Partner di progetto

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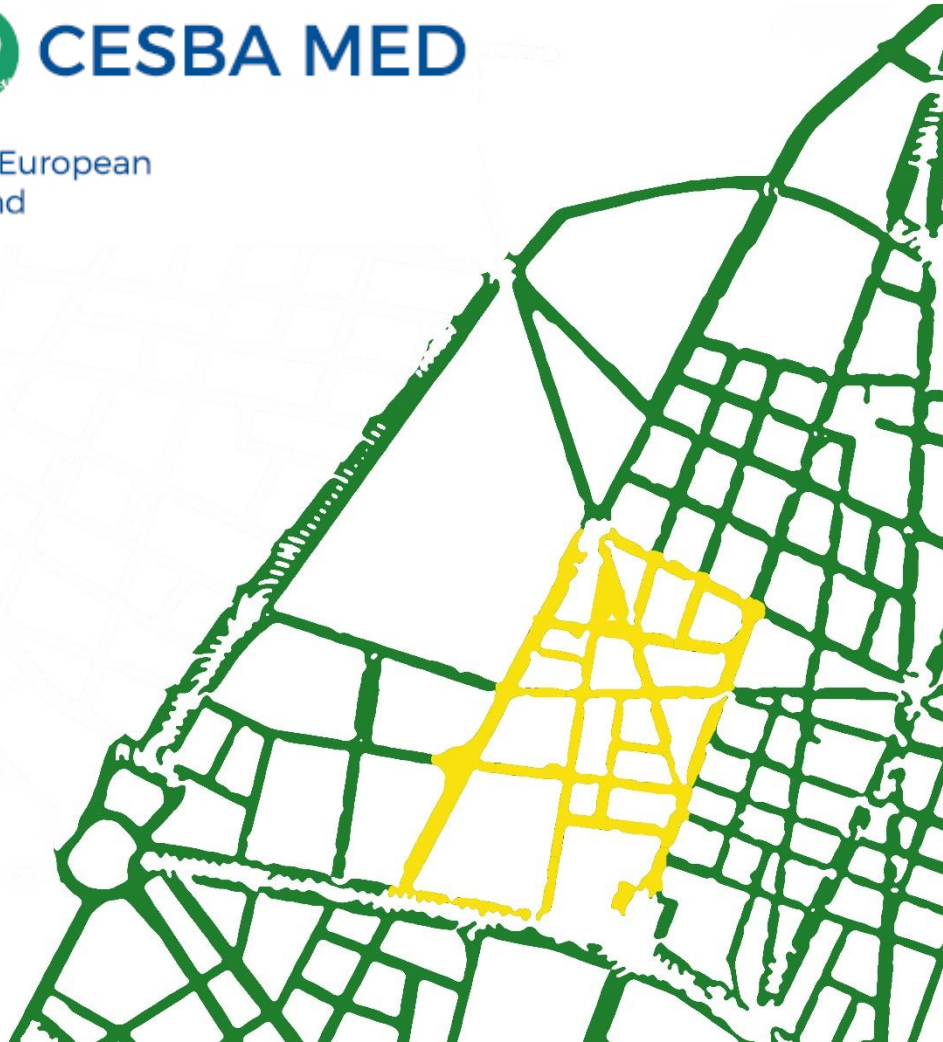
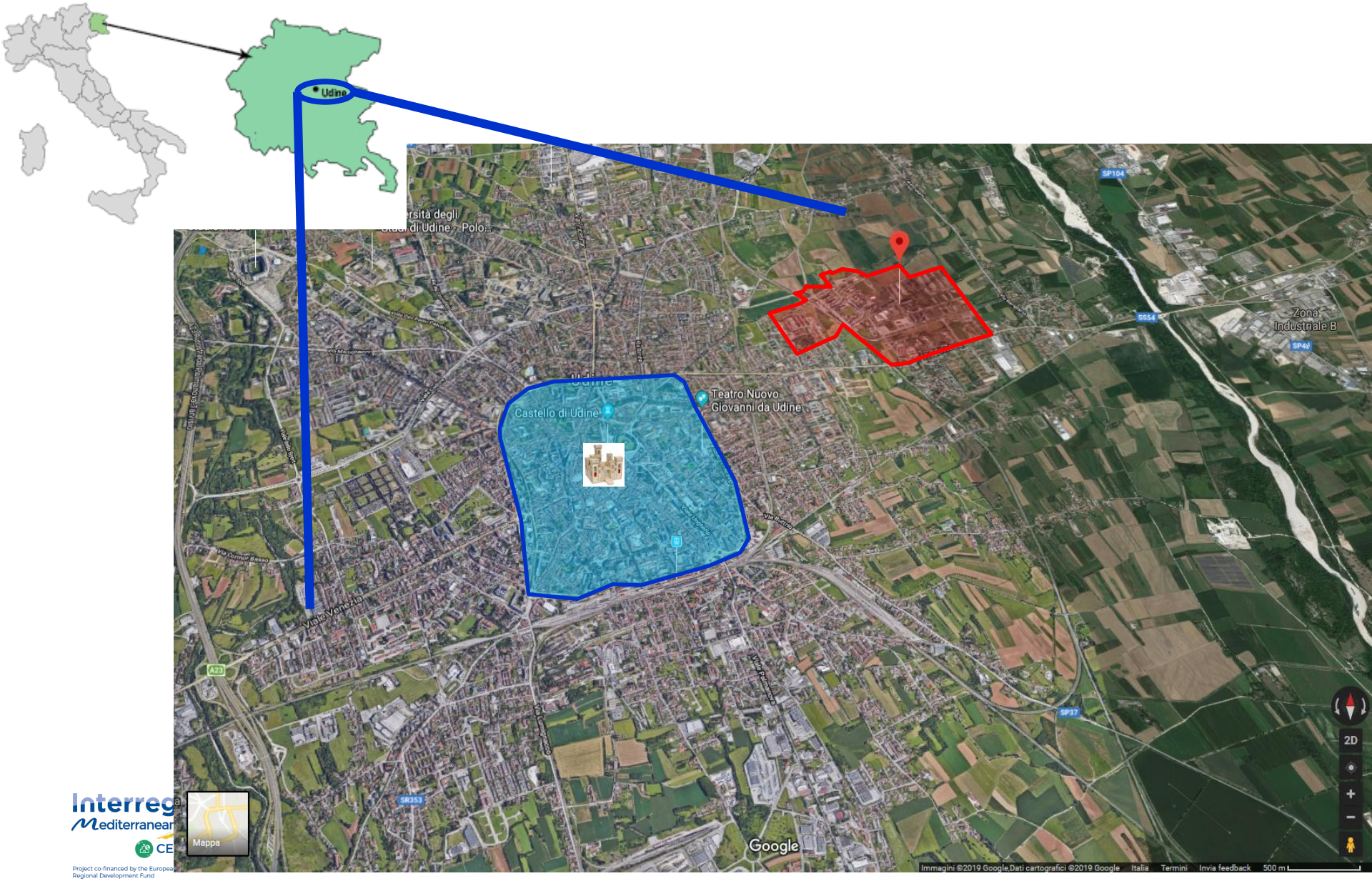
Social housing area refurbishment in Udine, Italy

Francesca Visintin

28th March 2019 – Marseille



Aurora neighborhood



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Aurora neighborhood


peepestudine

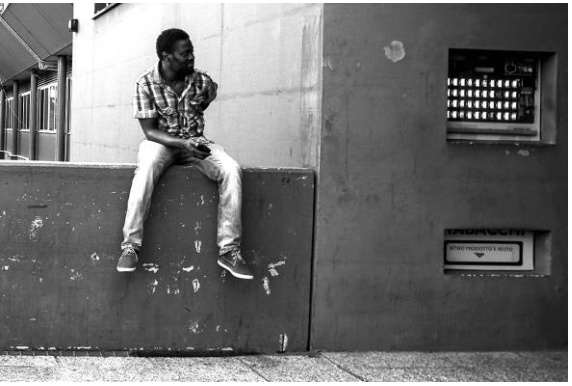

giovanifvg


Agorà


Il Gazzettino


Il Friuli

Aurora neighborhood



Aurora neighborhood

Description of the area	North-east corner of Udine The area borders with poorly urbanized areas Characterized by park and agricultural destination Relatively new urbanization, which started at the end of Fifties and reached the maximum expansion in the Eighties
Social and economic context	Social housing Area with predominantly popular economic construction Neighborhood with a purely working-class and low-income population Socially marginalized neighborhood

Aurora neighborhood

The North-East corner of Udine can be assumed as a manifesto

- crossroads of people and details of a minor history
- characterized by precious architectural evidence that can be transformed into an experimental laboratory for new ways of living and sustainability

Not only. The North-East corner of Udine is a border area:

- where, until 1900 border between city and countryside (rurality witnessed by the presence of farmhouses)
- from the Fifties until the end of the Cold War, it was the eastern border of the Iron Curtain: 3 large barracks were established, 2 of them in and around the Aurora neighborhood

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Aurora neighborhood

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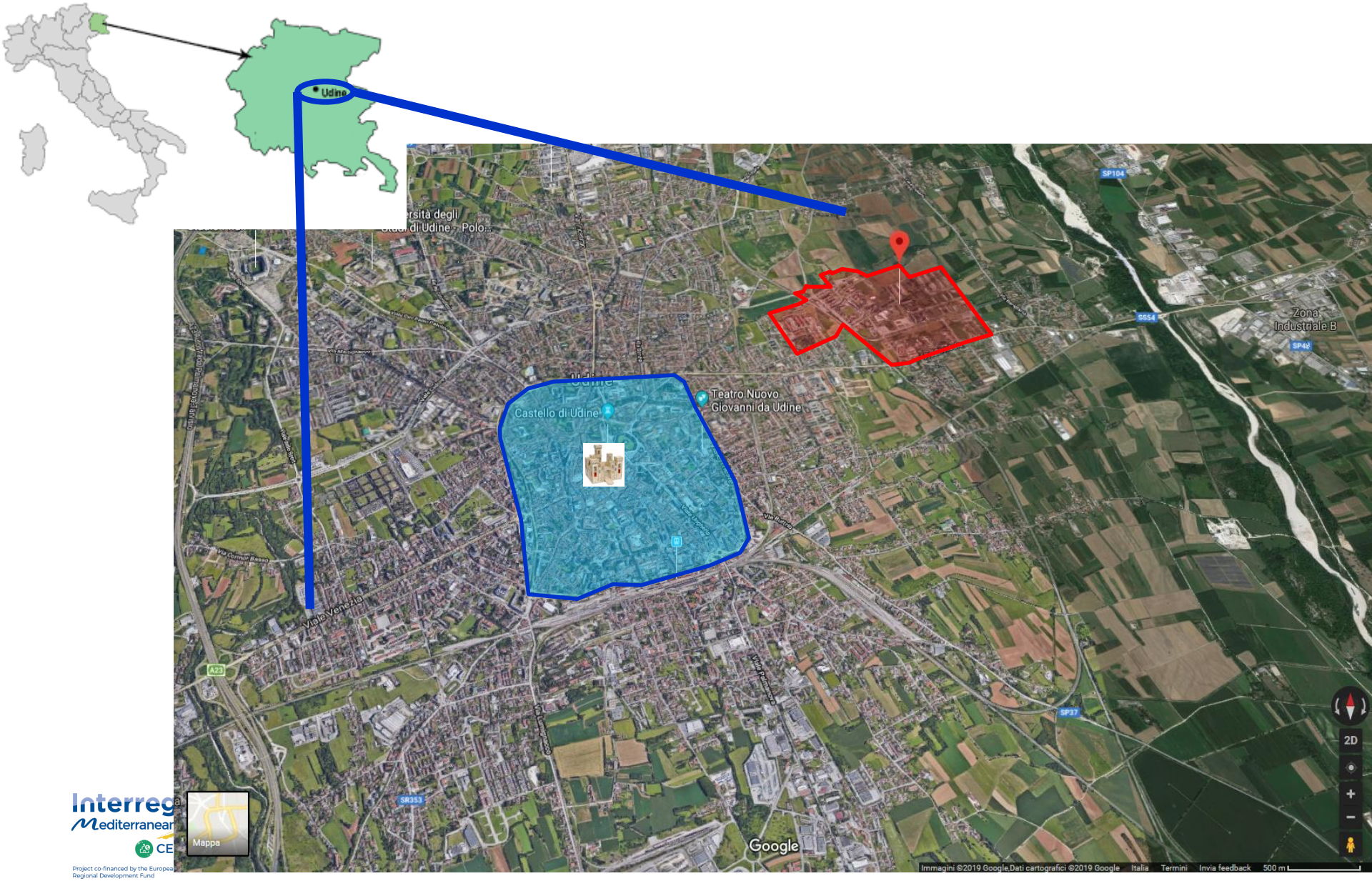
Aurora neighborhood



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Aurora neighborhood

Experimental City Project financed in the frame of the urban safety, security and urban regeneration Program	When: 2015 Who: Municipality of Udine What: Objectives - Improving and qualifying urban decorum - Increasing territorial security and urban resilience - Regenerating the former Osoppo barrack with the aim to provide services and public spaces for the Eastern side of Udine - Improving slow and public mobility - Reducing global emissions, energy | natural resources consumption, including land consumption - Improving the quality of life - Guaranteeing equal opportunities
	Budget: 30 million euro • Public funding: 18 million euro • Private funding: 12 million euro

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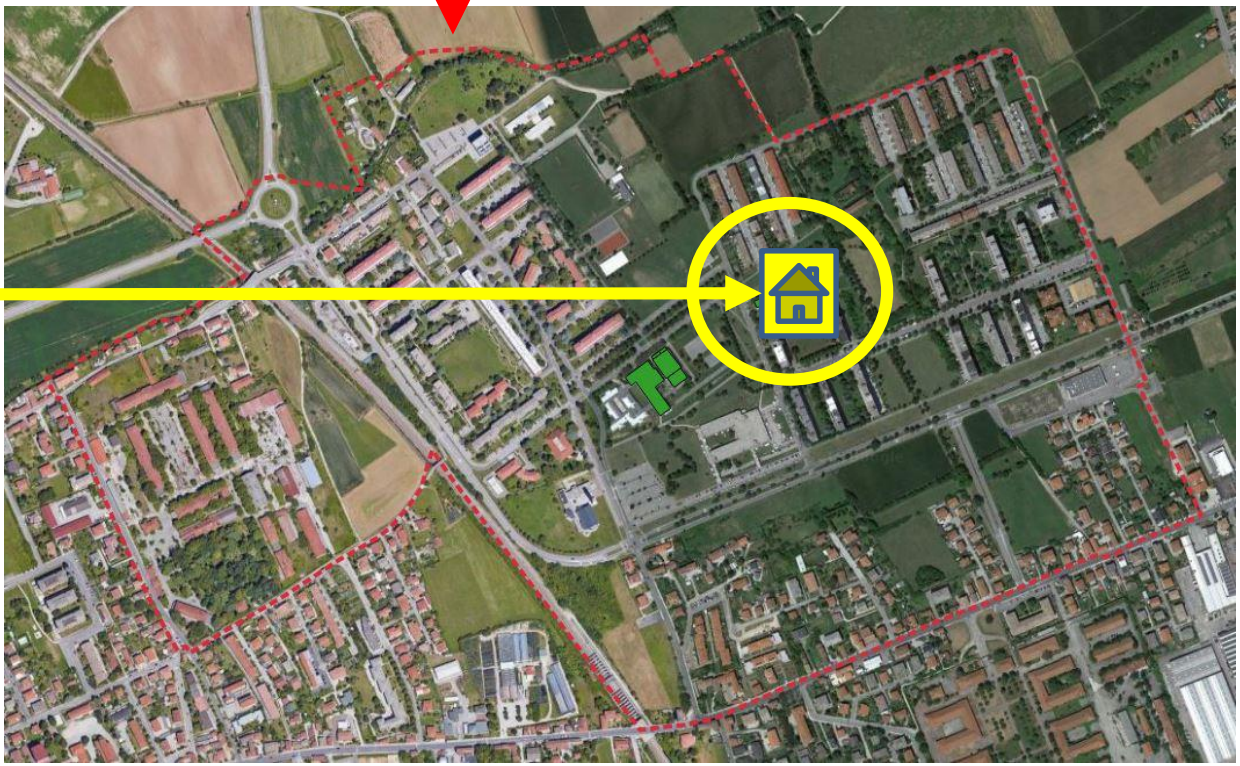
Aurora neighborhood | PEEP EST i67 building

Aurora neighborhood: Peripheral neighborhood with a population density per square meter equal to 0,0043 inh/m^2

PEEP EST i67:
Residential building destinated to social housing



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PEEP EST i67 building

PEEP EST i67 | Via Afro 1 | Udine | Italy

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PEEP EST i67 building

Building type and ownership

General information on the selected building	
PEEP EST i67	
Address	Via Afro 1 | 33100 UDINE | Italy
Building use	Residential building | social housing
Owner	Municipality of Udine
Year of construction	1981-1984
Number of levels above earth	7
Number of levels underground	1
Number of occupants	155
Net useful surface of building	4.913 m^2

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PEEP EST i67 building

Technical aspects

General information on the selected building	
PEEP EST i67	
Building type	Building in line with load-bearing wall in reinforced concrete and concrete-slab floors
Heating system	Autonomous gas generator system
Cooling system	Absent
DHW system	Autonomous system with gas heating generator in each unit
Ventilation system	Natural ventilation
Lighting system	Incandescent and energy-saving lamps

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Refurbishment of the PEEP EST i67 building

- **Scenario**
  - Scenario 0: State of the art
  - Scenario 1: Retrofitting
- **Comparing scenario by applying**
  - CESBA MED Generic Framework – building
  - CESBA MED Tools – building

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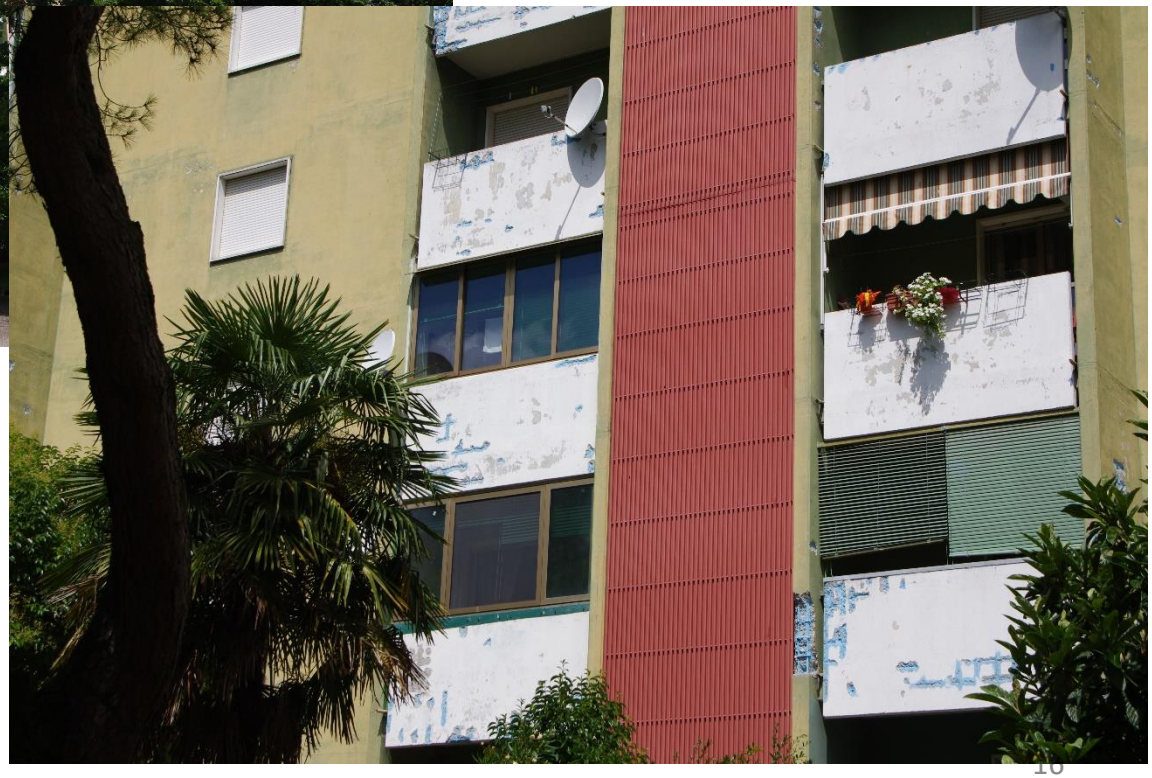
Scenario 0 || State of Art



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Scenario 0 | | State of Art

Actual performance analysis	
STRENGHT ASPECTS	Some interventions have been carried out in the Eighties: • Thermal insulation on the blind facades (east and west), on the attic of the first floor (garage) and on the roof

Thermal insulation on west facade

Thermal insulation on the attic of the first floor

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Scenario 0 | | State of Art

Actual performance analysis	
WEAKNESS ASPECTS	The building is • Owned by the Municipality of Udine • Managed by ATER (Azienda Territoriale per l'Edilizia Residenziale, Regional Agency for Social Housing) • Used by third parties and • ATER does not have administrative and financial autonomy the project has to be approved by the Region and • The building is entirely inhabited and the interventions from the inside are not easy to carry out • The conversion from autonomous to centralized systems is not feasible due to the lack of adequate space for the central heating plant and related system

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Scenario 0 | | State of Art

CONSTRAINTS / RESTRICTIONS	
LEGAL CONSTRAINTS	- The General Urban Development Plan, and - The Building Regulations - Landscape legal constraints due to the presence of water channels (Communication of the 19/08/2016 of the Archaeological, fine Arts and Landscape Supervision Office of Friuli Venezia Giulia)

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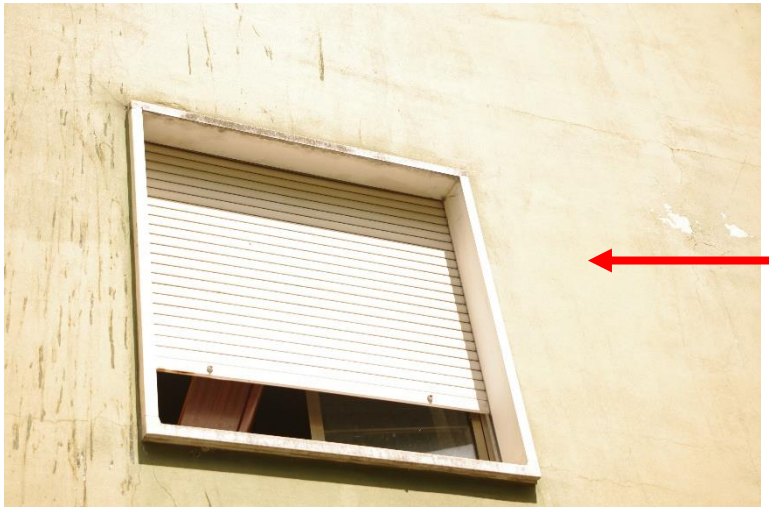
Scenario 0 | | State of Art

Actual performance analysis	
POTENTIAL FOR PERFORMANCE IMPROVEMENT	The scenario analysis identifies as improvements: - **Thermal insulation (thermal coat) of southern and northern vertical walls** - **Replacement of external windows** - Replacement of the former thermal roof and first floor attic insulation - Installation of photovoltaic system on the roof that could however only cover shared electrical services (stairs lighting)



Existing windows: aluminium frame and single glass

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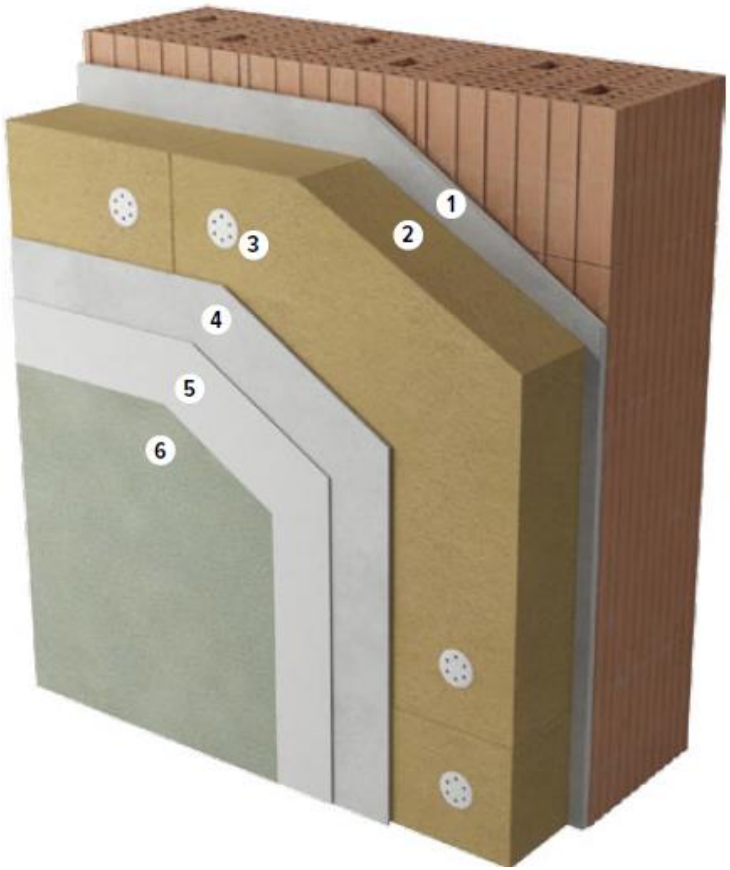
Scenario 1 | | Retrofitting

Hypothesis of intervention | first

Thermal insulation of facades – m^2 3.016	
1. NaturaKALK POR	Adhesive
2. NaturWALL	Thermal insulation material of wood fibre Thickness: 0,14 m Density: 145 kg/m^3
3. Anchors	
4. Glass fibre mesh	
5. NaturaKALK FILLER	Finishing layer
6. NaturaKALK SILICATI	Plaster/base coat
7. NaturaKALK	Finishing layer



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Scenario 1 | | Retrofitting

Hypothesis of intervention | second

External doors and windows – m^2 520
Thermal break casement series with blind leaf CE marked
Thermal insulation system with tubular bars
Glass Systems: LOW EMISSION and SOLAR CONTROL GLASS in accordance with current norms and fitted with ARGON GAS and WARM EDGE CONDUIT as a standard
4 be + 14 GA WE + 4T + 12 GA WE + 33.1 be

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Scenario 1 | | Retrofitting

Financial results	Subjects involved	
Total investment	Public Private Partnership	790.000 €
Annual cost saving	Tenants	22.840 €/year
Building regeneration	Municipality of Udine	

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Key Performance Indicators | Building passport

B – Energy and Resources Consumption

B1 – In use energy consumptions			S0	S1
B1.1 – Primary energy demand (in use stage)	**Annual primary energy demand per useful internal floor area**	**kWh/m²/y**	**160,66**	**97,13**
B1.2 – Delivered thermal energy demand (in use stage)	**Annual delivered thermal energy demand per useful internal floor area**	**kWh/m²/y**	**108,48**	**48,07**
B1.3 - Delivered electric energy demand	Annual delivered electric demand per useful internal floor area	kWh/m²/y	19,26	19,26
B1.4 – Energy from renewable sources in total primary energy consumption	Primary energy demand of the building that is met by renewable sources on total primary energy demand	%	0	0
B1.5 – Energy from renewable sources in total final thermal energy consumption	Share of renewable energy in final thermal energy consumptions	%	0	0
B1.6 – Energy from renewable sources in total electric energy consumption	Energy from renewable sources in total electric energy consumption	**%**	0	0

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Key Performance Indicators | Building passport

B – Energy and Resources Consumption

B3 – Use of materials			S0	S1
B3.5 – Recycled materials	Weight of recycled materials on total weight of materials	%	0	0
B4 – Use of water, stormwater and greywater				
B4.2 – Water consumption for indoor uses (in use stage)	Water consumption per occupant per year	m^3/occ/yr	52,23	52,23

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Key Performance Indicators | Building passport

C – Environmental Loadings

C1 – Greenhouse Gas Emissions			S0	S1
C1.3 – Global Warming potential	**CO_2 equivalent emissions per internal floor area per year**	**kg CO^2 eq/m^2/yr**	**31,65**	**18,96**
C3 – Solid and liquid wastes				
C3.1 – Construction and demolition waste	**Weight of waste and materials generated per 1 m^2 of useful floor area demolished or constructed**	**kg/m^2/life cycle stage**	**0**	**2,92**
C3.2 – Solid waste from building operation	Ratio of the number of collectable solid waste categories within a 100 m distance from the building's entrance to the reference solid waste categories	%	0	0

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Key Performance Indicators | Building passport

D – Indoor Environmental Quality

D1 – Indoor air quality and ventilation			S0	S1
D1.4 - TVOC concentration in indoor air	TVOC concentration in indoor air	µg/m^3	NA	NA
D1.10 – Ventilation rate	Ventilation rate normalized per useful floor area	l/s/m^2	NA	NA
D2 – Air temperature and relative humidity				
D2.2 - Thermal comfort index	Predicted Percentage Dissatisfied (PPD)	**%**	ND	ND

NA = Not Applicable
ND = Not Detected

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Key Performance Indicators | Building passport

G – Cost and Economics Aspects

G2 – Cost and economic aspect			S0	S1
G1.4 - Use stage energy cost	**Energy annual cost per usable floor area**	**€/m²/y**	**12,55**	**8,20**
G1.5 - Use stage water cost	Water annual cost per usable floor area	€/m²/y	2,17	2,17

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Comparison | Scenario 0 | Scenario 1

Performance scores assessed by CESBA MED Tool

Issues	State of the art Scenario 0 S0	Scenario 1 S1
TOTAL SCORE	**-0,8**	**0,4**
B – Energy and Resources Consumption	-0,6	0,4
C – Environmental Loading	-1,0	0,6
D – Indoor Environmental Quality	-1,0	-1,0
G – Cost and Economic Aspect	-1,0	0,2

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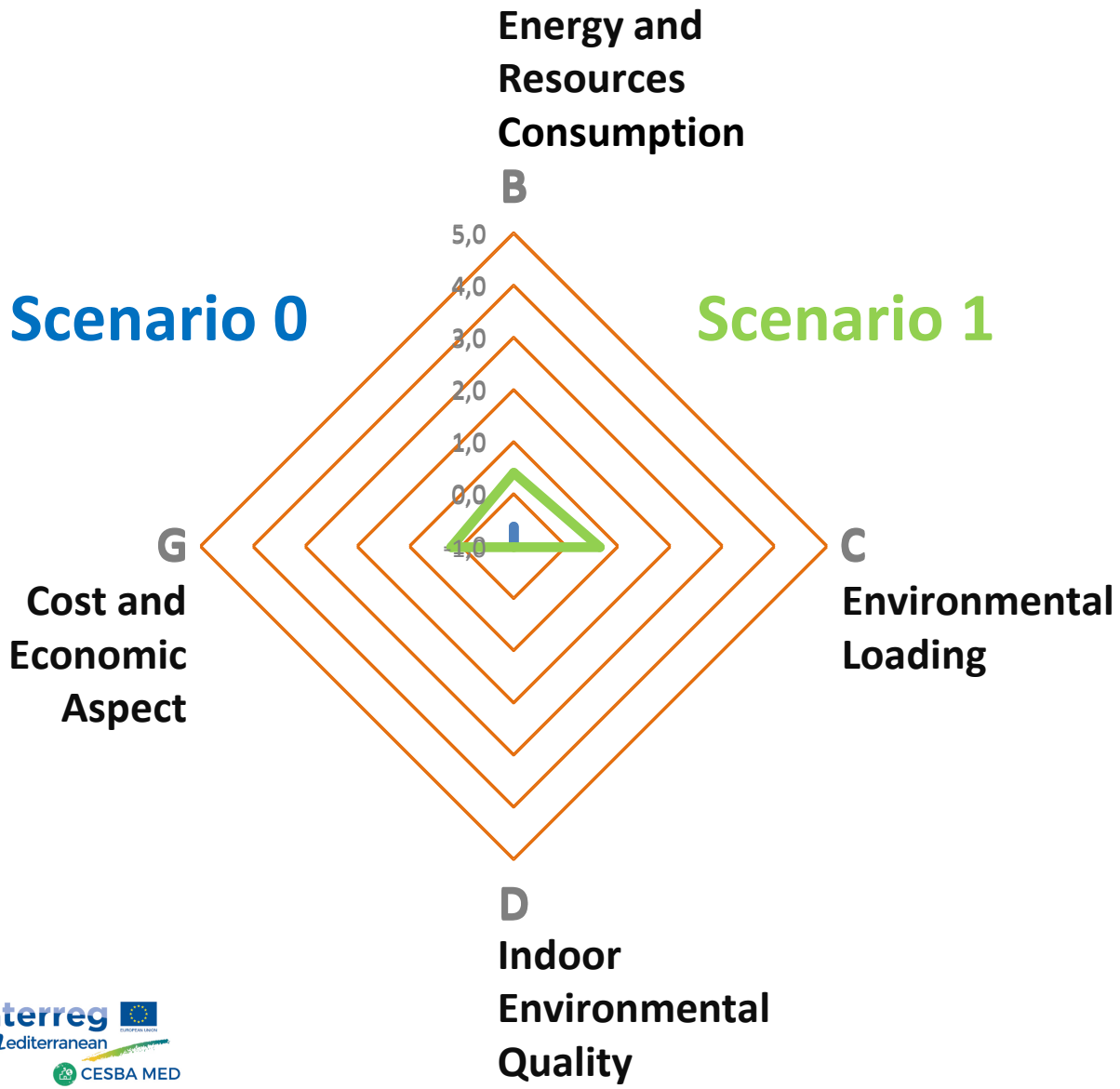
Comparison | Scenario 0 | Scenario 1



5	BEST
4	EXCELLENT
3	GOOD
2	FAIRLY GOOD
1	PASS
0	MINIMUM
-1	NEGATIVE

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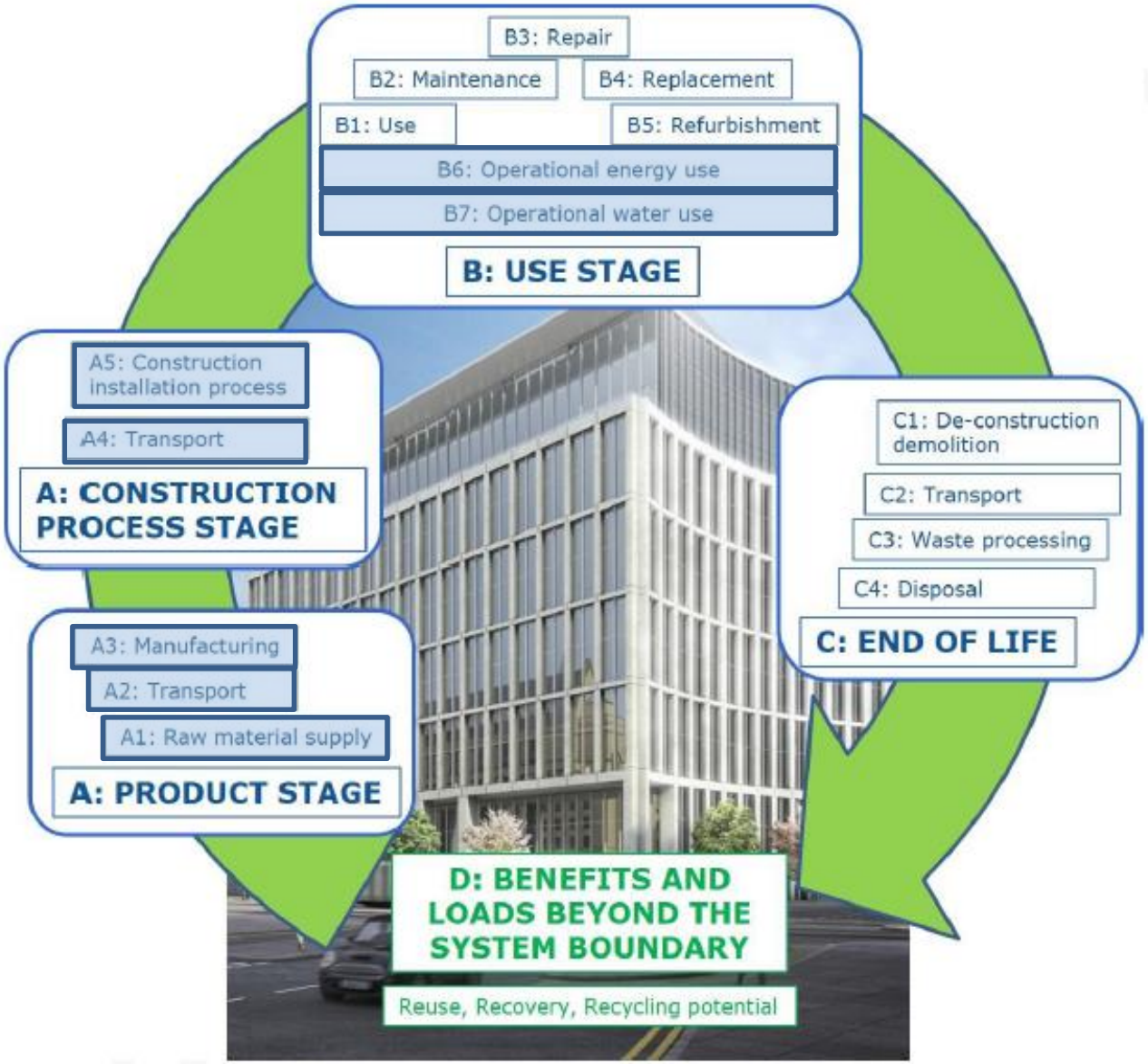
Step forward | Testing Level(s) Protocol



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Testing Level(s) | Life Cycle Global Warming Potential

S1	GWP_{100} kg CO_2eq/m^2 • year	Assessment
A – PRODUCT STAGE and CONSTRUCTIONC PROCESS STAGE		
A1 – A5 Raw material supply, transport, manufactory, Transport from the gate to the site of use, Construction/installation project	2,81	16%
B – USE STAGE		
B6 – Operational energy use	14,80	83%
B7 – Operational water use	0,21	1%
TOTAL	**17,83**	**100%**

Life cycle stage: 30 years

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Testing Level(s) | Life Cycle Costs

S1	€/m² • year	Percentage
A – PRODUCT STAGE AND CONSTRUCTION PROCESS STAGE		
One off costs	3,85	35%
B – USE STAGE		
Annual recurrent costs – Energy	5,08	45%
Annual recurrent costs – Water	2,26	20%
TOTAL	**11,19**	**100%**

Life cycle stage: 30 years
Reference discount rate: 3%
The calculation method is based on elemental cost estimates, i.e. the cost of land and labour is not included

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Thanks for your attention ;-)