

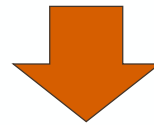
FEATURES OF IMIP PANELS

Eva Hermoso
hermoso@inia.csic.es

CRITERIA OF SELECTION OF MATERIAL TO DESIGN OF IMIP PANELS:



- Use of **renewable** raw materials, pine wood and cork.
- Stress the proximity (**km 0**) both of the sites where raw material is extracted, and where the system is produced and consumed.
- Promote **local** economy by generating an industry that foster economy in the involved regions.
- **Minimize** the consumption of resources and the generation of **waste** by developing a modular construction system industrialize.
- Users health and comfort by producing a building well isolated to reduce **energy** consumption.



RESULTS

INSULATED PANEL PROTOTYPES



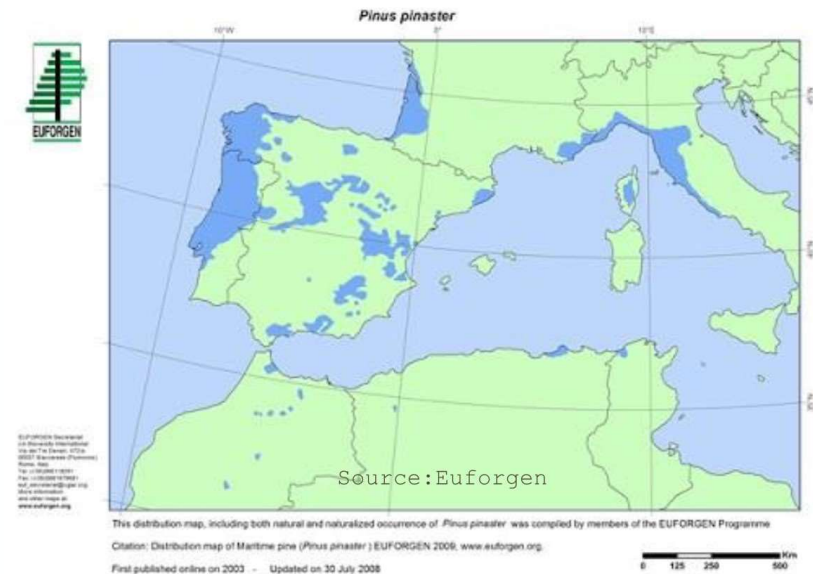
Composition and design

IMIP panel components



Species chosen: Maritime pine wood (*Pinus pinaster* Ait.)

- Spreads naturally in Atlantic-influenced regions of Portugal (Northern and Central), Spain (Mediterranean regions) and France (Atlantic coast): 2.9 million ha
- Sawn wood production: France: 1.1 million m³
Portugal: 1,0 million m³
Spain: 0.8 million m³
- Structural timber characterization available (EN-338) for Portugal (E-C18), France (STII-C24, STIII-C18, STIV-C14) and Spain (ME1-C24, ME2-C18) source.



Sawn timber: CLT



SWP(Sawn Wood Panels)

IMIP panel components



Species chosen: Mountain pine wood (*Pinus uncinata* Ram.)

- Scattered populations across the mountains of southern France and northern Spain. Reforestation programmes in the Mediterranean: 53,000 ha
- Tree volume: 5.4 million m³
- Due to limited yield, the wood is not of any particular value.
- Structural timber characterization on going (EN-338).



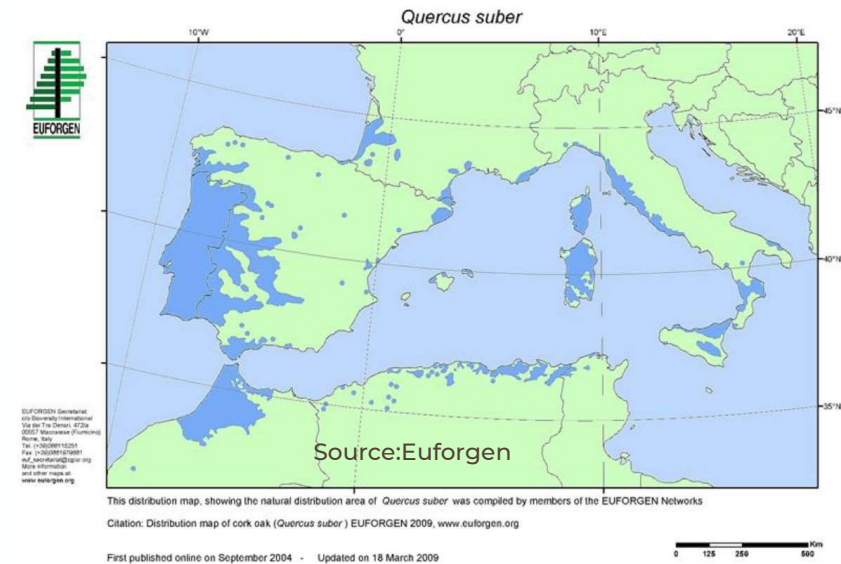
IMIP panel components



Cork for insulation:

Quercus suber L.

- Typical species of the Western Mediterranean region: Portugal, Spain and in restricted areas of France.
- Outer bark is composed of a compact, elastic, thermally insulating tissue with impermeable cell walls
- Insulation is improved in industrial processing: black agglomerates
- Coef. Thermal conductivity: 0,04 W/m°C



Granulated cork:



Black Cork Expanded Boards(BCEB)

IMIP panel components



Other wood components:

OSB (Oriented Strand Boards)



Commercial one.

Made usually of pine/spruce.

Suitable for load-bearing applications in construction

OSB/3 – Load-bearing boards for use in humid conditions

IMIP panel types



Type A (roof): 1200(w)x6000(L)x260(t)mm

CLT60 P.uncinata

+ ribs P.uncinata (80x200mm)

+ granulated cork



IMIP panel types



Type B (roof): 240-190(t)x1000(w)x1200(L)mm

SIP SWP-OSB P. pinaster

+ black cork boards



IMIP panel types



Type C (floor): 320(t)x1200(w)x6000(L)mm

CLT60 P.uncinata

+ ribs P.uncinata (80x200mm)

+ granulated cork



IMIP panel types

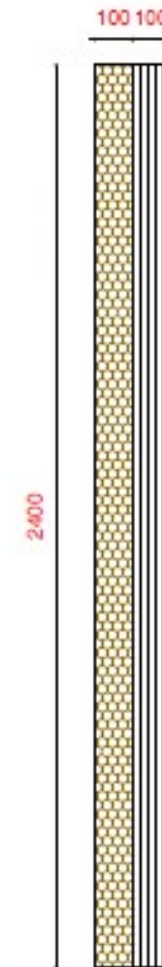


Type D (façade):200(t)x2400(w)x5500(L)mm

CLT100 P. pinaster

+

black cork boards

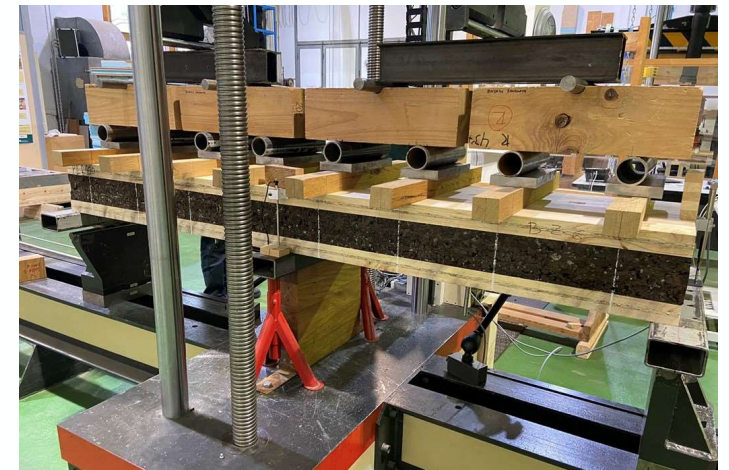


Panel Tests

IMIP panel properties



Bending tests:
Panels A , B, C
Components



IMIP panel properties



Shear bending tests:
Panels A , B, C



IMIP panel properties



Glued quality tests:

Panels

Components



IMIP panel properties



Glued quality tests:

Panels

Components



IMIP panel properties



Soft body impact tests:

Panels



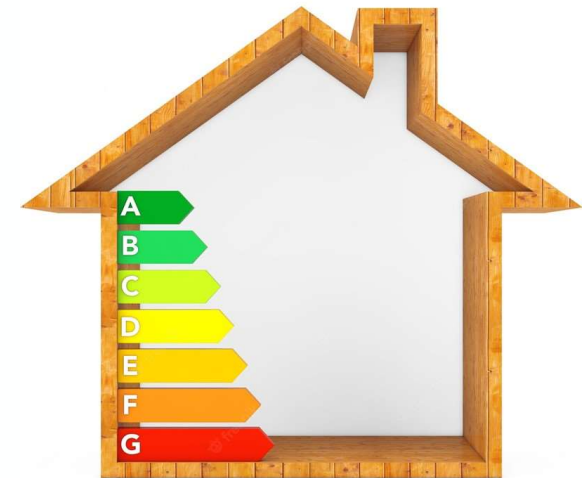
Features of IMIP panels

Features of IMIP panels



CONTRIBUTION TO ENERGY EFFICIENCY:

- Buildings are responsible for **40%** of energy use.
- Wood/cork are a naturally **good thermal insulators**: The cellular structure slows down the loss of heat (for wood 16 greater than concrete). **Hygroscopic** character.
- Process of wood panel **manufacturing** consume less energy than other based on steel or concrete.



Features of IMIP panels



CONTRIBUTION TO ENVIRONMENT:

Source of decarbonisation:

- 55% from renewable energies.
- 45% from **products**: wood material, wood products carbon capture and storage (CCS).

Buildings are responsible of **30%** of CO2 emissions in Europe.

Recyclables/renewables resources.

Biodegradable resources.



Features of IMIP panels



SOCIO-ECONOMIC CONTRIBUTION:

Encourage to use of wood and cork, support:

- **Wood industries:** In Spain 36.781 companies and 212.900 workers (FEIM, 2020). Sawmills in Portugal employ 4 592 persons (ICNF 2015). In Nouvelle Aquitaine (France), 28 300 industries employed 56 300 people (Agreste NA Analyse et résultats 2015).
- **Cork sector:** In Portugal, cork products represent about 1 % of Gross Domestic Product, and annual exports of more than 1 billion euros (2018). There are approximately 642 companies operating in the cork industry in Portugal, and they employ about 8 305 workers (Ministry of Labour and Social Solidarity, 2016). In Spain provides more than 2.000 full-time jobs in more than 98 cork processing and producing companies.



Features of IMIP panels



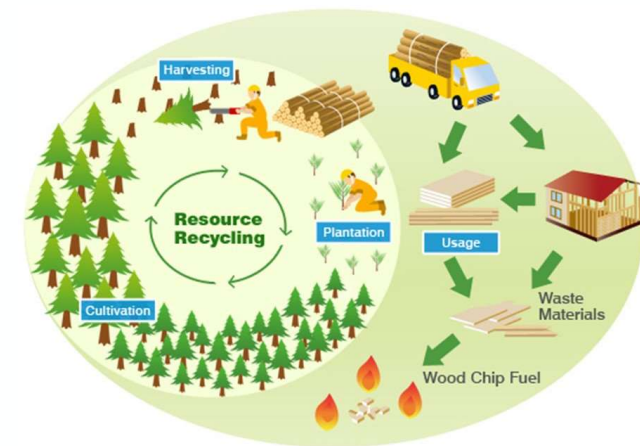
CONTRIBUTION TO CIRCULARITY:

Wood and cork: Infinitely **renewable** resources, sustainable building material.

Long-term supplies of wood/cork support forest repoblations.

Wood is never wasted:

- **Reused:** other buildings, other mixed systems or non-structural uses .
- **Recycling:** components for other engineering products, non-structural uses, board industries, biomass.
- **Biodegradable:** end of life.



Thank you for your attention