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Lugo more Bio-dynamic. Planning of a multi-ecological neighbourhood as a model of urban resilience

Lara Méndez López & Susana Penedo Souto - Lugo Municipality, Spain





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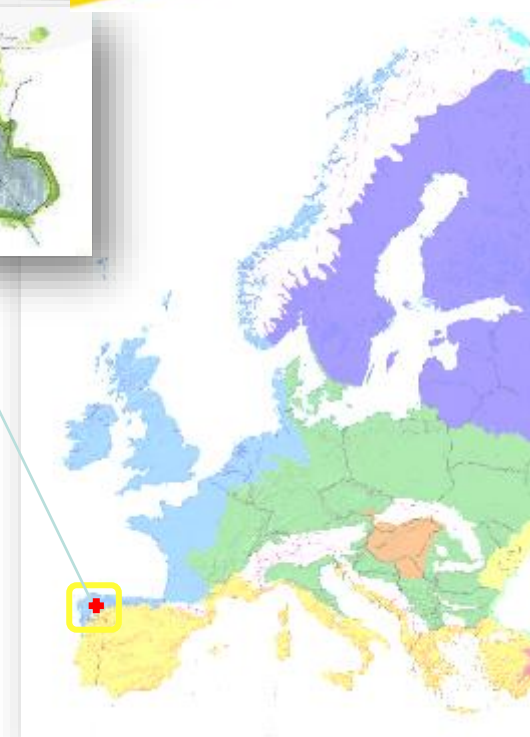
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URBAN PLANNING STRATEGY FOR NEIGHBOURHOODS AND RESIDENTIAL AREAS RESILIENT - LIFE14 CCA/ES/000489



SEEDING SUSTAINABLE CITIES (NZECITIES)

Implementation in the city of Lugo of an **INNOVATIVE URBAN PLANNING STRATEGY** aimed at intermediate-scale actions in neighborhoods or residential areas to achieve resilient urban systems adapted to the consequences and effects of climate change, sustainable cities, decarbonised cities.



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The project is a mosaic of **MULTIPLE ACTIONS** aimed at the achievement of a **SUSTAINABLE URBAN DEVELOPMENT** model that will become a new engine of growth for Lugo in the **BIO-ECONOMY SECTOR** and at the same time be **TRANSFERABLE AS AN URBAN STRATEGY** to other places. And thus to **REDUCE THE EFFECTS OF CLIMATE CHANGE**, from the local area to achieve the best global effects.

TO DO THIS, LET'S SOW A SEED! THE SEED OF ENVIRONMENTAL AWARENESS

| | | | |
|---|---|---|--|
|  <p>THE BEST SEED</p> <ul style="list-style-type: none"> - NATURAL HERITAGE - USC-CAMPUS TERRA - UPM |  <p>THE BEST PLACE</p> <ul style="list-style-type: none"> - MUNICIPAL PROPERTY - GREEN BELT - "WOOD VALLEY" |  <p>THE BEST MOMENT</p> <ul style="list-style-type: none"> - CLIMATE CHANGE - SUSTAINABILITY - "ROSETTA STONE" |  <p>THE BEST GROWTH</p> <ul style="list-style-type: none"> - STRATEGY - SYNERGIES - TRANSFERABILITY |
|---|---|---|--|

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DEMONSTRATIVE ACTIONS

Urban forest- Actions of conservation and restoration of the archetype ecosystems in the area.

- C 4 Forestry of native hardwoods in urban areas for the production of quality wood
- C 5 Energy Crops in the urban environment: biofuels energy-efficient
- C 6 Establishment of a Chestnut grove "Souto" with traditional varieties
- C 7 Recovery and enhancement of Riparian Forest
- C 8 Establishing an Arboretum
- C 9 Urban Agriculture of Land and Elevation
- C10 Adaptation of construction systems with built-in low energy native materials and analysis of other adaptive technologies
- C11 Launching wood pavilion "Impulso Verde" (green impulse) for future urban developments.



ACTIONS PLANNED AT MULTI-SCALE

- C 1 Catalog of solutions of the Urban Design "GUD-Lugo"
- C 2 Strategic Plan Biodinamic
- C 3 Detailed Planning of Residential Comfort Climatic Areas (ZCCR)





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ACTION C2-STRATEGIC PLAN BIODINAMIC

MAIN DESIGN CRITERIA

European Reference Framework for Sustainable Cities (RFSC)



5 DIMENSIONS 30 GOALS



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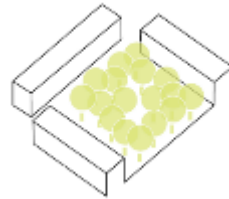
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ACTION C1-CATALOGUE OF SUSTAINABLE URBAN SOLUTIONS "GUD-LUGO"



WATER CYCLE



GREEN SPACES



ACCESIBILITY



**BIOCLIMATIC
URBANISM**



**CIRCULAR
ECONOMY**

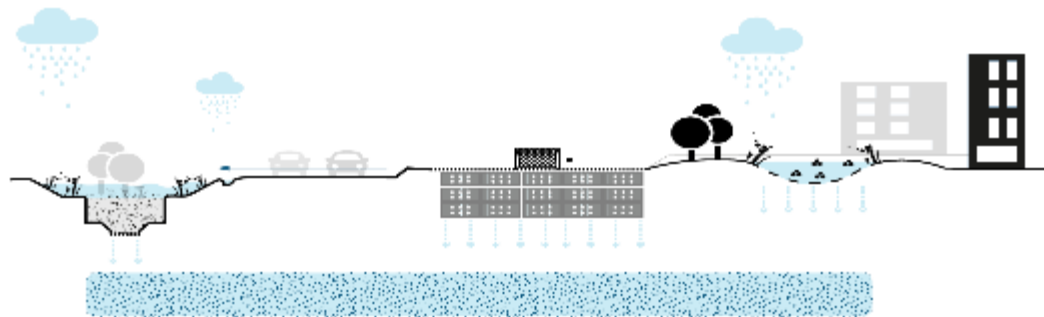


**PUBLIC
PARTICIPATION**

**Measuring
tool included**
CO2 / NO / Water



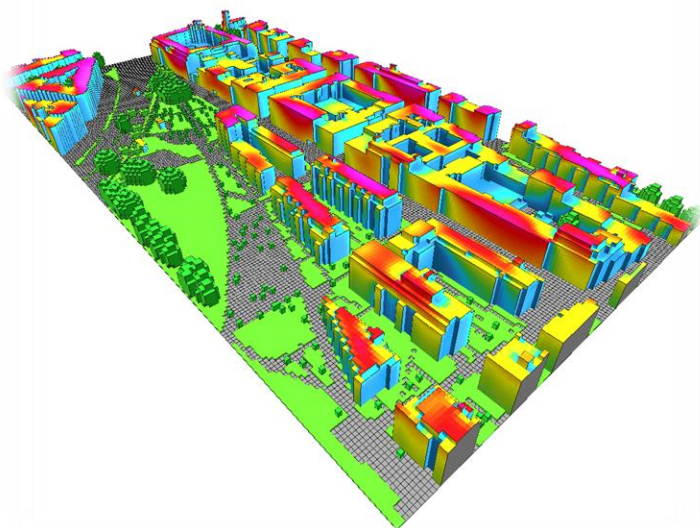
DIAGRAM OF RAINWATER RETENTION AND INFILTRATION ELEMENTS LOCATED IN COMMUNITY SPACES



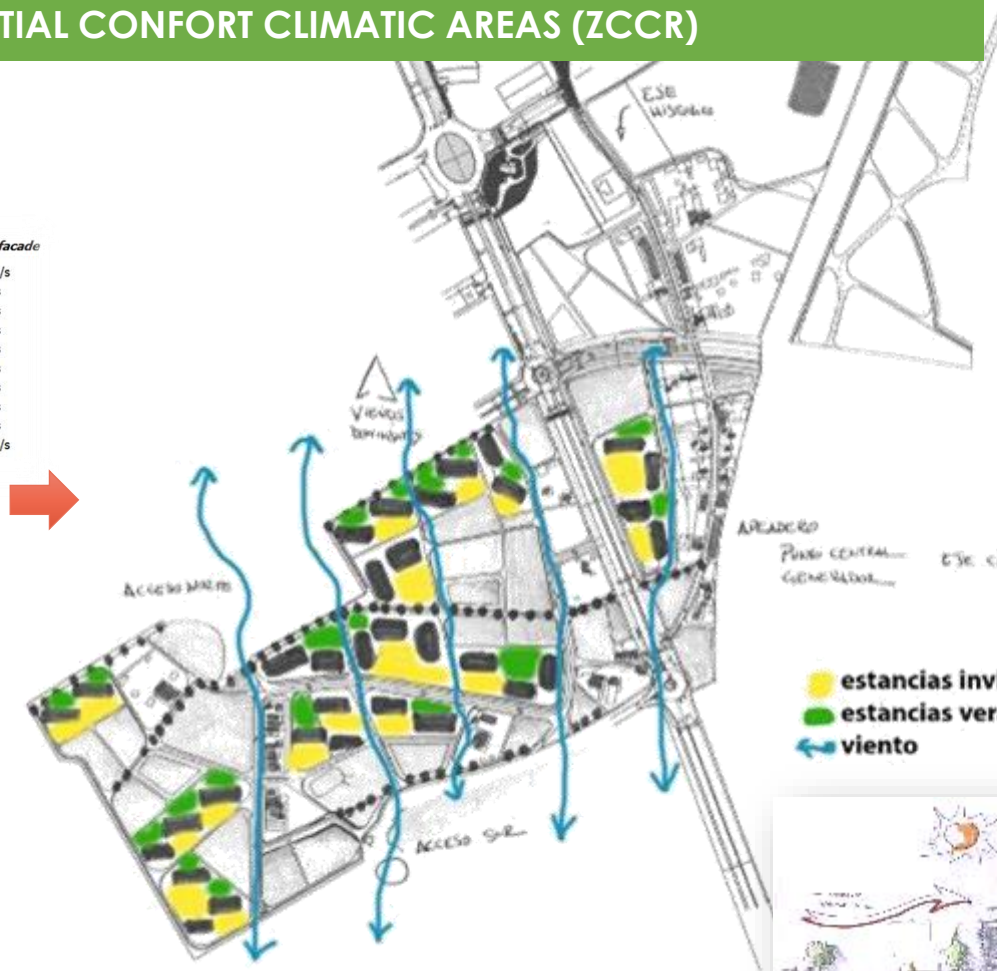
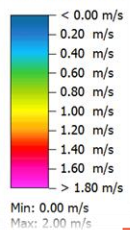


ACTION C3- DETAILED PLANNING OF RESIDENTIAL CONFORT CLIMATIC AREAS (ZCCR)

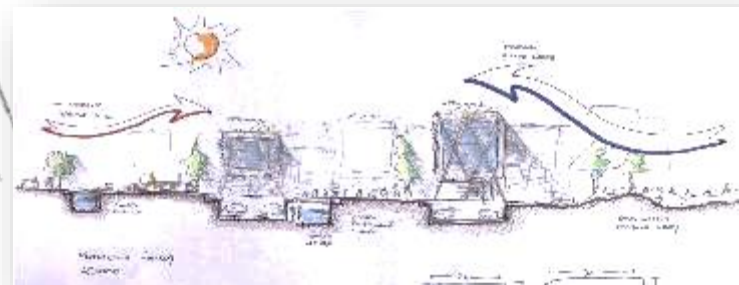
Urban planning schemes
Climate behavior and comfort
Simulation of urban metabolism



uvw in front of facade



estancias invierno
estancias verano
viento





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C11-DESIGN AND IMPLEMENTATION OF THE PILOT PROJECT "GREEN IMPULSE"

**MINIMIZE CO2 EMISSIONS IN
THE BUILDING**

BUILDING

MAINTENANCE

WITH **WOOD**

WITH OTHER **SUSTAINABLE** MATERIALS

ZERO ENERGY BALANCE

RESIDUE ZERO



A marca da xestión forestal responsable





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WOODEN BUILDING
"GREEN BOOST"

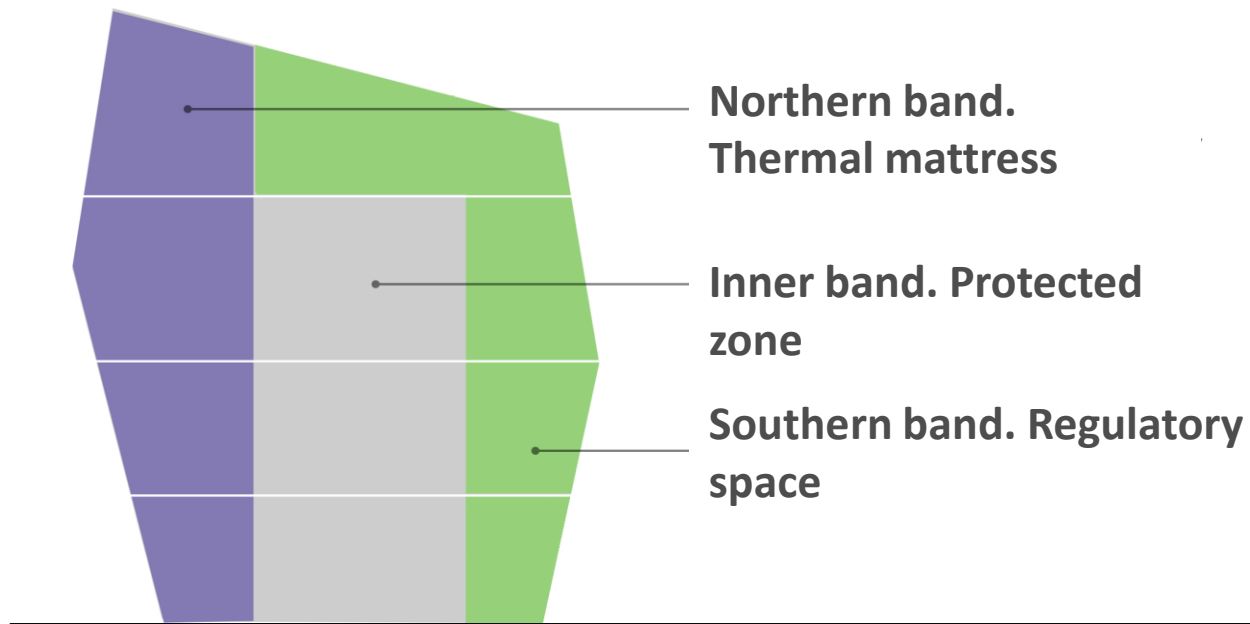


MINIMIZE CO2 EMISSIONS IN THE BUILDING- PROJECTUAL CONCEPTS

Formal concept

0 Kilometer-Materials

Programmatic organization



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MINIMIZE CO2 EMISSIONS IN THE BUILDING- PROJECTUAL PASSIVES CONCEPTS

TRADITIONAL PASSIVE STRATEGIES

Orientation

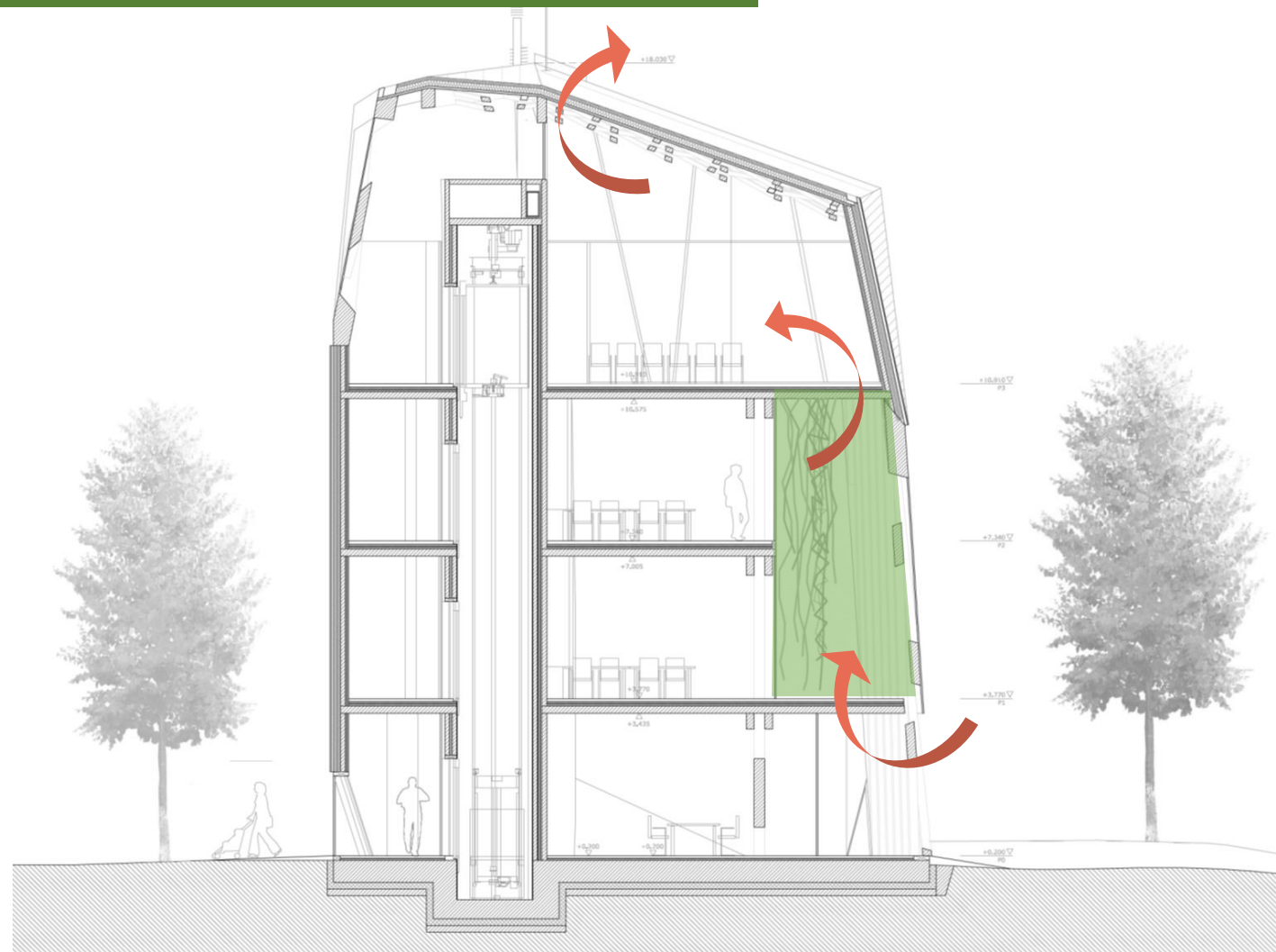
Compactness

Solar protection

Natural ventilation

Thermal inertia

Unique passive concepts



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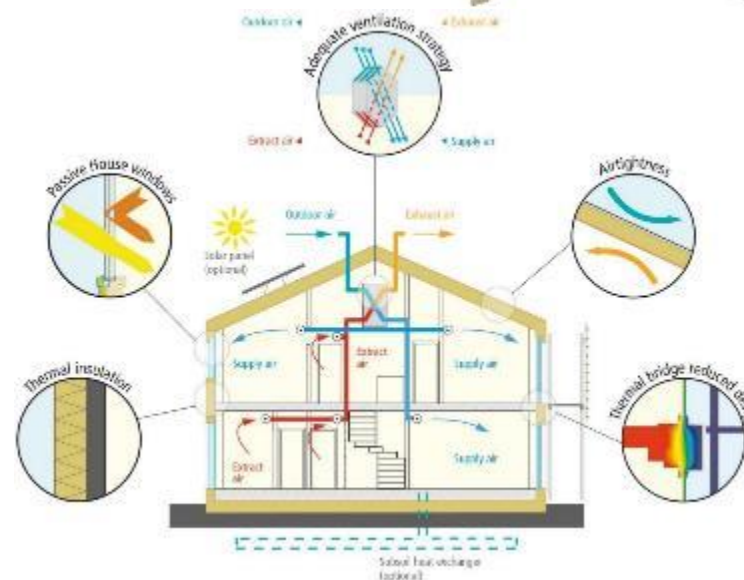
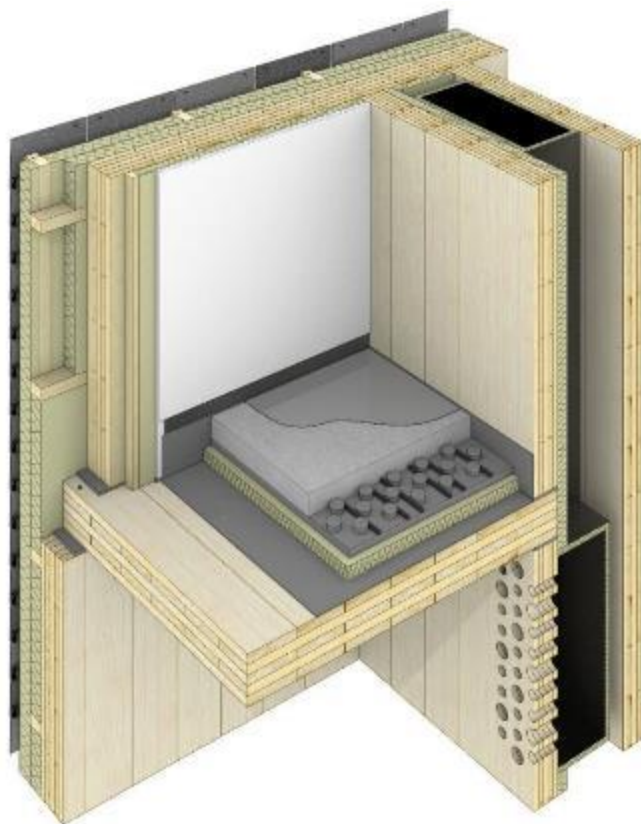
**WOODEN BUILDING
"GREEN BOOST"**



MINIMIZE CO2 EMISSIONS IN THE BUILDING- PROJECTUAL TECHNICAL PRINCIPLES

5 MAIN PRINCIPLES

- Thermal insulation
- Passive windows
- Ventilation heat recovery
- Hermetic sealing
- No thermal bridges





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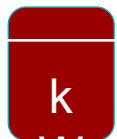


MINIMIZE CO2 EMISSIONS IN THE BUILDING-THERMOCONDITIONING AND COMFORT TECHNIQUES

MONITORING



Photovoltaic E. Production



Energy expenditure
measurement by circuits



Indoor temperature



Indoor relative humidity



CO2 air extraction probe



Natural interior lighting



Outdoor station (T^a / H%)

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MANAGEMENT AND REGULATION SYSTEM



Biomass heating boiler:
radiant floor heat



Cooler: radiant floor cooling



Double flow mechanical
ventilation with heat recovery
unit



Position of the openings in
the regulation space - cover



Shading elements (blinds)



Illumination: Off / On /
Intensity



ENERGY
EFFICIENCY

COMFORT



CLIMATIC
COMFORT



AIR
QUALITY



COMFORT
LIGHTING



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Ground floor: reception and exposition

Section



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Second floor. Coworking and start-ups

Section



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First Floor. Municipal offices.





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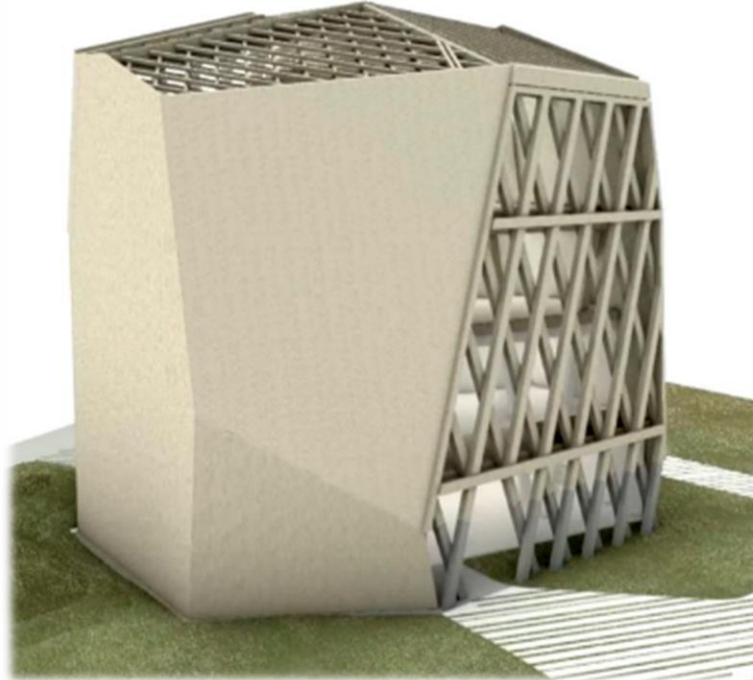
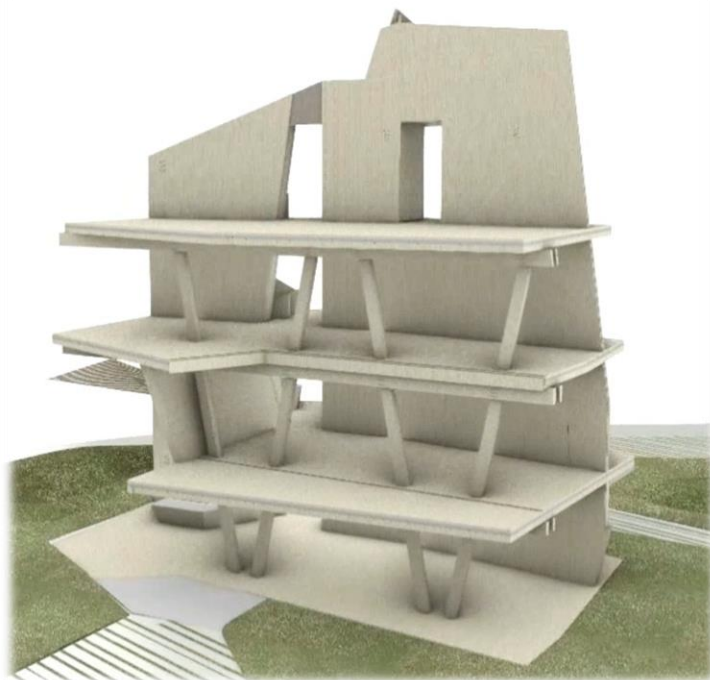


WOOD STRUCTURAL SYSTEM- HIGH TECH

Floors/Portics

Roof-Gridshell

Walls





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Third floor. Training room and rest area



Section



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IMPACTS

ENVIRONMENTAL CO2

INDICATORS

A: Project initial status

B: Status end 2017 (2017/12/31)

B2: Status end 2018 (2019/12/31)

C: Estimated situation at the end of the project

URBAN FOREST

TOTAL CARBON SEQUESTRATION:

969 Ton CO2 /year

WOODEN BUILDING “GREEN IMPULSE”

420 ton CO2 less than a conventional building

280 ton CO2 sequestrated

700 ton CO2 total near 700 m2

1 ton CO2 per m2

| 8 | Climate Change Mitigation | | | | Justification and Valuation |
|-------|--|--|---------------------|---|--|
| 8.1 | Greenhouse Gas Emissions | | | | |
| 8.1.1 | A | B | B2 | C | |
| | 238.0 ¹ 285.6 ^{***} | 238.0 ^{**} 285.6 ^{**} | 285.6 ^{**} | 5.0 ^{**} 6.8 ^{***} | Units: ton CO ₂ *Conventional building (concrete, for example) will represent 238 ton CO ₂ emissions/500m ² (an average) **Wooden building "Green Boost" will represent around 5 ton CO ₂ emissions/500m ² This indicator is in ongoing and it is being implemented as initially expected ***New data derived from the increase in the surface area of the building, from 500m ² to 677.62m ² |
| | 476.0 ² 571.2 ^{***} | 476.0 571.2 ^{**} | 571.2 ^{**} | 13.5 ^{***} | Units: kg CO ₂ /m ² building NOTE: ¹ and ² correspond to the same values with different units; they should not be summed up ***New data derived from the increase in the surface area of the building from 500m ² to 677.62m ² |

| 8.2 Carbon sequestration | | | | Justification and Valuation |
|--------------------------|-----|---|---------------------|---|
| A | B | B2 | C | |
| 0.0 | 0.0 | | 233.0 | Units: CO ₂ ton/year |
| 0.0 | 0.0 | 3000 | 40.000 | Units: kg/ha year |
| 0.0 | 0.0 | 3 ^{***} 3.15 ^{**} 4 CO ₂ ton | 936.0 ^{**} | TOTAL CARBON SEQUESTRATION Units: CO ₂ ton/year Actions C10 and C11 (Wooden buildings) and actions considering tree planting (Actions C4, C5, C6, C7 and C8) ^{**} it was estimated that: i) adult trees (fifth year of the project) will fix 40 ton/ha year; Considering Actions C4, C5, C6, C7 and C8, summing up 18.4ha; ii) the building will prevent around 233 ton of CO ₂ emissions. Therefore, we may estimate 969.0 ton CO ₂ /year by the end of the Project. ^{***} 3 tons/year of food carbon since plants were planted recently ^{**} It was estimated that 1m ³ of wood sequesters 0.9 ton of CO ₂ . In the prototype gridball (C10) 3.5m ³ of wood (ast) have been installed, which result in 3.15 tons of CO ₂ . This indicator is in ongoing and it is being implemented as initially expected |



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IMPACTS

ECONOMIC

FIRST CROSS-LAMINATED TIMBER FACTORY IN GALICIA

xilonor ^



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IMPACTS

GOVERNANCE

EDUSI MURAMIÑAE



- IMPLEMENTATION OF URBAN DESIGN SOLUTIONS
- POETA AQUILINO IGLESIAS SOCIAL WELFARE BUILDING
 - PUBLIC GATEWAYS
 - SUBWAY WALKWAY
 - BICYCLE LANE
 - LUGO SPORT-LIFE PAVILION





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IMPACTS

GOVERNANCE



INTERMODAL STATION

HOTEL PLAZA DE SANTO DOMINGO

HOUSING IN LA TINERÍA

TABLICIA COMPANY WAREHOUSES

DEVELOPMENT PLANS S5I AND S14R



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**IMPACTS
SOCIAL**



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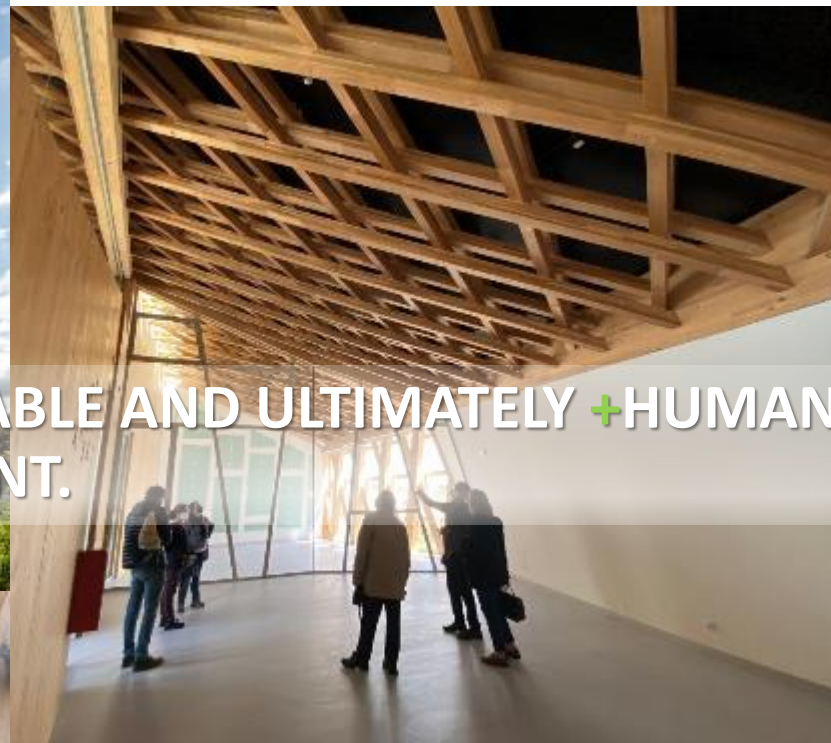
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TOWARDS A +SUSTAINABLE, +GREEN, +COMFORTABLE AND ULTIMATELY +HUMAN URBAN DEVELOPMENT.



**THANK YOU FOR YOUR ATTENTION
WAITING FOR YOU IN LUGO**

**ДЯКУЮ ЗА УВАГУ
ЧЕКАЄМО НА ВАС В ЛУГО**

www.lugobiodinamico.eu

"Lugo, el tesoro verde en el que invertir"

Time Lapse-Green Impulse

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LIFE LUGO + BIODINAMICO – KEY MESSAGE

Creating and Replicating Sustainable Cities for a +BIODYNAMIC Europe



UKRAINE GREEN RECOVERY CONFERENCE
КОНФЕРЕНЦІЯ «ЗЕЛЕНЕ ВІДНОВЛЕННЯ УКРАЇНИ»