

NeZeR Design Competition [Spain]

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What challenge?

Present situation of the building



- Multifamily block, 20 dwellings, 1362.15 m²
- Building year: 1967
- No renovation
- Ownership type: private/ Elder users
- 5 floors, 1 basement, brick walls and gabled ceramic roof
- Energy consumption. Individual boilers
 - Space heating 113,8 kWh/m²
 - Domestic hot water 17,1 kWh/m²
- Deficient indoor environment quality
- Neglected facades, electric cables unprotected
- Architectural barriers (no lift)

Renovation concept – general

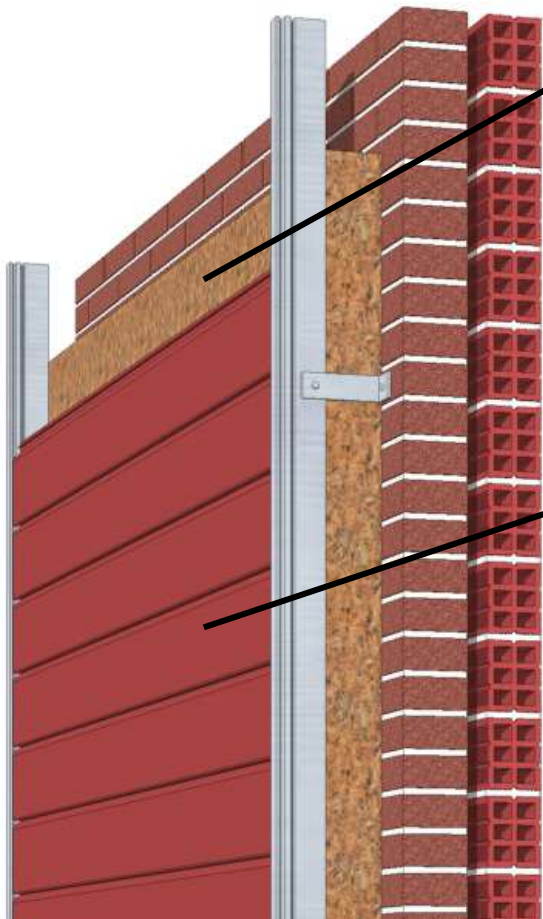
- Envelope improvement, use of renewable energy sources, accessibility and efficient illumination improvement.
- Ambition – energy performance after renovation:
 - Energy consumption:
 - Space heating (48.88 kWh/m²)
 - Domestic hot water (13.65 kWh/m²)
 - Energy performance leap from label E to A
- Building envelope improvements: Ventilated façade with wood fibre insulation
- Changes in HVAC installation: Centralized installation with individual energy efficient monitoring
- Renewable energy technologies: biomass boiler, solar panels
- Accessibility: lift installation, change the central core of the building



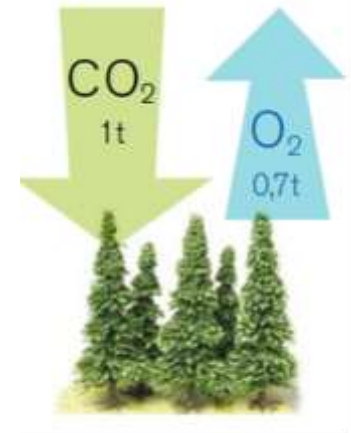
Proposed technical solutions

	Original building	After NZEBR
Walls	External walls main façade: Double brick masonry with intermediate air cavity without insulation U= 0.81 W/m ² ·K	Ventilated façade with wood fibre insulation (100mm) U= 0.27 W/m ² ·K
Floors	Concrete slab without insulation U= 1.16 W/m ² ·K	Wood fibre insulation on the ceiling of the basement (120mm) U= 0.22 W/m ² ·K
Roofs	Concrete slab without insulation under gabled roof U= 1.57 W/m ² ·K	Internal wood fibre insulation (120mm) U= 0.26 W/m ² ·K
Windows	Old windows. Aluminium or wood frame	Double glazing windows without thermal break
HVAC	Individual electric and gas boilers. Natural ventilation Primary energy consumption no renewable : 198,4 KWh/m ² yr	Centralized biomass boiler with individual energy efficient monitoring Primary energy consumption no renewable: 17,06 KWh/m ² yr
RES	-	Installation of solar thermal system providing hot water, covering at least 47% of the building demand

Environmental aspects – Materials selected



- Wood fibre insulation
Wood is a natural, ecological, renewable material and carbon sink. It has excellent thermal and acoustic behaviour. Zero toxicity
- Anodized aluminium
100% recyclable, “cradle to cradle”, easy to transport (light material), durable, low maintenance (corrosion and abrasion resistance) , zero toxicity, “eco-metal”, sustainable.



1 m³



User aspects

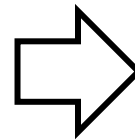
- Improvements in user comfort levels
 - Significant improvement acoustic insulation (effect on sound transmission from exterior) 45→64dBA
 - Monitoring of indoor climate
 - Decrease air leakage
- Health aspects
 - No condensations, no mould risk (breathing problems), no smells, minor air pollution sources
 - Noise reduction
- Robustness for incorrect or unexpected user behaviour
 - Regulation and control of thermal installations
- Duration of renovation process
 - Industrialized construction: time reduction
- Communication with residents
 - Meetings (advisory council, healthy technicians), opinion surveys, user involvement (decision making), good practices (use of energy)

Aesthetical Aspects

- Visual quality of new facades



Before



After

Market appeal

- Replication potential (buildings from 1951 to 1980)
 - 702 buildings in Sestao (60%)
 - 3.410.771 buildings in Spain (35%)
- Proven technologies
 - Case study: Residential building in Urduliz (Spain)
- Engineering solutions – ease of implementation
 - Use of common retrofitting solution (ventilated façade)
 - Easy external cladding assembly
 - No scaffolding
- Technical risks
 - Material cost fluctuation (aluminium)
 - Proven technology without technical risks
- Prospects for scale of volume effects
 - Higher demand implies lower material price
- Financial aspects – life cycle costs
 - Less maintenance and energetic costs (less demand 60%)
 - Grants: Energy efficiency and accessibility
 - Revalorization of housing (use of basement, lifts, aesthetic improvement)



Case study in Urduliz (Spain)

Strengths and weaknesses

Strong points of renovation concept:

- Less energetic demand (60%) and primary consumption (90%)
- Monitoring will be undertaken after rehabilitation works
- No scaffolding, fast and dry construction
- Industrialized construction
- Less disturbances to tenants (dust, noise, time, need for space)
- Revalorization of housing (use of basement, lifts, aesthetic improvement)
- Involvement of homeowners (aesthetic decision, wall painting, basement management)

Weaknesses / aspects to be improved:

- Social awareness for sustainability development
- Agreements from 100% of the owners

