



**LIFE LUGO +
Biodinámico**



LIFE LUGO + BIODINÁMICO

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

seeding sustainable cities
NZE Cities

life LUNGS

1º Encontro técnico do Projeto Europeu LIFE LUNGS

Adaptação e resiliência urbana: soluções e boas práticas para um clima em mudança.

29 de novembro de 2022
Centro de Interpretação de Monsanto (CIM), Lisboa

SUSANA PENEDO SOUTO
MUNICIPAL ARCHITECT, HEAD OF SERVICE

Impulsed by:



Financed by:



Project partners:





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European
Commission

ENVIRONMENT

LIFE Programme

Start date: January 2016
End date: December 2022

LIFE LUGO + BIODINÁMICO

PLANNING FOR A MULTI-ECOLOGICAL NEIGHBORHOOD AS A MODEL OF URBAN
RESILIENCE LIFE14 CCA/ES/000489

PROJECT'S IMPLEMENTORS:	BUDGET INFO:		
	Actions total amount	Diputación de Lugo	European Union
<u>Coordinating Beneficiary: City Council of Lugo</u>	1.768.900,00 €	526.220,00 €	701.340,00 €
Associated Beneficiary: University of Santiago de Compostela USC-Lugo	1.667.267,58 €		1.000.360,55 €
Associated Beneficiary: University Polytechnic of Madrid (UPM)	152.384,05 €		91.430,43 €
TOTAL AMOUNT	3.588.551,63 €	526.220,00 €	1.793.130,98 €

The project is part of the European Life program, one of the two grants obtained for Spain out of the 26 granted for the entire European Union, from among the more than 1,400 applications in the 2014 call, the first in urban environments, in the fight against Climate Change in Adaptation and Mitigation

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PROJECT LIFE LUGO+BIODINÁMICO

PLANNING FOR A MULTI-ECOLOGICAL NEIGHBORHOOD AS A MODEL OF URBAN RESILIENCE

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 fabrics 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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 <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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-THE BEST SEED:

The seed **has the essential elements of our local area**. Inside have the main lines of investigation of the **"Earth Campus"** from Lugo specialized in environmental, social and economic sustainability of **land use and from university polytechnic of Madrid**, directly applicable to our proposed:

- ADAPTATION OF BUILDING SYSTEMS USING LOCAL MATERIALS** with low energy incorporated and analysis other adaptive technologies.
- ENERGETIC CULTIVATION IN URBAN SURROUNDINGS** which will produce biofuels in form of wood chips.
- NATIVE DENSE SELVICULTURE IN AN URBAN ENVIRONMENT** (cherry, maple, ash and oak trees).
- INTEGRAL URBAN AGRICULTURE.**

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 <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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-THE BEST MOMENT:

Concurrently, we consider this moment as the optimal moment to put into practice our actions.

The **moment to encourage new economical initiatives** in the **context of environment protection and adaptation to climatic change**, in our emerging industrial framework, the moment to take advantage of the valuable knowledge provided by our University, promoting at the same time its development, the moment to raise and stimulate the environmental awareness of our citizens...

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 <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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-THE BEST GROWTH:

These **new seeds**, descending our rivers, and transported by the winds of change will hopefully spread to other regions along our continent, colonizing cities with a similar structure as ours. **REPLICABILITY AND TRANSFERIBILITY.**

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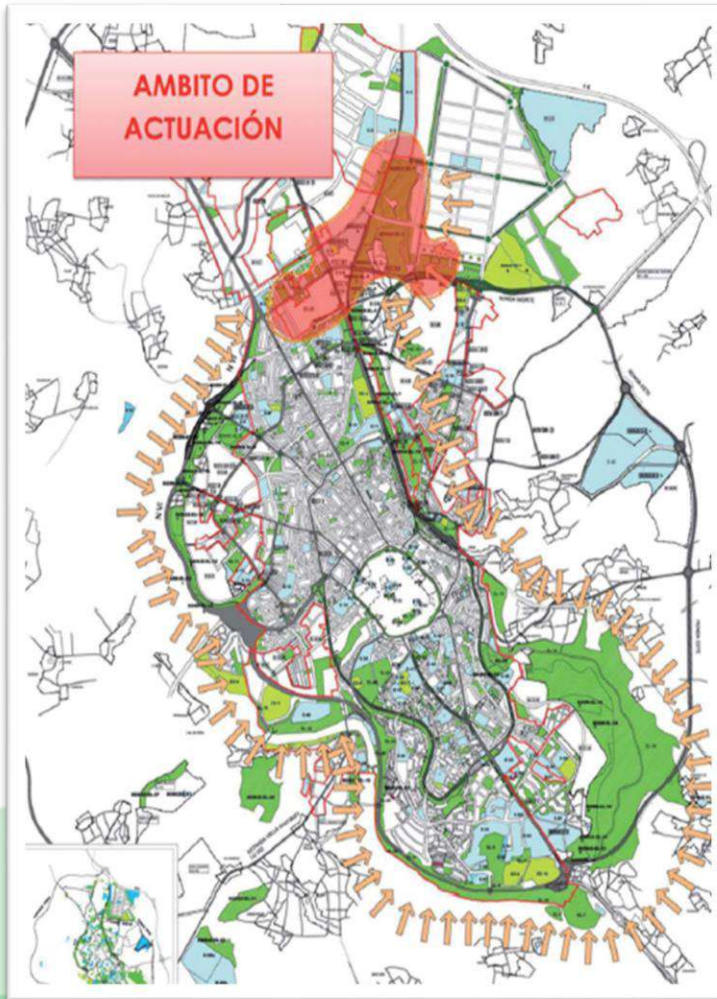


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THE BEST PLACE
-MUNICIPAL PROPERTY
-GREEN BELT-Urban Ecosystem.
-"WOOD VALLEY"



THE BEST MOMENT
-CLIMATE CHANGE
-SUSTAINABILITY
-"ROSETTA STONE"



THE BEST GROWTH
-STRATEGY
-SYNERGIES
-TRANSFERABILITY

-THE BEST PLACE:

As well, it was carefully chosen the best place to sow it, by the **confluence of many positive factors** for the best growth of the seed.

-First, it is a vast **green area, owned in exclusivity by the municipality**, where we can develop the latent properties of the seeds, mentioned above, and demonstration actions, because also has unique properties, is located **at the headwaters of the river greenbelt of the city**, and we are going to classify as ENIL (natural environment of local interest).

-Secondly is located **between two industrial parks**, and one of them recently implemented, where it could provide the seedbed for clean and healthy economic growth in the future. With this we have a **double effect:**

- **minimize negative climatic effects that usually cause these types of areas.**

- And this will permit to **put in contact these actions with industry**, intending to create the germ of a progressive synergy, like a small scale "Biodynamic Silicon Valley" (Wood-Valley) leading to a higher sustainability of industrial activities, promoting the creation of new companies for the bioeconomy sector and developing new technologies focused on adaptation to climate change. **LUGO TRANSFORMA**

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“Lugo, the green treasure to invest in”

Lugo Transforma, **is a pioneering strategy in Galicia at the municipal level**, with which 12 million euros will be mobilized through the constitution of a **public entrepreneurial** fund to attract new investments for the city, **attract companies and create sustainable employment**.

The Lugo Transforma Strategy will be articulated through the temporary entry of the City Council into the **capital of innovative business projects** through the venture capital fund modality. **They must be projects with high added value, both from small or medium-sized** companies as well as newly created ones, with growth potential and with high training in those **sectors that preferably generate social and environmental impact**.

The City Council is committed to this type of entrepreneurship funds, which are highly supported in the European Union because, on the one hand, it allows companies access to financing for initiatives that would have difficulty accessing resources from financial sources and, on the other, for the profitability generated and its contribution to economic growth, since the investee companies are the ones that most improve their solvency and ability to obtain personal financing, present greater rigor in their management, **invest more in R+ D+I and create more quality employment**.

["Lugo, el tesoro verde en el que invertir" - YouTube](#)

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DEMONSTRATIVE ACTIONS

ACTIONS PLANNED AT MULTI-SCALE
"DINAMIC ADAPTATION"

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DEPUTACIÓN DE LUGO

Project partners:
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DEMONSTRATIVE ACTIONS

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.



C9- URBAN AGRICULTURE



C11 GREEN IMPULSE BUILDING



C 2 Strategic Plan Biodinamic -22HA



C7- ENIL- 5HA



C8-ARBORETUM-5HA



C5-ENERGY CROPS- 1HA



C6-CHESTNUT GROVE "SOUTO" 3,6HA



C4-HARDWOODS- 4HA



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 Confort Climatic Areas (ZCCR)

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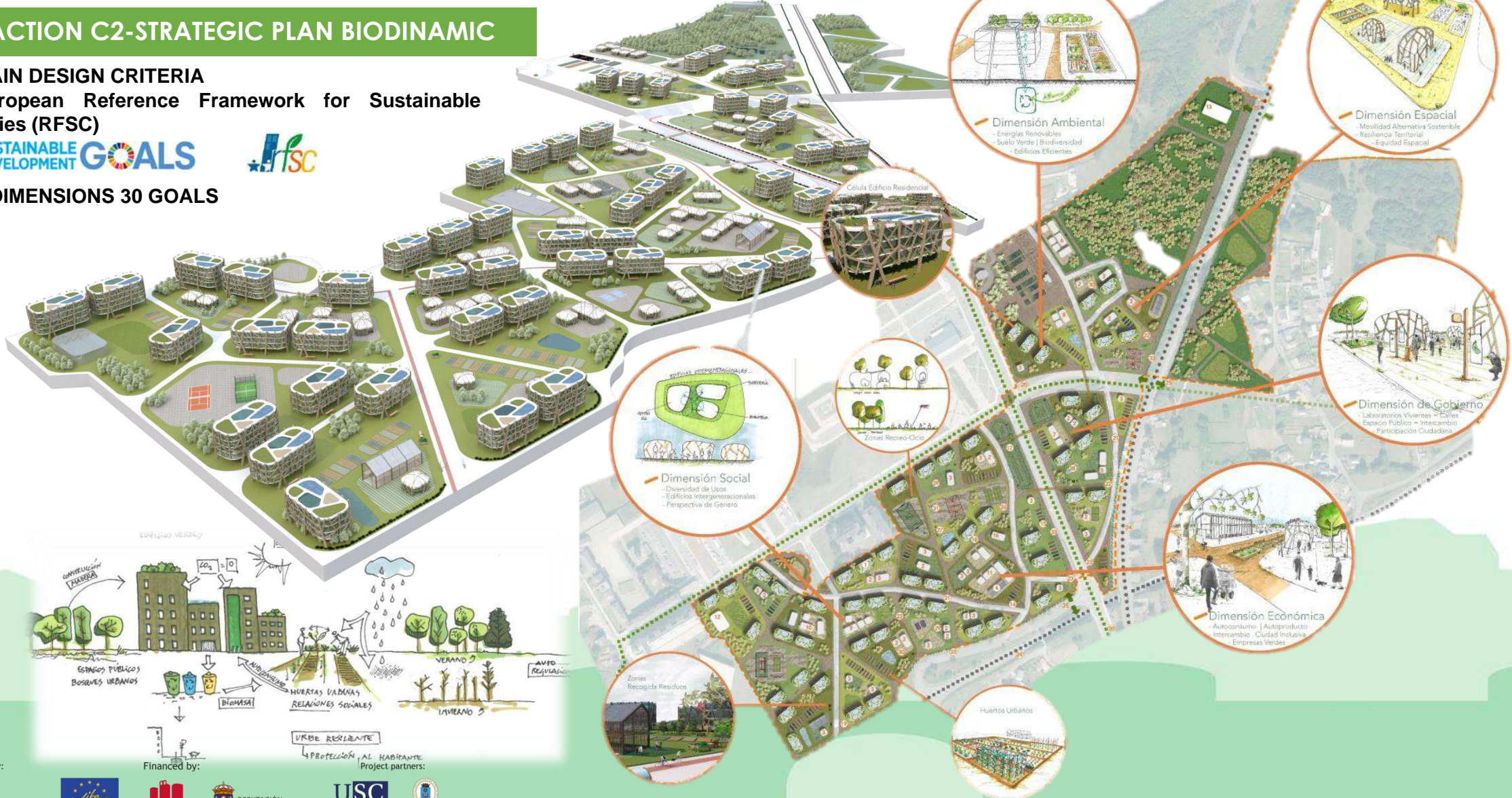
ACTION C2-STRATEGIC PLAN BIODINAMIC

MAIN DESIGN CRITERIA

European Reference Framework for Sustainable Cities (RFSC)



5 DIMENSIONS 30 GOALS





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ACTION C1-CATÁLOGO DE SOLUCIONES DE DISEÑO URBANO "GUD-LUGO"

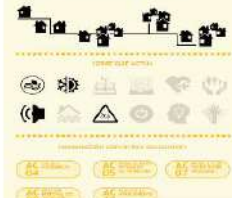
AC 01 JERARQUIZACIÓN VIARIA

Clasificación del viario basada en la función deseada de cada vía: paso, distribución o acceso.

Objetivo
Analizar el viario existente en el territorio urbano para determinar la jerarquía de las vías y clasificarlas en función de su función deseada: paso, distribución o acceso. Esto permitirá definir el tipo de intervención que se debe realizar en cada vía para mejorar su funcionalidad y garantizar la movilidad sostenible.

¿Por qué?
La jerarquía viaria es un elemento clave para garantizar la movilidad sostenible y mejorar la calidad de vida en el territorio urbano. Una correcta jerarquía viaria permite definir el tipo de intervención que se debe realizar en cada vía para mejorar su funcionalidad y garantizar la movilidad sostenible.

¿Cómo?
Para la jerarquización viaria se debe analizar el viario existente en el territorio urbano y clasificarlo en función de su función deseada: paso, distribución o acceso. Esto permitirá definir el tipo de intervención que se debe realizar en cada vía para mejorar su funcionalidad y garantizar la movilidad sostenible.



Medio EMPESADA
Vías de paso para peatones



FIGURA DE GOBERNANCIA, RELACIONES ENTRE MOVILIDADES Y RED DE ESPACIOS PÚBLICOS



51 FICHAS



LIFE Lugo + Biodinámico CATÁLOGO DE SOLUCIONES DE DISEÑO URBANO "GUD-LUGO"

Impulsado por el financiado por:

Concello de Lugo, Deputación de Lugo, Concello de Lugo

Menos de 10 minutos para encontrar la solución que necesitas. Consulta el catálogo de soluciones de diseño urbano "GUD-LUGO".

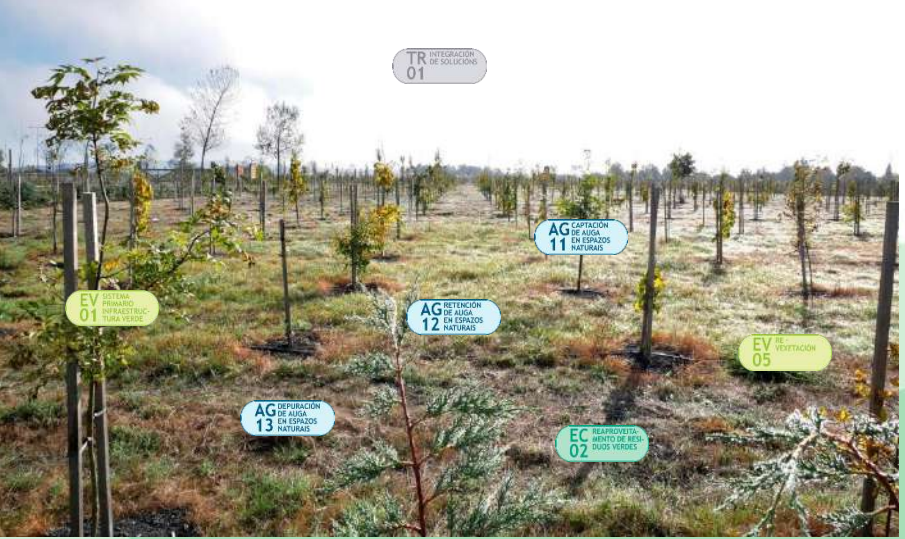
AG 01, AG 02, AG 03, AG 04, AG 05, AG 06, AG 07, AG 08, AG 09, AG 10, AG 11, AG 12

AC 01, AC 02, AC 03, AC 04, AC 05, AC 06, AC 07, AC 08, AC 09, AC 10, AC 11, AC 12

EV 01, EV 02, EV 03, EV 04, EV 05, EV 06, EV 07, EV 08, EV 09, EV 10, EV 11, EV 12

EC 01, EC 02, EC 03, EC 04, EC 05, EC 06, EC 07, EC 08, EC 09, EC 10, EC 11, EC 12

	A	B	C	D	Resultado
Autoflorescencia Hídrica (%)					
AG01					0%
AG02					0%
AG03					0%
AG04					0%
AG05					0%
AG06					0%
AG07					0%
AG08					0%
AG09					0%
AG10					0%
AG11					0%
AG12					0%
Total Autoflorescencia Hídrica					
					0%
Reducción de consumo energético (MWh/hab)					
AG01					0
AG02					0
AG03					0
AG04					0
AG05					0
AG06					0
AG07					0
AG08					0
AG09					0
AG10					0
AG11					0
AG12					0
Total MWh/hab reducción					
					0
Superficie verde por habitante (m²/hab)					
EV01					0
EV02					0
EV03					0
EV04					0
EV05					0
EV06					0
EV07					0
EV08					0
EV09					0
EV10					0
EV11					0
EV12					0
Total m² de superficie verde por habitante					
					0



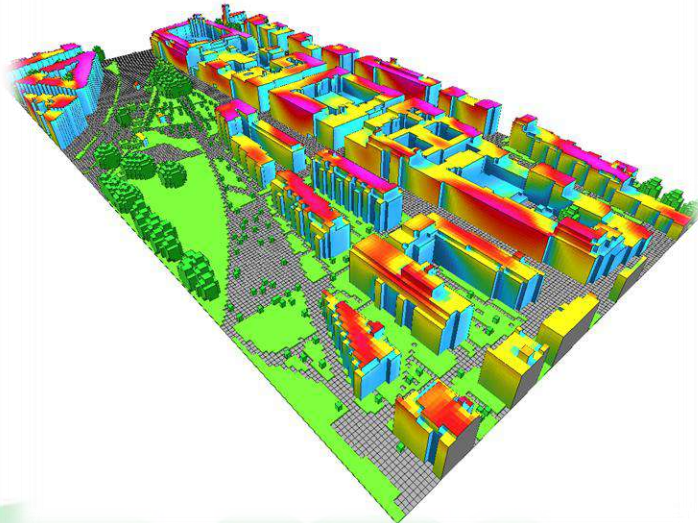


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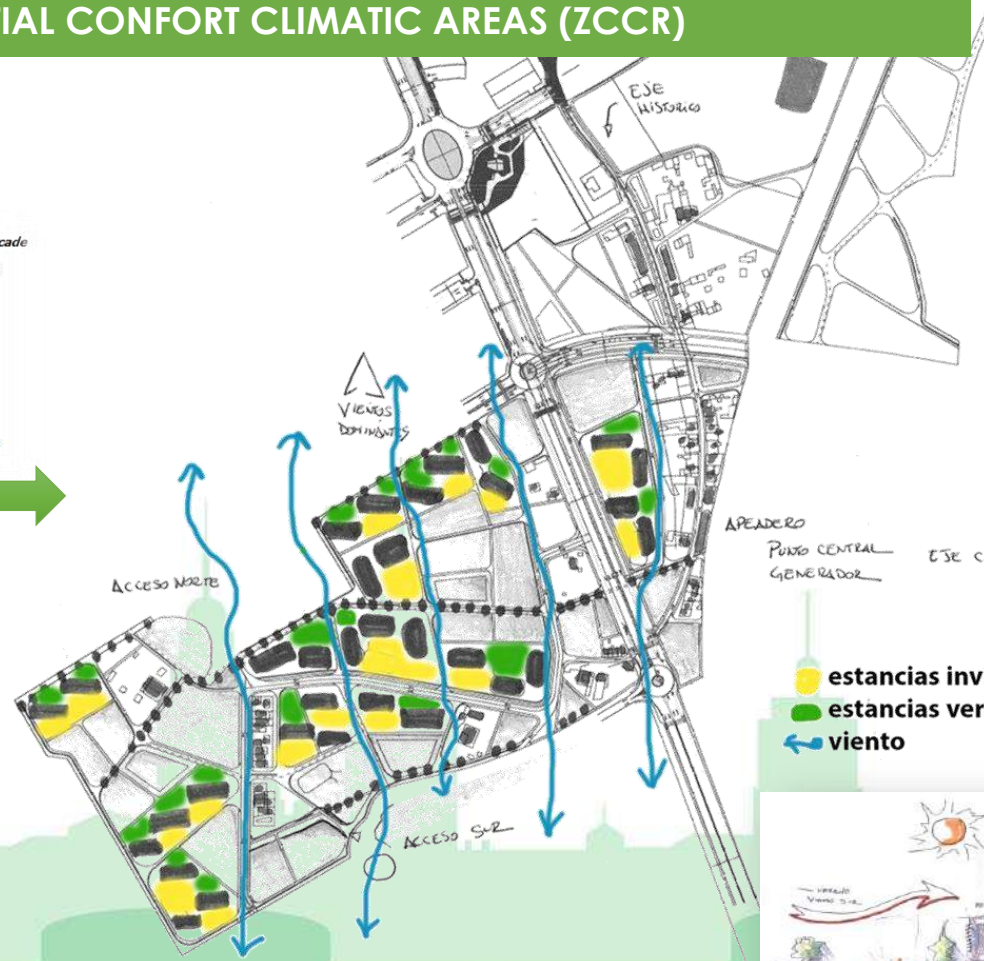
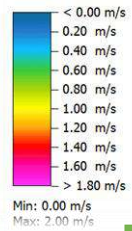


ACTION C3- DETAILED PLANNING OF RESIDENTIAL CONFORT CLIMATIC AREAS (ZCCR)

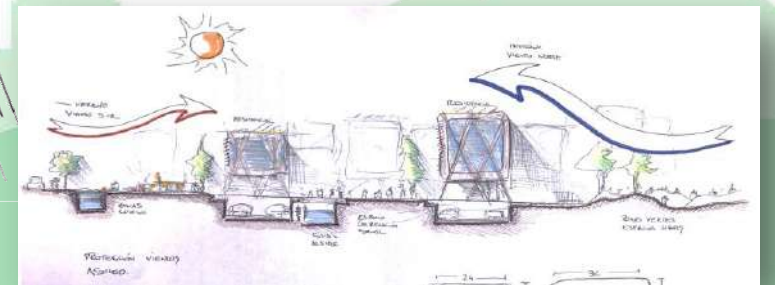
Urban planning schemes
Climate behavior and comfort
Simulation of urban metabolism



uvw in front of facade



- estancias invierno
- estancias verano
- viento



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C4-HARDWOODS- 4HA



Selvicultura frondosas



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Prunus avium L.

Galicia
Montañas-Mesetas
Interiores



Quercus robur L.

Rodal Selecto ES01
Galicia



Fraxinus excelsior L.

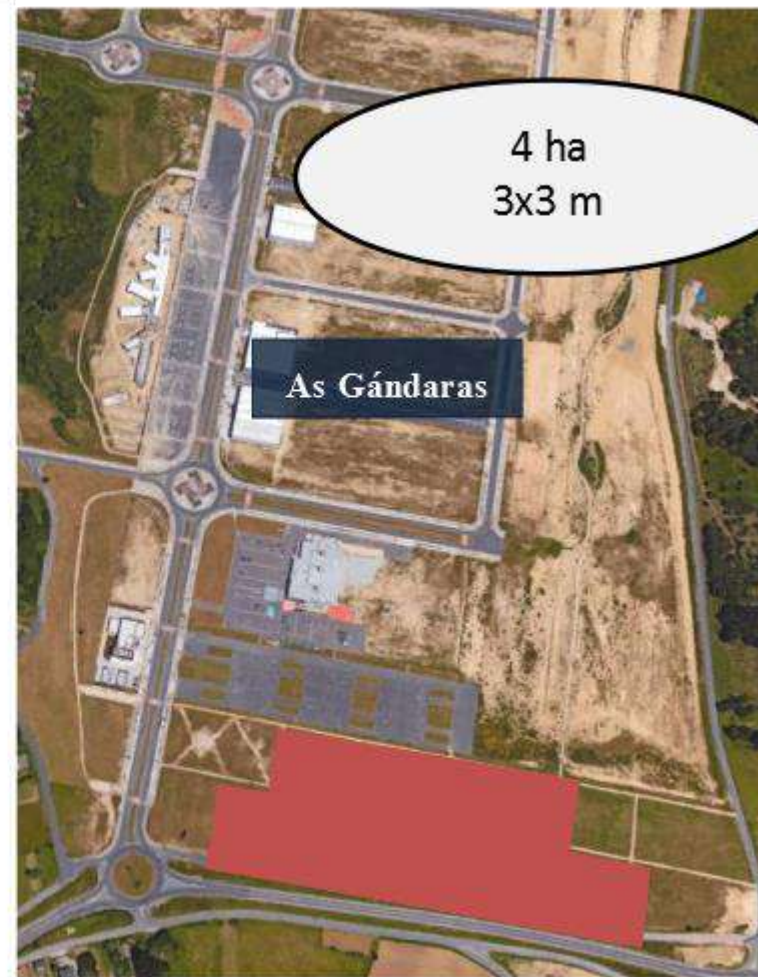
Selección árbores Plus
Xunta Galicia



Acer pseudoplatanus L.

Montañas
Mesetas Interiores

Selvicultura frondosas



4 ha
3x3 m

As Gándaras

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CÂMARA MUNICIPAL

1º Encontro Técnico do Projeto Europeu LIFE LUNGS
29 de novembro de 2022 | Centro de Interpretação de Alcazarria (CIM), Lisboa
"Adaptação e resiliência urbanas: soluções e boas práticas para um clima em mudança"



Selvicultura frondosas

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"Adaptação e resiliência urbanas: soluções e boas práticas para um clima em mudança"

C5-ENERGY CROPS- 1HA



Selvicultura frondosas

Cultivos Energéticos

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Total: 1 ha

Miscanthus x giganteus (0,5 ha)

Clon: PICOPLANT
600 kg de rizomas



Selvicultura frondosas

Cultivos Energéticos



LIFE Lugo + Biodinámico



Total: 1 ha

Miscanthus x giganteus (0,5 ha)

Populus sp. (0,5 ha)

Estaquillas 2 Clones:
Populus trichocarpa (TRICHOBEL)
RASPALJE (interamericano)
3.000 estaquillas / clon



Silvicultura frondosas

Cultivos Energéticos

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9.000 pies



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Project partners:



UNIVERSIDADE DE SANTIAGO DE COMPOSTELA



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**C6-CHESTNUT GROVE
"SOUTO" 3,6HA**



Selvicultura frondosas Cultivos Energéticos Souto

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Total: 3,6 ha
286 castaños
(10 x 10 m)

Variedades

Parede / Blanca

Garrida

Ventura

Negral

Patrones híbridos

7521 P042 C004

2671 P011 C053

Certificación mediante técnicas
moleculares
(Short Sequence Repeats-SSRs)



Selvicultura frondosas Cultivos Energéticos Souto



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"Adaptação e resiliência urbana: soluções e boas práticas para um clima em mudança"



28 may. 2018



28 may. 2018



28 may. 2018

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C7- RIPARIAN FOREST-ENIL- 5HA



Selvicultura frondosas Cultivos Energéticos Souto Bosque de Ribera



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Hábitat 9230:
Robledal galaico-portugués de *Quercus robur* L. y *Quercus pyrenaica* Will.



Hábitat Prioritario 91E0*
Bosques aluviales de *Alnus glutinosa* y *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) (Aliseda de *Salix atrocinerea*)



Hábitat 6510:
Prados pobres de siega de baja altitud.



Espacio Natural de Interés Local (E.N.I.L.)
Decreto 124/2005



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Total: 5 ha

**R.D 139/2011: especies silvestres en
régimen de protección especial**

✓ Inventario Faunístico: 61 spp. (36 fam.)

2 spp.

7 spp.

4 spp.

15 spp.

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Sapillo pintojo
(*Discoglossus galganoi*)



Lagarto verdinegro
(*Lacerta schreiberi*)



Culebra lisa
(*Coronella austriaca*)



Murciélago hortelano
(*Eptesicus serotinus*)



Murciélago rabudo
(*Tadarida teniotis*)

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Total: 5 ha

Especie. Exótica. Invasora

✓ **Inventario Faunístico: 61 spp. (36 fam.)**

✓ **Inventario Florístico: 130 spp. (40 fam.)**

- Reconocimiento «visu»: sp conocidas

- Herborización de sp. desconocidas/duda

identificación laboratorio

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Lilar
(*Buddleja davidii* Franch.)



Enredadera
(*Fallopia baldschuanica* (Regel) J.Holub.)



Falsa acacia
(*Robinia pseudoacacia* L.)



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**Espacio Natural de
Interés Local
(E.N.I.L.)**

Decreto 124/2005

Impulsed by:



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C8-ARBORETUM-5HA



Superfície: 5 ha

**9 Bosquetes
(altitud)**

196 arbustos/ 34 sp
286 árboles /35 sp

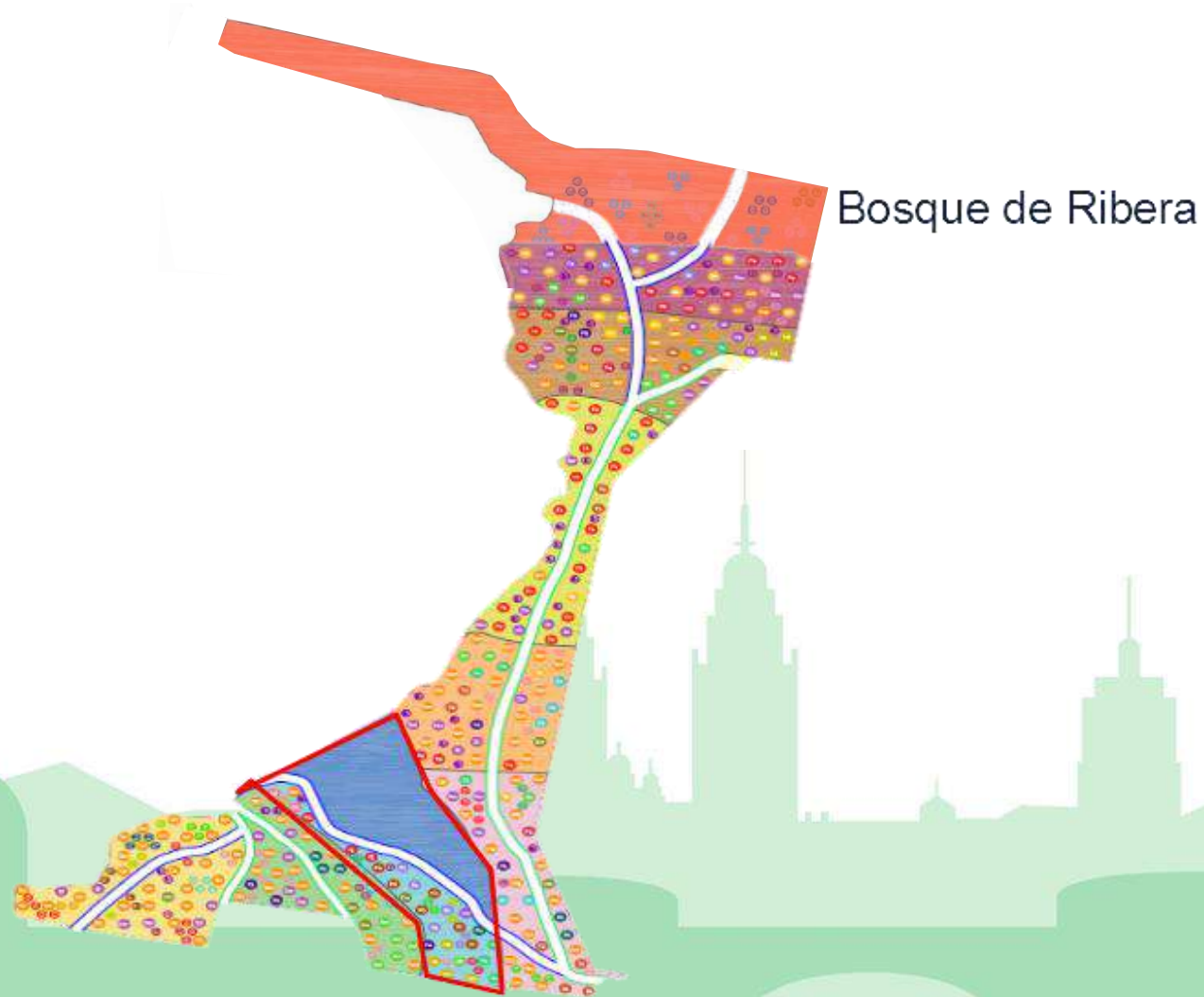
Selvicultura frondosas Cultivos Energéticos Souto Bosque de Ribera Arboretum



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"Adaptação • resiliência urbana • saúde • boas práticas para um clima em mudança"



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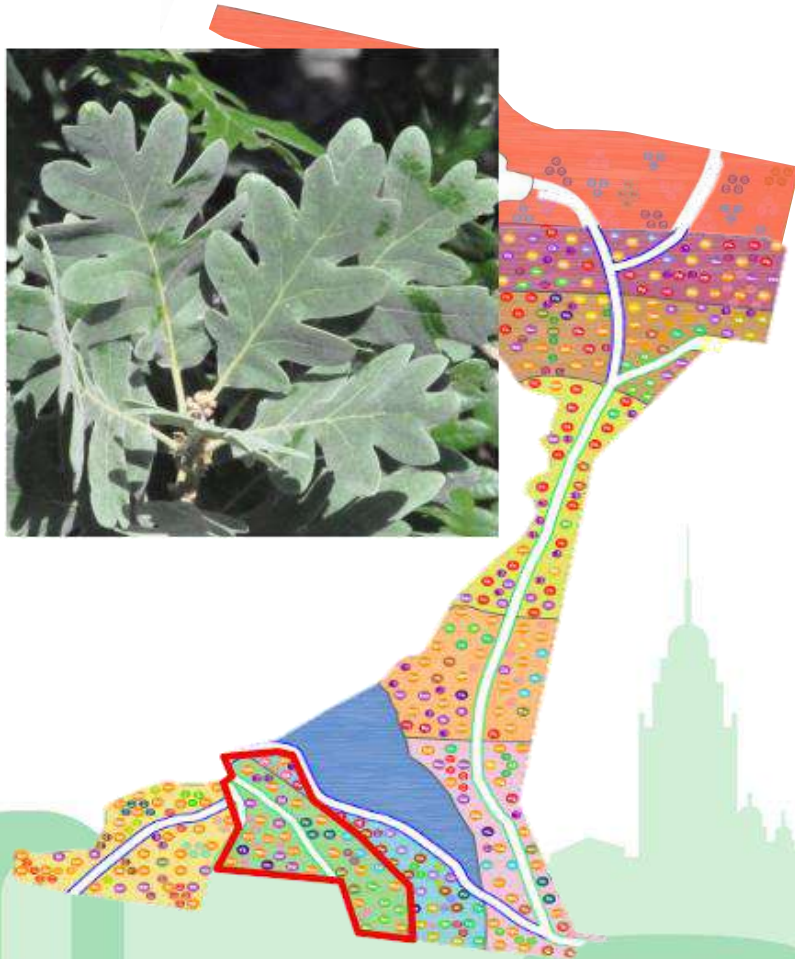
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Bosque de Ribera

Rebollar

Quercus pyrenaica Willd. (rebollo)



Impulsed by:



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Project partners:



USC

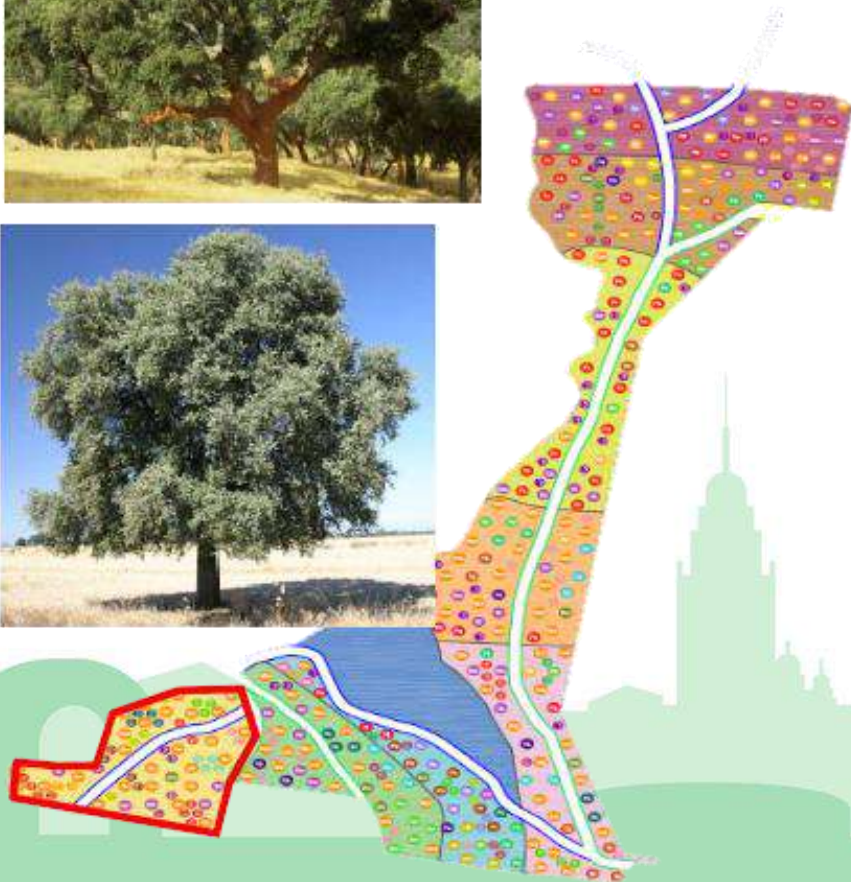


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Bosque de Ribera

Rebollar

Bosque Mediterráneo

Quercus suber L.

Quercus ilex subsp. ballota (Desf.) Samp.

Impulsed by:

Financed by:

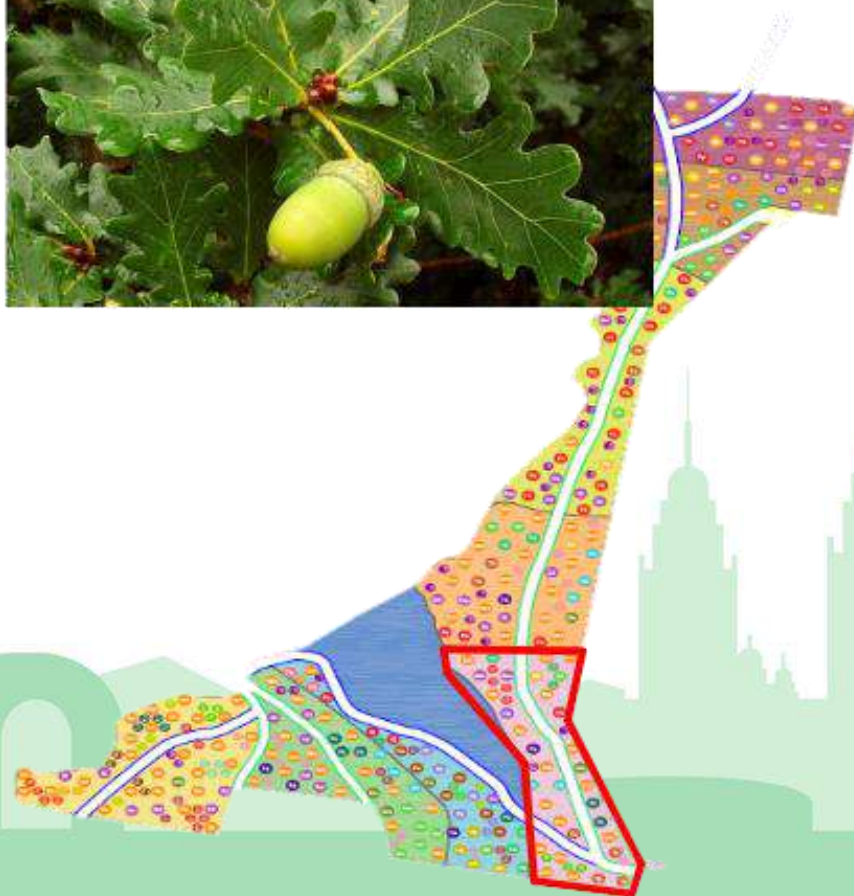
Project partners:



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Bosque de Ribera

Rebollar

Bosque Mediterráneo

Robledal de Roble común

Quercus robur L.

Impulsed by:



Financed by:



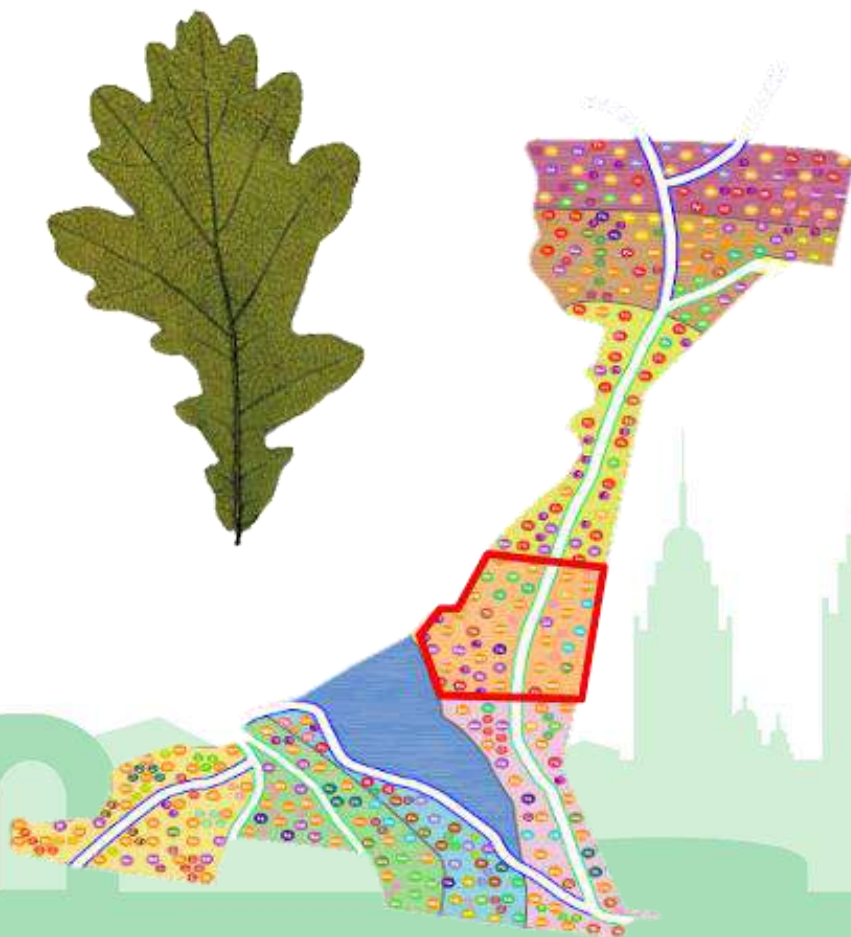
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Biodinámico



Bosque de Ribera

Rebollar

Bosque Mediterráneo

Robledal de Roble común

Robledal de Roble albar

Quercus petraea (Matt.) Liebl.

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Bosque de Ribera

Rebollar

Bosque Mediterráneo

Robledal de Roble común

Robledal de Roble albar

Hayedo

Fagus sylvatica L.

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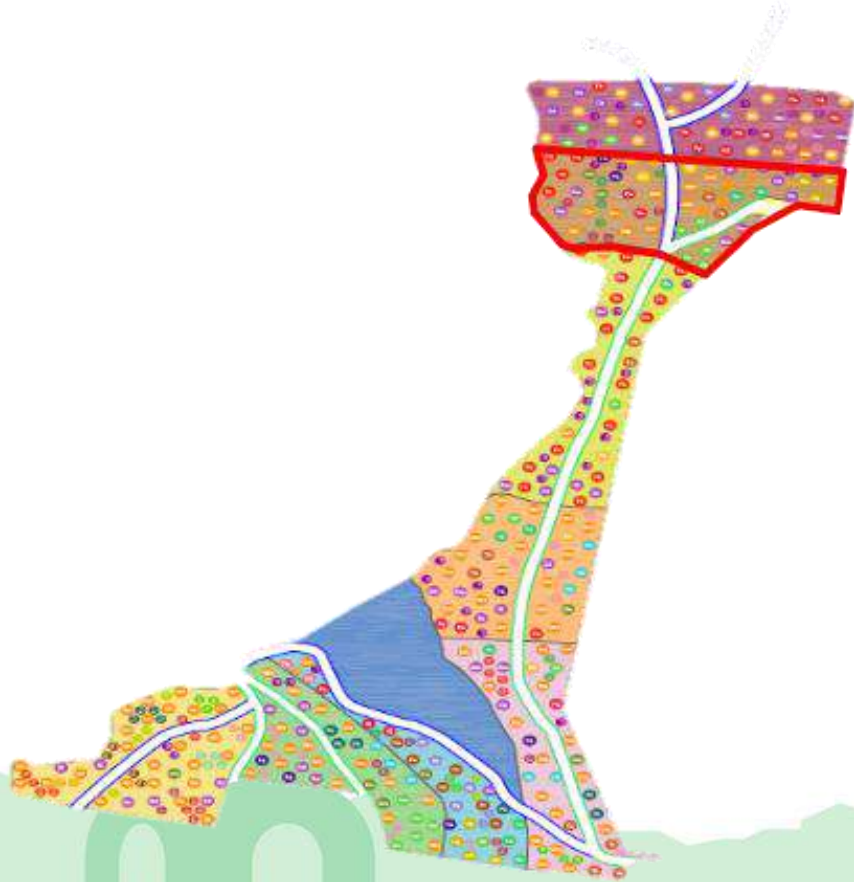
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Bosque de Ribera

Rebollar

Bosque Mediterráneo

Robledal de Roble común

Robledal de Roble albar

Hayedo

Bosque mixto



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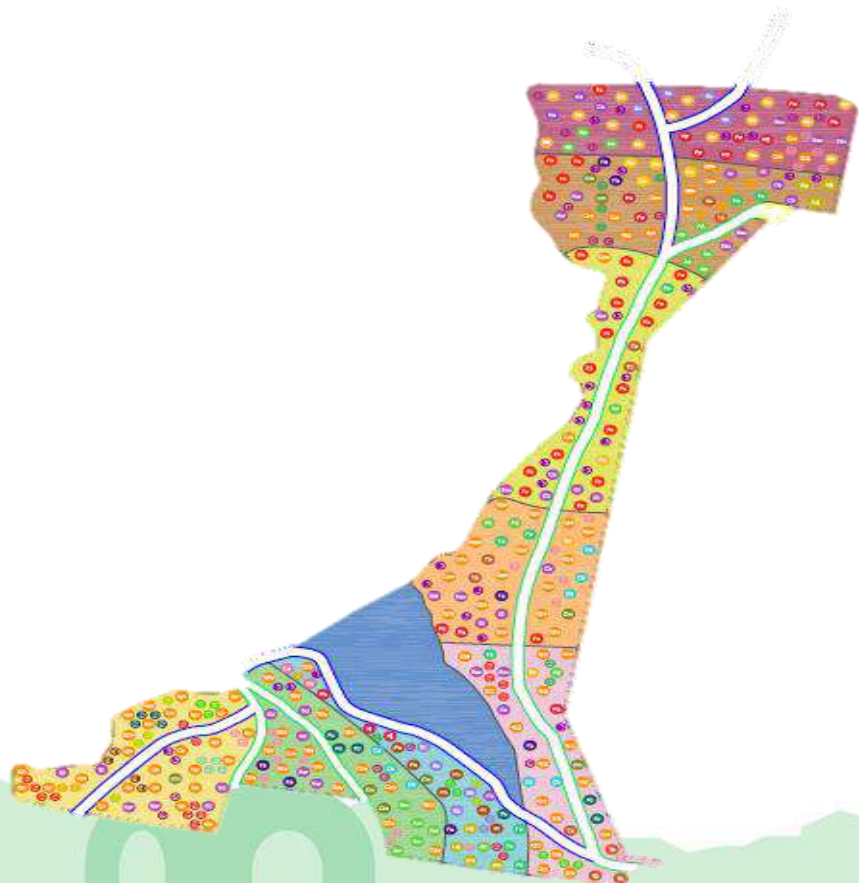
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Bosque de Ribera

Rebollar

Bosque Mediterráneo

Robledal de Roble común

Robledal de Roble albar

Hayedo

Bosque mixto

Abedular



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- Bosque de Ribera
- Rebollar
- Bosque Mediterráneo
- Robledal de Roble común
- Robledal de Roble albar
- Hayedo
- Bosque mixto
- Abedular
- Matorral (Estudio aves-ENIL)
26 spp.



R.D 139/2011: especies silvestres en régimen de protección especial

15 (spp.)

Impulsed by:



Financed by:



Project partners:

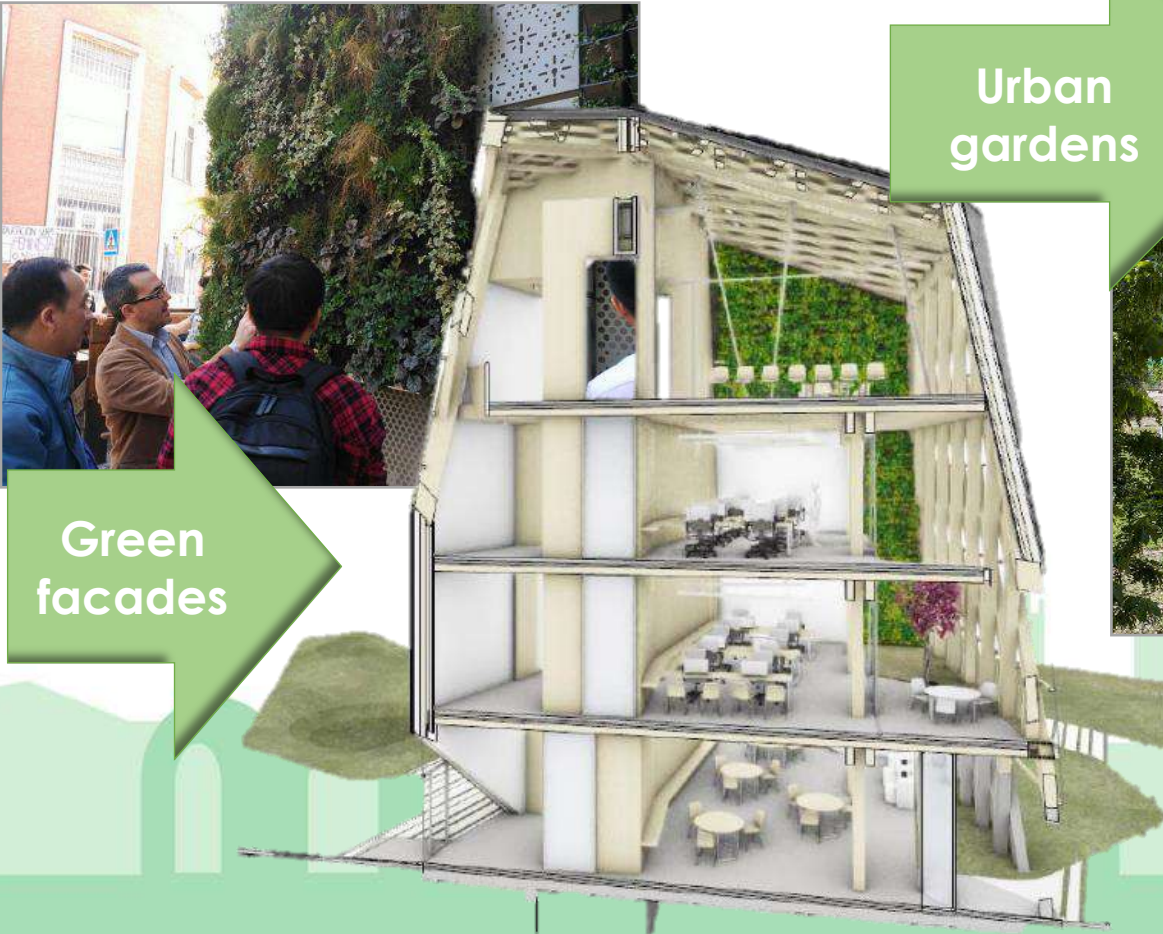




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ACTION C9: URBAN AGRICULTURE



**Green
facades**

**Urban
gardens**



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**C10- ADAPTATION OF CONSTRUCTION SYSTEMS WITH BUILT-IN LOW ENERGY NATIVE MATERIALS
AND ANALYSIS OF OTHER ADAPTIVE TECHNOLOGIES**

VUELO 15 M
LUZ 4,5 M



Prototipo Cubierta *Gridshell* para Almacén de Madera en el Campus de Lugo.

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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



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 Concello de Lugo DEPUTACIÓN DE LUGO

Project partners:
 USC POLITÉCNICA



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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

LOW ENERGY DEMAND

High thermal insulation
Orientation
Thermal inertia
Controlled ventilation

LOW ENERGY CONSUMPTION

Biomass
Aerotherm
Geothermal
Thermal solar

ENERGY GENERATION

Photovoltaic E.
Wind turbine
Mini hydroelectric plants

ZERO BALANCE

It is produced the same energy amount that is consumed annually



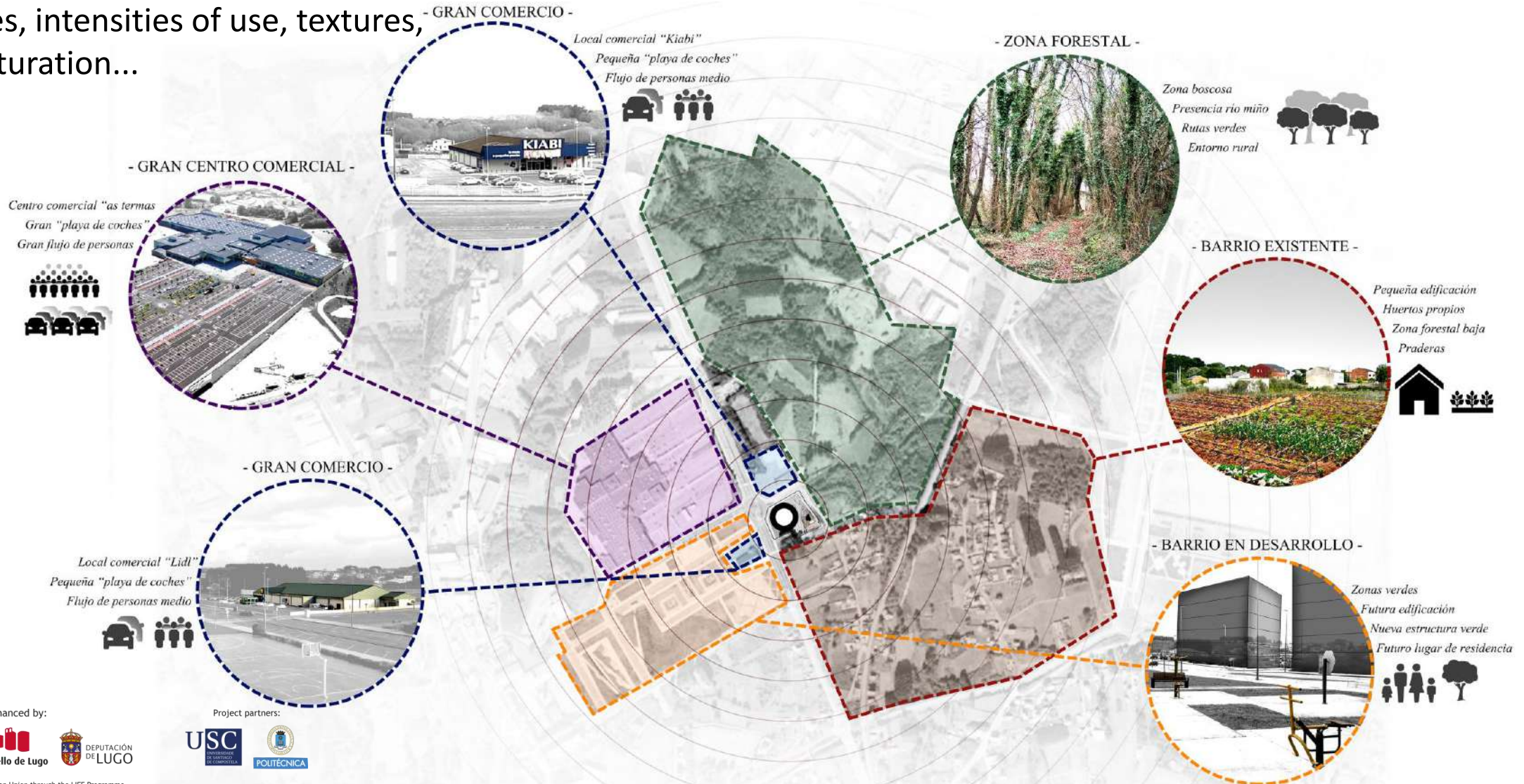
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**Edificio demostrativo
IMPULSO VERDE**



The site as a collision area of landscapes:
different scales, intensities of use, textures,
degrees of naturation...



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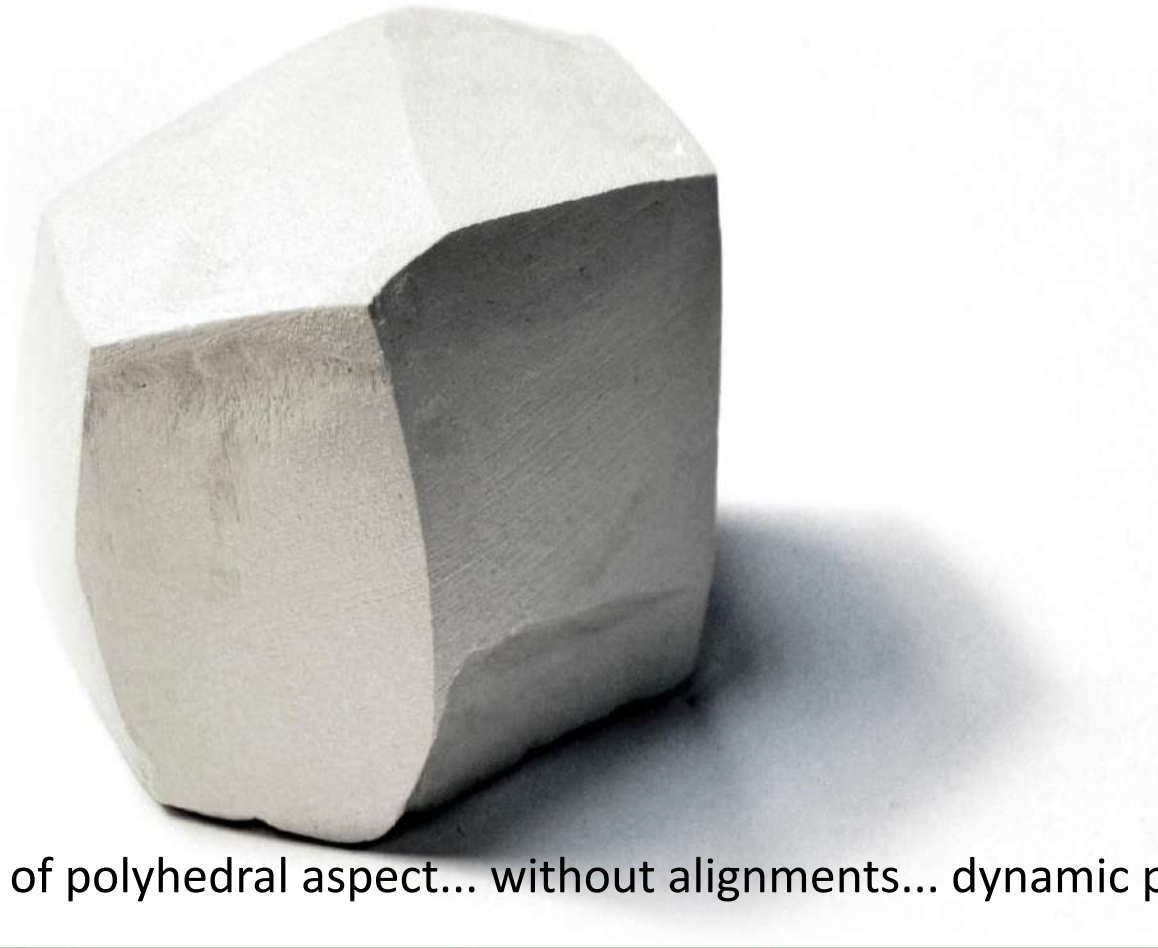
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IMPULSO VERDE



Formal concept

Singular geometry of polyhedral aspect... without alignments... dynamic perception.

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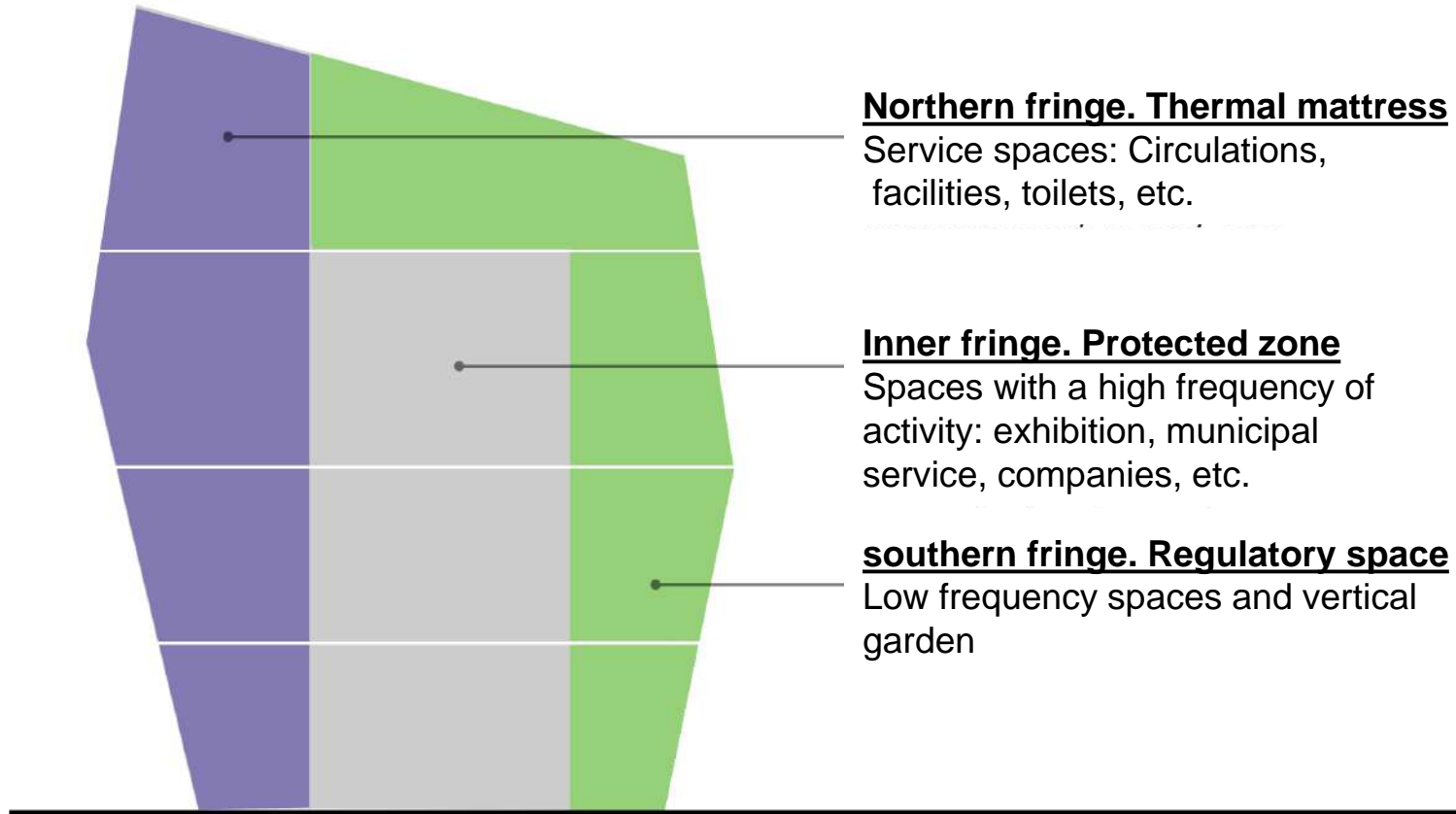




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**Edificio demostrativo
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Programmatic organization concept by bands
Maximum energy savings. Protection of activity spaces

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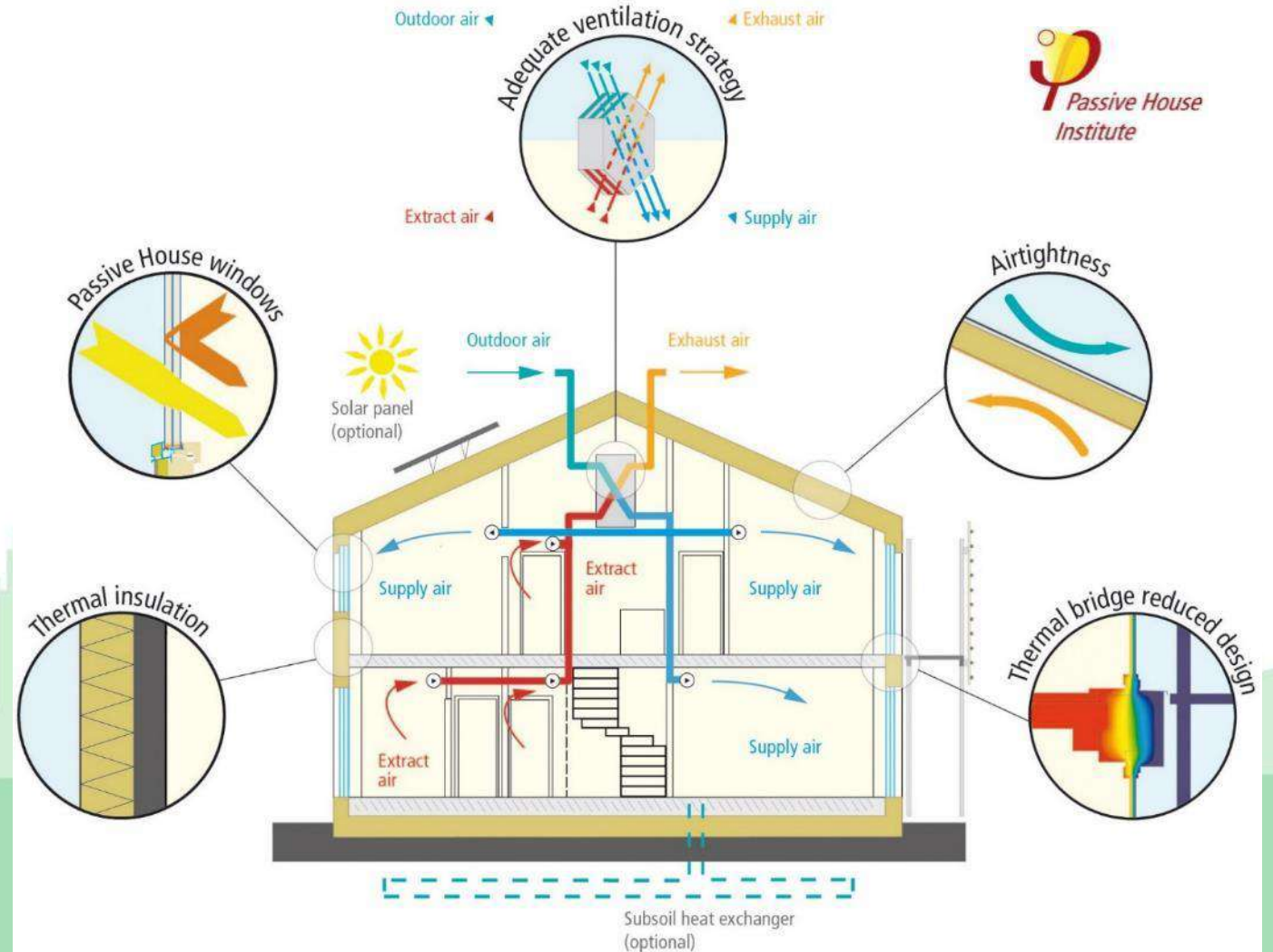


IMPULSO VERDE



5 MAIN PRINCIPLES

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



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IMPULSO VERDE



ESTRATEGIAS PASIVAS TRADICIONALES

Orientation

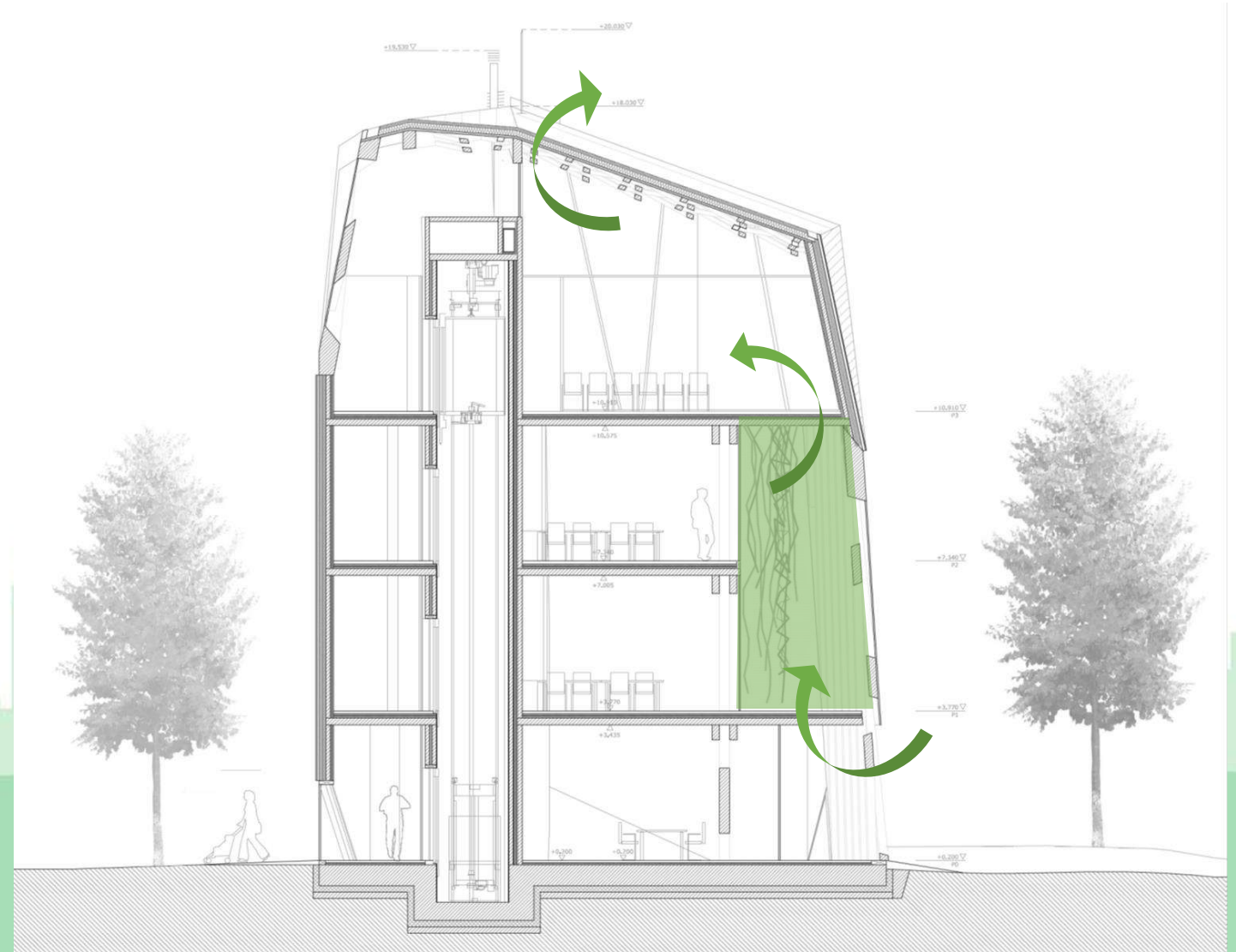
Compactness

Solar protection

Natural ventilation

Thermal inertia

Unique passive concepts



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IMPULSO VERDE**



Ground floor: reception and exposition

Section



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Edificio demostrativo IMPULSO VERDE



First Floor. Municipal offices.



Infographic of the project. Office space - gallery area





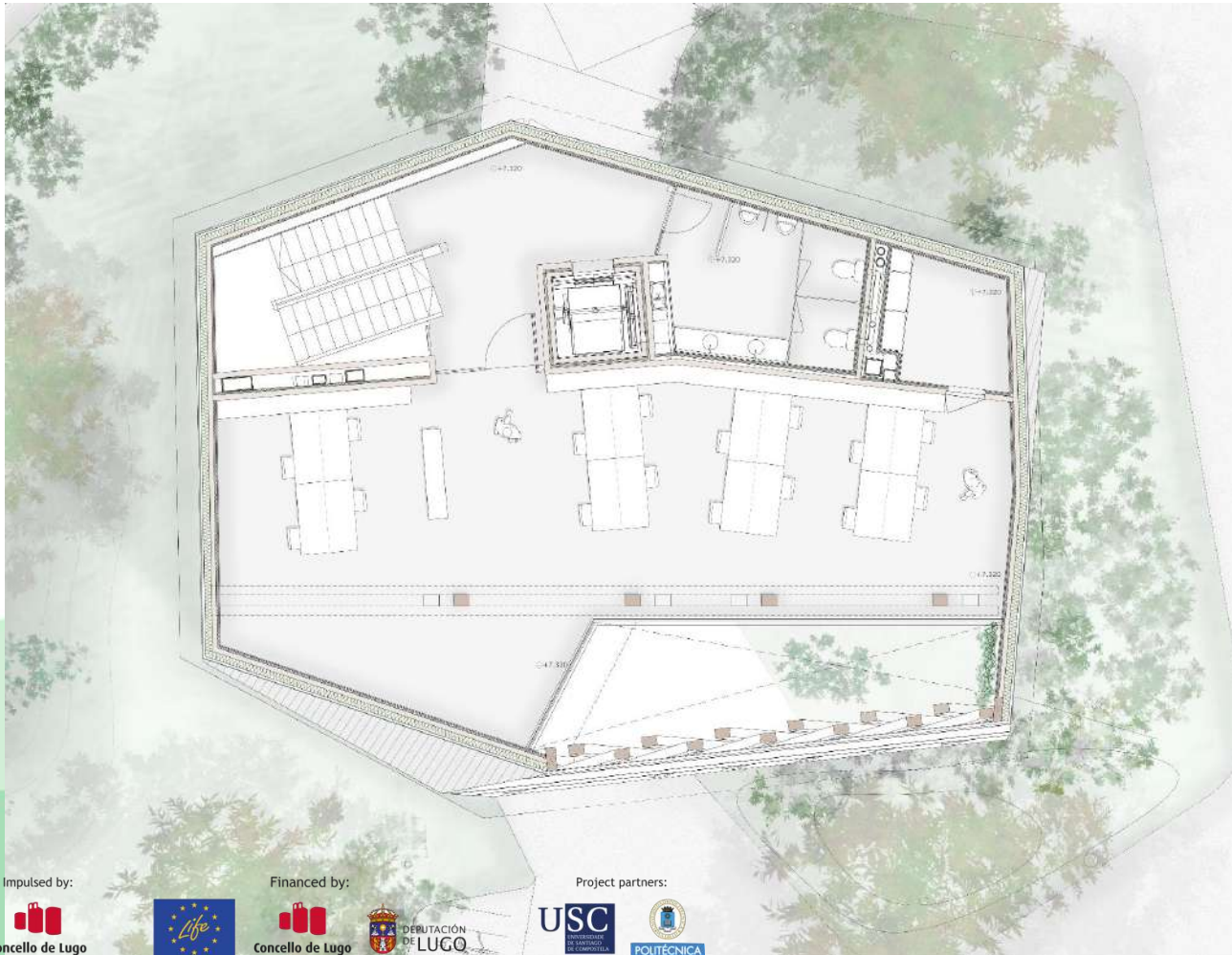
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Pl. Second. Coworking and start-ups



Section



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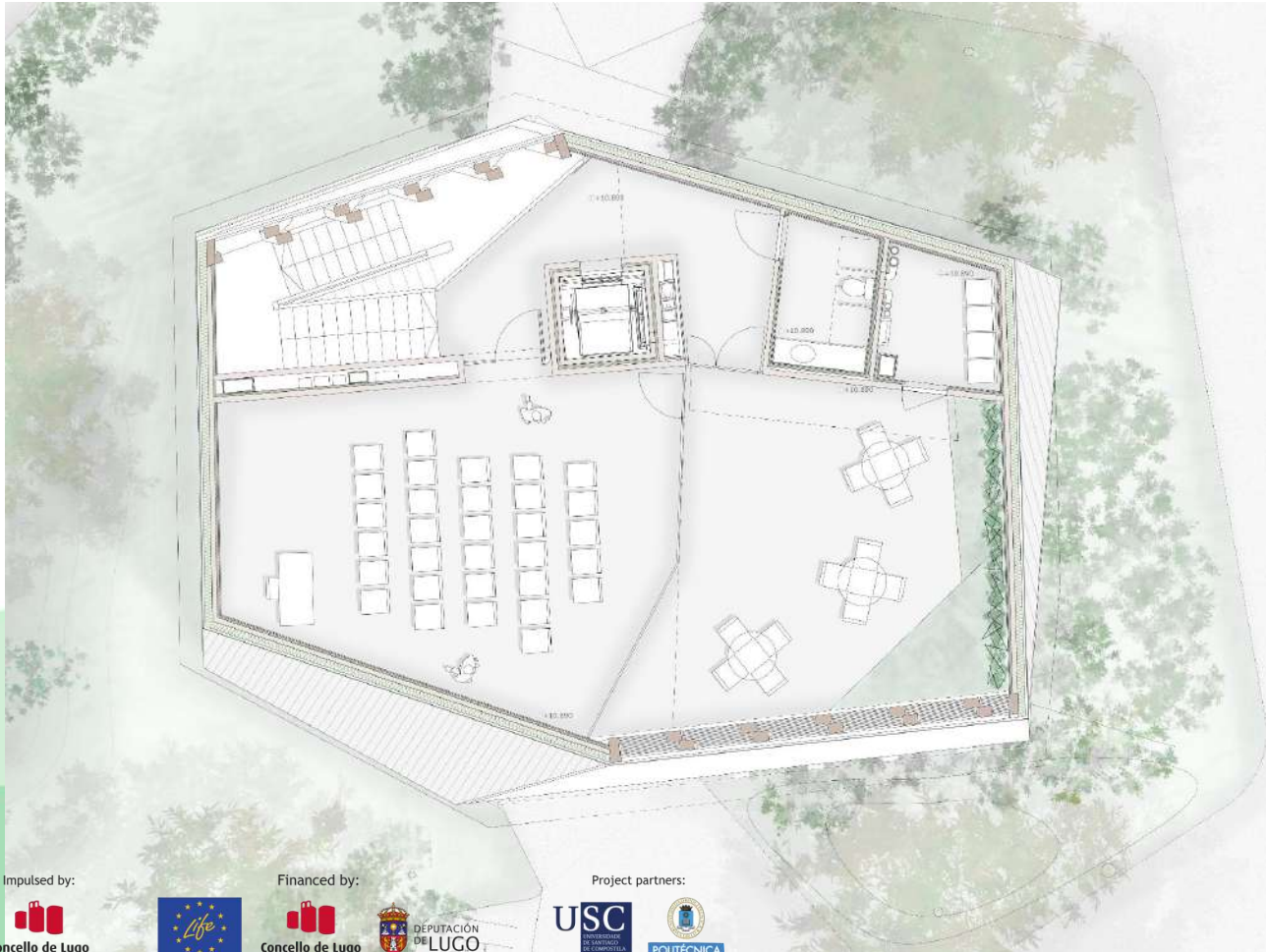
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Third floor. Training room and rest area



Project infographics.
Third floor. Classroom and rest area



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THERMO CONDITIONING AND COMFORT

MONITORING



Photovoltaic E. Production



Energy expenditure
measurement by circuits



Indoor temperature



Indoor relative humidity



CO₂ air extraction probe



Natural interior lighting



Outdoor station (Tª / 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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Rest area. 3rd floor

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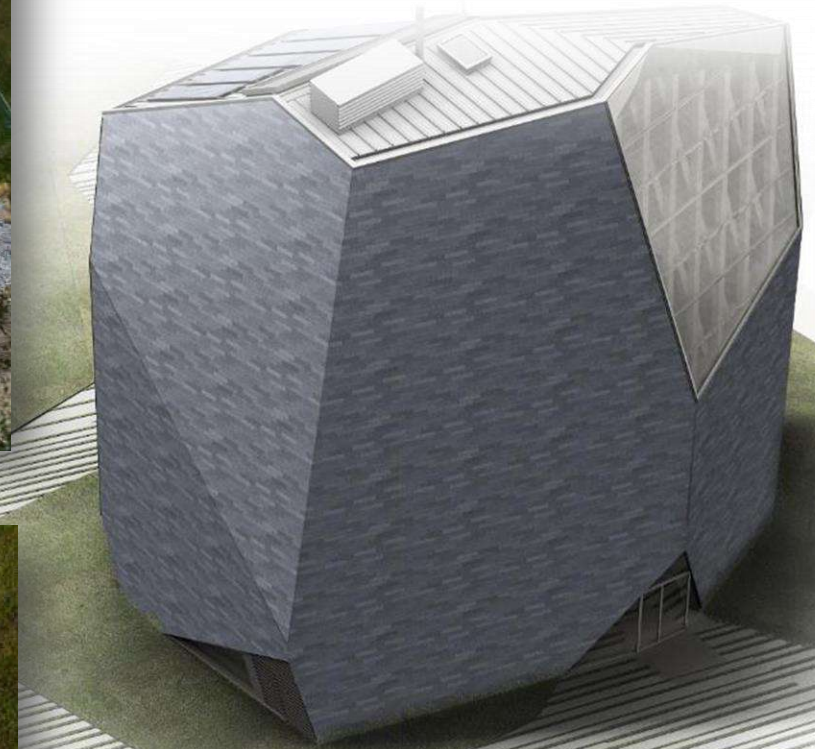
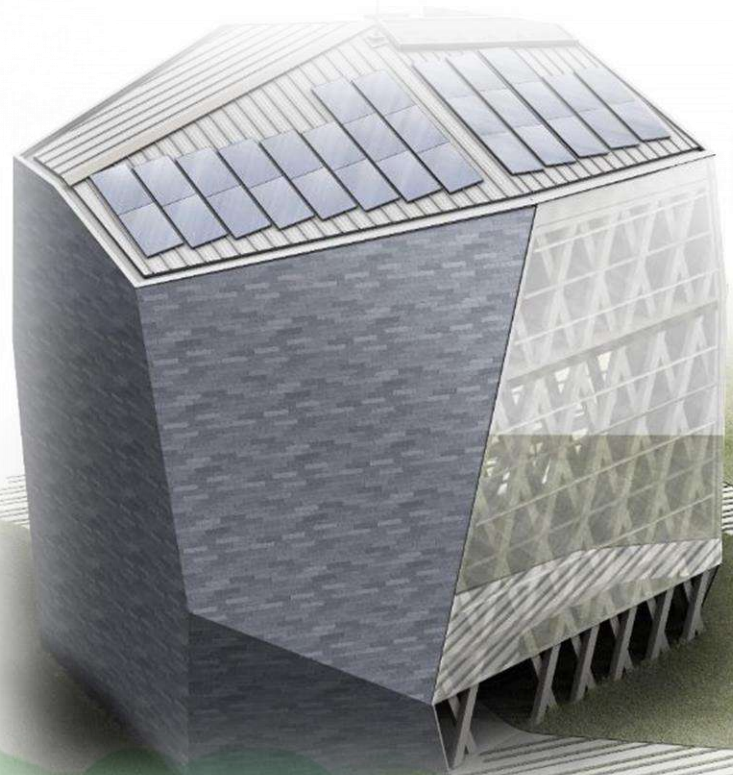


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Southwest view

Northeast view





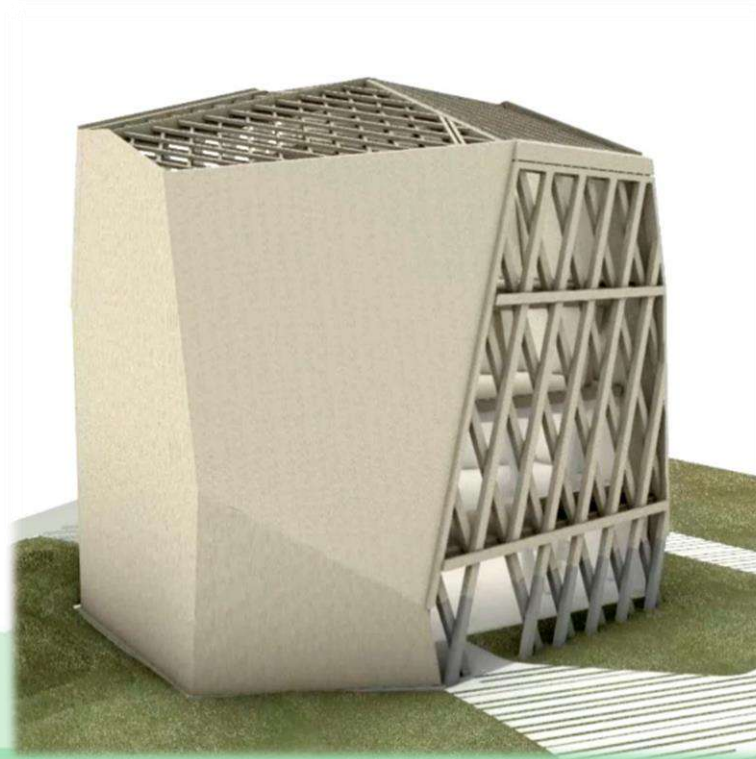
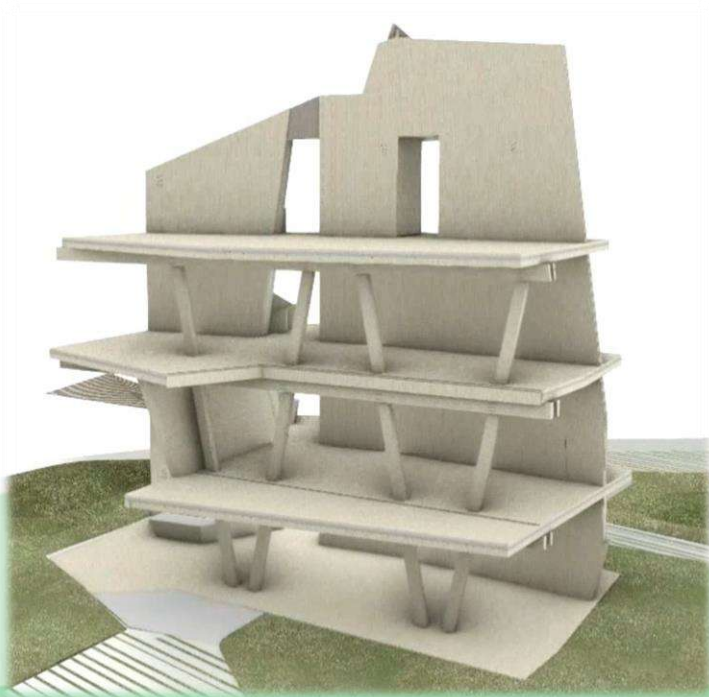
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Structural system



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Construction detail. Walls and floor.

Alto aislamiento térmico

Transmitancia cerramiento tipo **$U=0,14 \text{ W/m}^2\text{K}$**

6 cm aislamiento en el trasdosado interior }
8+8 cm aislamiento por el exterior } 22 cm

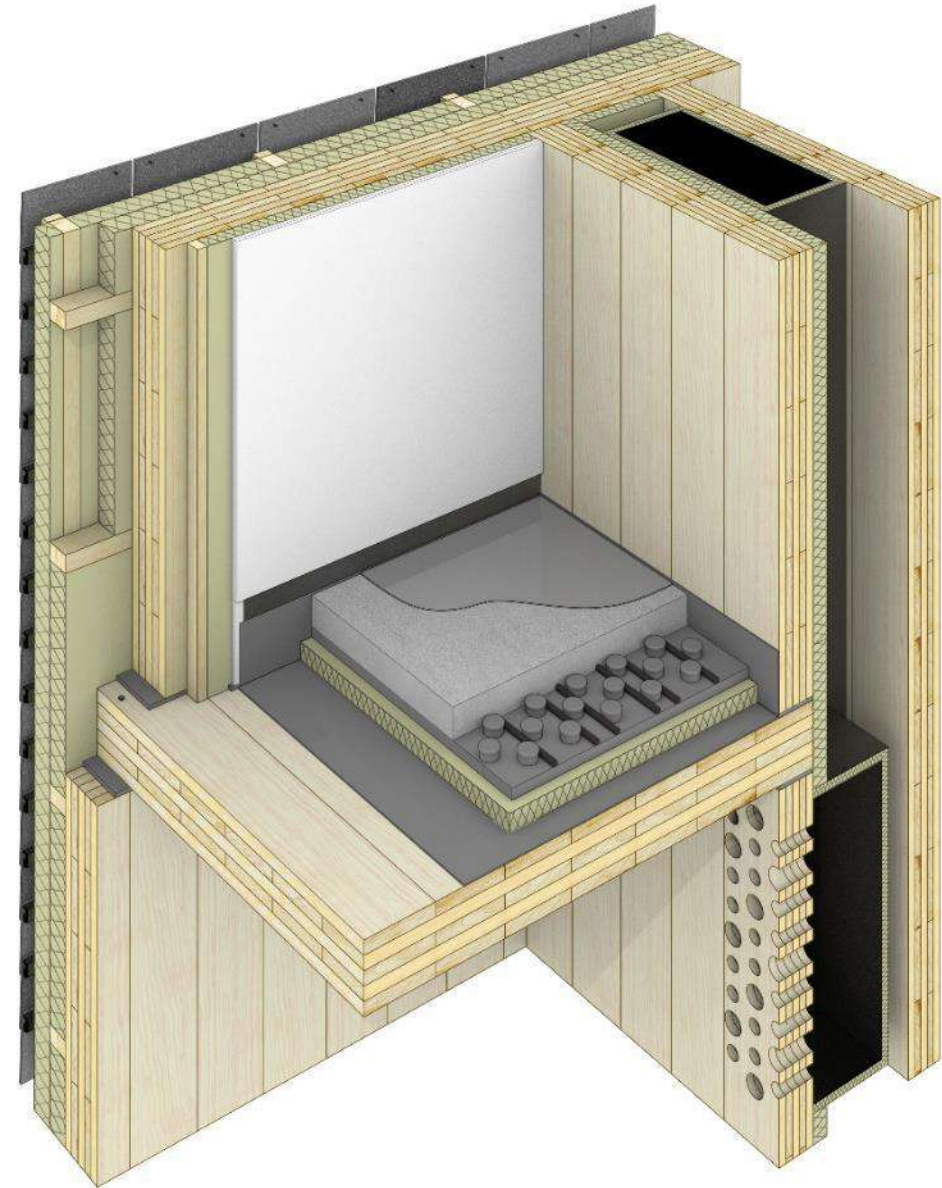
Alta hermeticidad al aire ($n_{50} \leq 0,6/h$)

Lámina estanca al viento

Sellado de encuentros entre elementos constructivos

Ensayos *Blowerdoor* durante la ejecución

Ausencia de puentes térmicos



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Detalle constructivo. Cubierta.

High thermal insulation

Roofed Transmittance **U=0,15 W/m2K**

8+8+6 cm of isolation = 22 cm

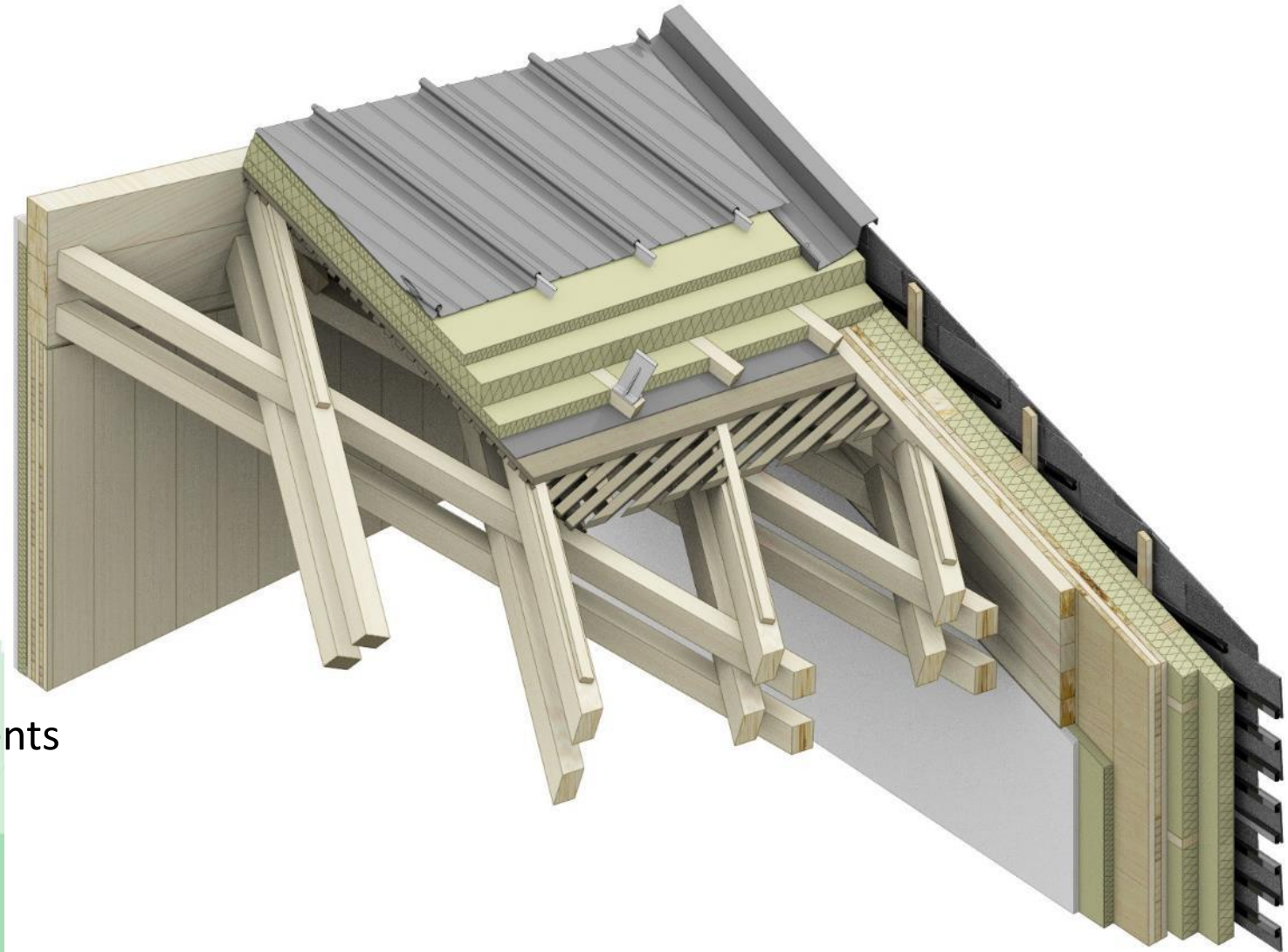
High air hermetic sealing ($n_{50} \leq 0,6/h$)

Wind-tight film

Sealing of joints between construction elements

Blowerdoor tests during execution

Ausencia de puentes térmicos



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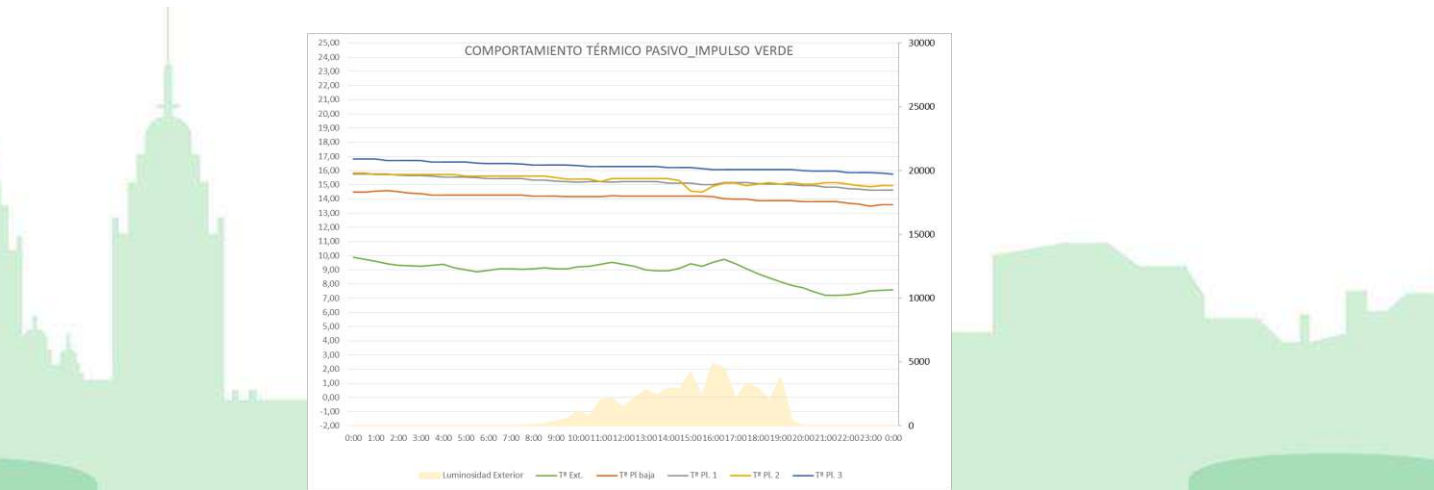
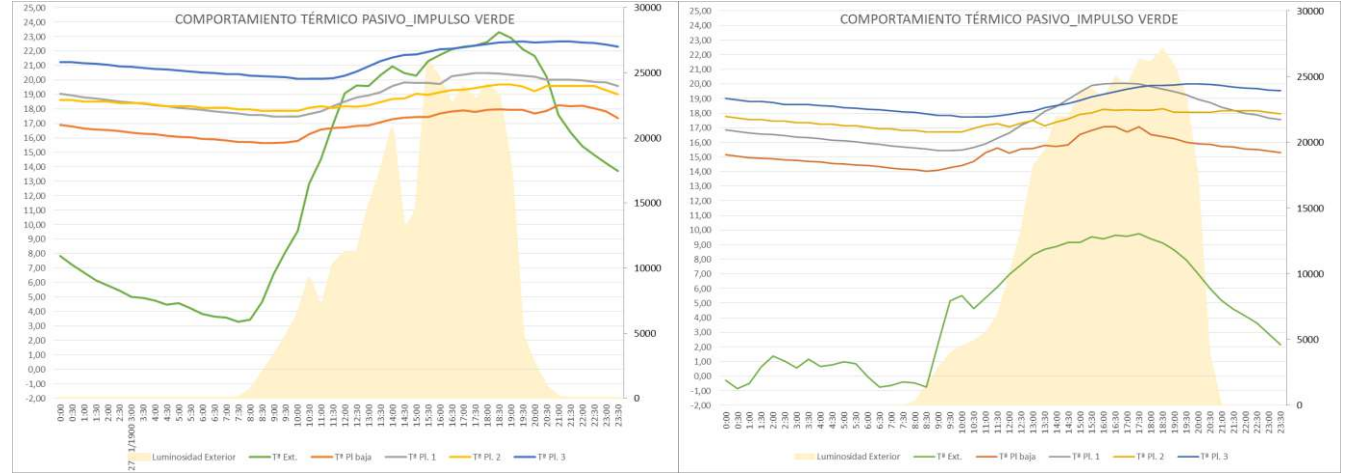




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Edificio demostrativo IMPULSO VERDE



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**Edificio demostrativo
IMPULSO VERDE**



ENVIRONMENTAL CERTIFICATION IN PROGRESS VERDE (España)



Organismo
responsable:
GBC-España

Impact Categories VERDE Certification (Spain)

Climate change	27%
Increase in UV radiation at the ground level	0%
Loss of fertility	5%
Loss of aquatic life	6%
Production of cancer and other health problems	8%
Changes in biodiversity	4%
Depletion of non-renewable energy, primary energy	8%
Depletion of non-renewable resources, other than primary energy	9%
Depletion of drinking waters	
Drinking water depletion	10%
Non-hazardous waste generation	6%
Health, welfare, and productivity for users	12%
Financial risk or returns for investors - Life cycle cost	5%

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The Impulso Verde building is the first FSC-certified project in Spain.

It was built entirely with FSC-certified engineered wood products. The wood used was locally sourced and included locally grown Galician timber species.

This construction model creates an alternative to conventional buildings as it minimizes environmental impact, improves quality of life and stimulates the local forestry sector. It is a benchmark for the construction of buildings using locally sourced natural resources.

FSC has developed a chain of custody standard for Project Certification. FSC project certification helps an organization affirm that all forest-based materials and products used in the project are FSC certified.

- It verifies that the wood in a building comes from responsible sources.
- Provides direct recognition of commitment to forest conservation.
- Can be used independently or as a complement to green building and other related certifications.
- Audits are conducted by an FSC-accredited third-party certifier



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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

8	Climate Change Mitigation				
8.1	Greenhouse Gas Emissions				
8.1.1	CO ₂				
	A	B	B2	C	Justification and Valuation
	238.0 ¹ 285,6***	238.0* 285,6***	285,6** *	5,0** 6,8***	<p>Units: ton CO₂</p> <p>*Conventional building (concrete, for example) will represent 238 ton CO₂ emissions/500m² (on average)</p> <p>**Wooden building “Green Boost” will represent around 5 ton CO₂ emissions/500m²</p> <p>This indicator is in ongoing and it is being implemented as initially expected</p> <p>***New data derived from the increase in the surface area of the building from 500m² to 677.62m²</p>
	476.0 ² 571,2***	476.0 571,2**	571,2** *	13,5***	<p>Units: kgr CO₂ /m² building</p> <p>NOTE: ¹ and ² correspond to the same values with different units; they should not be summed up</p> <p>***New data derived from the increase in the surface area of the building from 500m² to 677.62m²</p>

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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

8.2 Carbon sequestration

A	B	B2	C	Justification and Valuation
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* * CO ₂ ton	936.0*	<p>TOTAL CARBON SEQUESTRATION Units: CO₂ ton/year Actions C10 and C11 (Wooden buildings) and actions considering tree planting (Actions C4, C5, C6, C7 and C8)</p> <p>*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 CO₂ emissions. Therefore, we may estimate 969.0 ton CO₂/year by the end of the Project.</p>

*** 3 tons/year of fixed carbon since plants were planted recently

** It was estimated that 1m3 of wood sequestrates 0.9 ton of CO2. In the prototype gridshell (C10) 3.5m3 of wood (net) have been installed, which result in 3.15 tons of CO2.

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 S51 AND S14R



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**IMPACTS
SOCIAL**



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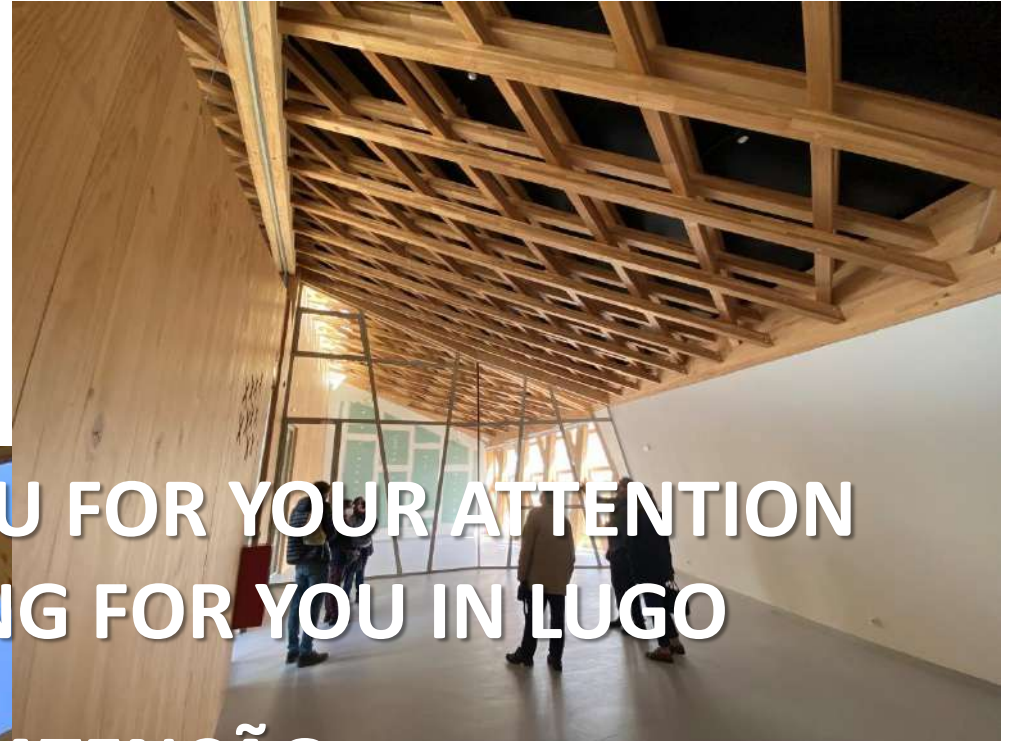
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["Lugo, el tesoro verde en el que invertir"](#)

[TIME LAPSE-IMPULSO VERDE](#)

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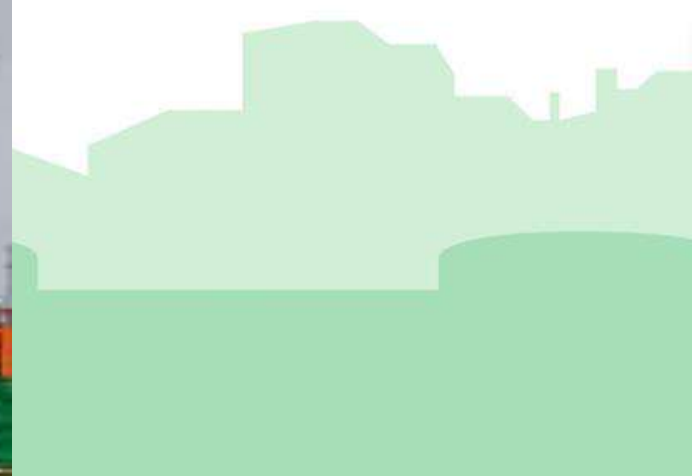
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1º Encontro Técnico do Projeto Europeu LIFE LUNGS
29 de novembro de 2022 | Centro de Interpretação de Monsanto (CIM), Lisboa
"Adaptação e resiliência urbanas: soluções e boas práticas para um clima em mudança"

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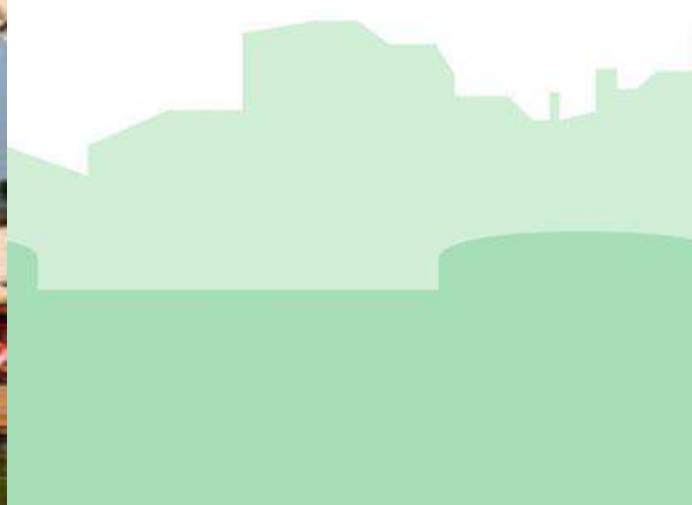
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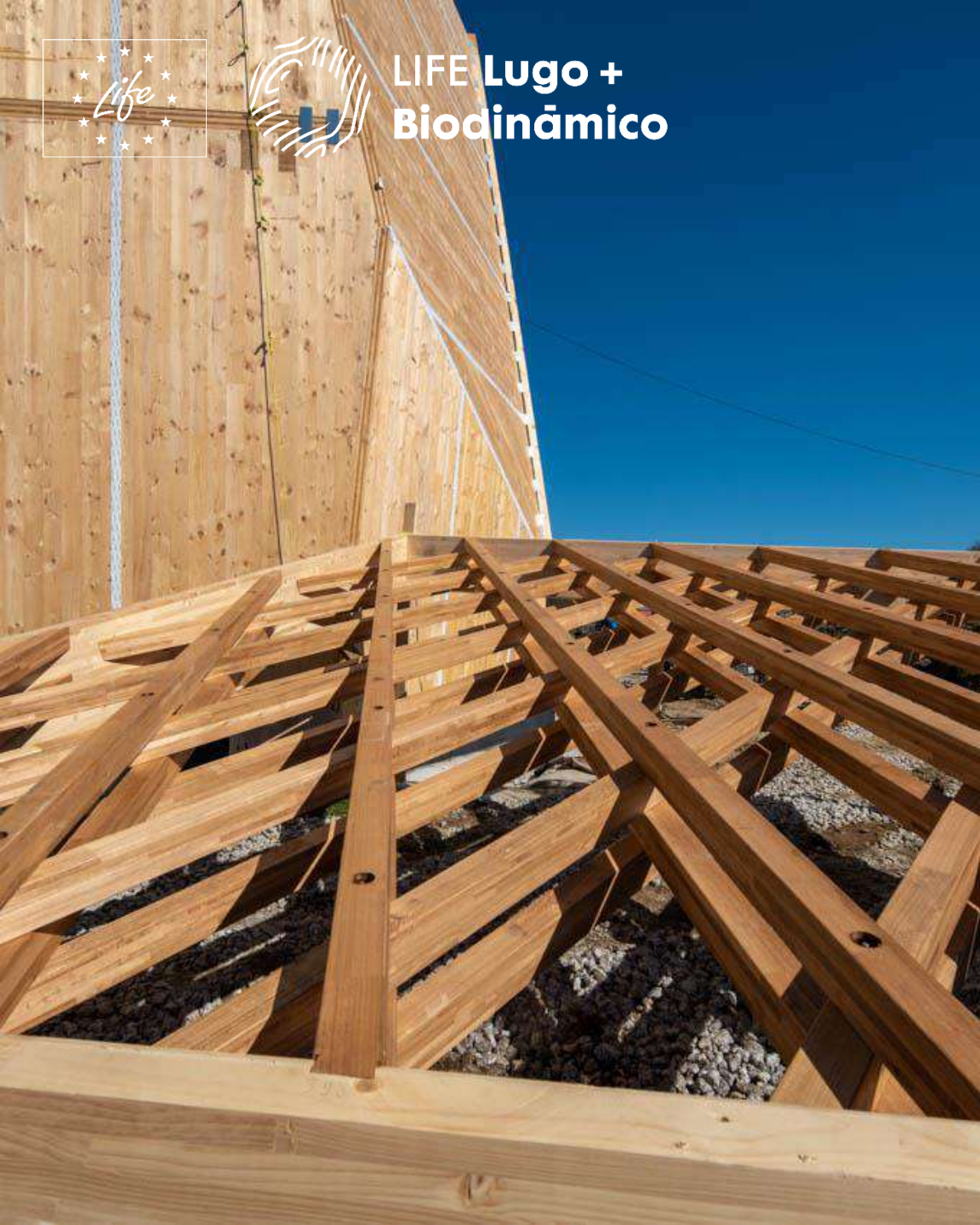


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