



Building with wood

Demonstrating innovative materials and building systems for the Circular Economy

Project summary factsheet | Sep 2021

BASAJAUN is a major European innovation action about sustainable building with wood. The main objective is to demonstrate how wood construction chains can be optimized to foster both rural development and urban transformation whilst being connected with sustainable forest management in Europe. Two full-scale medium-sized demo buildings are being constructed in Finland and France that integrate various innovative materials, products and components developed within the project.



Figure 1. Southern demo building in Bordeaux, France. Architectural design by UNStudio.

The core idea is to enable the construction of a mid-sized building with the lowest possible surface of forest area. A series of innovative bio-based materials, products and constructive systems are jointly developed and tested by companies and researchers. A digital framework of the 'forest to building' chain and several regional innovation roadmaps are set up to explore how wood construction can create benefits for rural areas.

Coordinated by TecNALIA in Spain, the consortium comprises 29 partners from 12 countries including 14 companies, 12 research organizations and universities, and 3 other public and sectoral organizations.





Wood, a sustainable building material and climate solution

The purpose of BASAJAUN is to foster the adoption of wood as raw material in building solutions and demonstrate that they contribute to increase performance, quality and habitability of the European building stock with many benefits for healthier, sustainable cities.

- The forest-wood value chain has a trifold impact on climate change mitigation (3S): i) *Sequestration*, that is carbon capture of atmospheric CO₂ by trees and accumulation in woody biomass, ii) *Storage* of carbon in long-lived engineered wood products, and iii) *Substitution* of carbon-intensive materials, e.g. concrete, cement, steel or plastics.
- The decisive advantages of the nature-based material wood from a circular economy point of view are that it can be recycled both in the *biological* and *technological* cycle, and that the carbon storage time in products can be further prolonged through additional reuse and recycling phases.
- Better integration of wood products in the construction sector will stimulate more sustainable development of rural regions.
- Building with wood is an emerging industry that can make a high contribution to the reduction of GHG emissions and help to unlock the low-carbon, circular economy.

BASAJAUN project concept: The special feature of the project is that it integrates *the full value chain*: all steps from forestry, wood processing, intermediate manufacturing and building are included, to establish the link from raw materials in rural areas up to the high-end products in the urban environment. The activities of the project can be grouped into three main topics: 1. Rural development, 2. Sustainable wood construction, and 3. Digitalization and innovation.

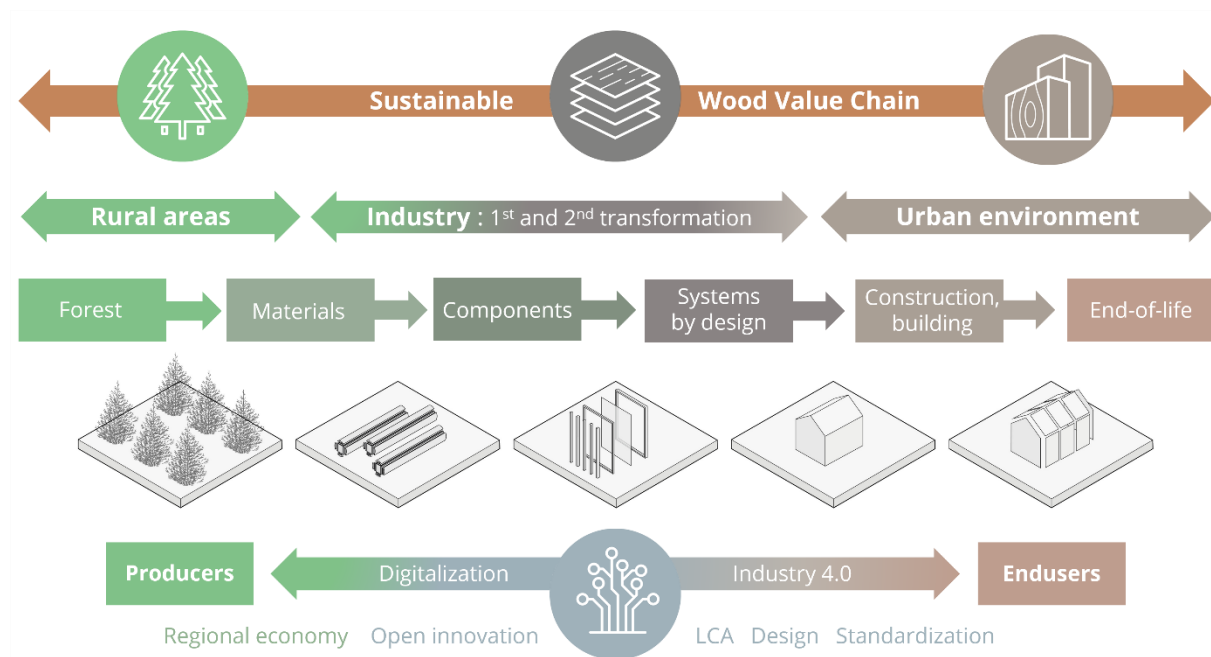


Figure 2. Integrative value chain approach, linking rural development with forest-based sector innovation.





Figure 3. Northern demo building in Jyväskylä, Finland. Architectural design by UNStudio.

The project partners develop and test innovative materials, products, building systems and supply chain solutions for manufacturers and end users. The proof points for industrial end users and customers include a full record of the product's technological and sustainability characteristics, productivity, cost efficiency and competitiveness, and their demonstration in the form of two full scale demo buildings realised in operational settings.

The aim is to exploit 100% of the raw materials obtained from harvested wood (i.e. solid wood, fibres, veneers, bark, sawdust, etc.) and create a building that is *as much as possible based in products and sub-products from all these materials*. This goal is challenging but can deliver convincing evidence that sustainable wood construction is ready to tackle three global challenges at the same time: 1. mitigation of GHG emissions of the construction sector, 2. development of sustainable high-value materials and products for urban customers, and 3. strengthening of rural development and employment.

Expected results

The partners collaborate to deliver the following main results:

- Several guidance reports about building with wood addressing a holistic value chain including LCA, recyclability and eco-design of novel building products and systems
- Studies on wood as driver for sustainable development in Europe's rural regions
- A 'Forest to Building Digital Framework' (F2BDF) as digital twin of the whole value chain
- A series of innovative bio-based materials, products and constructive systems, including thermoplastic composites, WPC foams, waterborne coatings with fire-proof properties, structural components, structural insulation panels, façade, interior partitions and roof prototypes, etc.
- Two full-scale demo buildings integrating these innovations, in France and in Finland
- A regional innovation platform for upscaling results with companies and stakeholders





R&D activities and industry innovations - overview



WP1 Sustainable wood construction value chain ◦ FCBA, LUKE, ITD

- Evaluating the European forest potential for wood construction
- Guidelines to foster building with wood
- Defining the future value chain
- Impact of wood construction on rural and urban areas/development



WP2 Recyclability, environmental issues ◦ VTT, TUM, FCBA

- Recommendations of zero-waste in wood-based products
- Technologies for wood recycling and recovery
- Environmental impact assessment methods and approaches
- End of Life - recyclability and reusability of BASAJAUN products



WP3 Forest 2 Building Digital Framework ◦ RISE, RemaSawco, StruSoft

- Framework to follow material data through value chain
- Digital twins for autonomous subsystems
- Design of a 'backbone' architecture to connect the value chain



WP4 Innovative materials ◦ Tecnia

- Compounds and hot-pressing of fire retarded WPC ◦ WKI, Tecnia
- Foam-formed thermal insulation materials ◦ Soprema, VTT
- Structural insulation panels (SIP) ◦ Garnica
- Foamed wood-plastic-composites ◦ Elastopoli, VTT
- Coatings with improved capabilities ◦ Irurena, Tecnia



WP5 Building systems and products ◦ Moelven

- Products design, structural components, connectors ◦ Moelven
- Facades, curtain wall system with biocomposites ◦ Focchi
- Roofs, internal partitions ◦ Garnica
- Industrial construction system ◦ Bouyges
- Industrial building concept in wood ◦ UNStudio
- Bio-composite profiles ◦ Omikron-Dokk
- Enhanced engineered wood products ◦ ENAR



WP6 Demo buildings ◦ UNStudio

- Northern demo Finland ◦ VTT
- Southern demo France ◦ Department Gironde, Bouyges, FCBA



WP7 Open Innovation Platform ◦ FCBA, IW

- Stakeholder mapping & participation
- Regional innovation roadmaps
- R&D needs, priorities & follow-up projects



Tackling climate change: contribution to EU policies

The project is aligned with all major EU policies for the twin green and digital transformation. The *European Green Deal* is the new industrial policy fostering sustainable, circular products, reduced waste, a new *Renovation Wave* to increase energy performance of buildings and enable digital technologies. The new *Circular Economy Action Plan* confirms the EU's ambition to transition towards a regenerative growth model, doubling the circular material use rate and become a leader at global level. The *New European Bauhaus* strives to embed this transition in a new, open, co-creative and interdisciplinary cultural movement for Europe.



"We know that the construction sector can even be turned from a carbon source into a sink, if organic building materials like wood and smart technologies like AI are applied."

Ursula von der Leyen

President of the European Commission | State of the Union Address, 16/09/2020

BASAJAUN innovative results and outcomes contribute to the following impacts:

- **Sustainable wood construction.** Wood stores CO₂ in solid products throughout their whole life cycle. By choosing this nature-based construction material instead of other materials, the carbon footprint of buildings can be significantly reduced. Maximizing storage in wood products will play an essential role in the mitigation of anthropogenic GHG emissions to combat climate change.
- **Digitalization and innovation.** Digital tech is a disruptive driver of change: Industry 4.0 sets the ground for fully connected smart factories and value chains, including digital twins of forests and buildings. By connecting the entire chain from the individual tree in the forest up to the specific wood product in a building, it will enable to fully optimise the value of wood in terms of economic, environmental and social benefits.
- **Rural development.** Sustainable forest products and services connecting forests with urban centres can ensure existing jobs and create new opportunities for employment and business especially also in rural areas. Fostering rural renaissance is a main purpose of the Basajaun innovations.

Together with several umbrella organisations in the European wood-based sector, BASAJAUN has supported the launch of the *Wood Sector Alliance for the New European Bauhaus (Wood4Bauhaus)*. This platform establishes a direct link to the New European Bauhaus and will enable to raise broader awareness for these important impacts.





BASAJAUN origin

The project title is adopted from an imaginary creature of the Basque mythology and can be translated as 'Protector of the forest'. Basajaun was believed to be strong, savage but peaceful human-like spirit dwelling in the Basque woods. The name was chosen for the project as an analogy to the idea that forests can be better protected through a sustainable use of forest products in wood construction, to generate positive benefits for the rural communities.

The partnership

The project has received a 10M€ grant funding from the *EU Horizon 2020 R&I programme*. It includes 29 partners from 12 countries including 8 leading research and technology organizations, 3 universities, 14 companies and 4 other public and sectoral organizations. The team unites strong expertise in wood construction systems and buildings, innovative materials, architecture, forestry, digitalisation, environmental assessment and rural development. It covers regions both in Northern, Central and Southern Europe.



Research: 1. Tecnia, 2. Aimplas (Spain), 3. VTT, 4. Luke (Finland), 5. FCBA (France), 6. RISE, 7. Lund Technical University LTH (Sweden), 8. Fraunhofer WKI, 9. TU Munich (Germany), 10. Lukaszewicz Research Network ITD (Poland), 11. Pontificia Universidad Catolica (Chile) | *Industry:* 12. Irurena, 13. Garnica, 14. ENAR (Spain), 15. Moelven, 16. RemaSawco, 17. StruSoft (Sweden), 18. Elastopoli (Finland), 19. Soprema, 20. Bouygues (France), 21. Focchi (Italy), 22. Etcetera Solutions, 23. UNStudio (Netherlands), 24. Overstory.ai (Portugal), 25. Omikrondokk (Hungary) | *Communication:* 26. Département de la Gironde (France), 27. BaskEgur (Spain), 28. InnovaWood (Belgium), 29. Alpha Consult (Italy).

Contact: TECNALIA Research & Innovation

Building Technologies Division | Bilbao, Spain

Javier García Jaca, PhD. | Project coordinator
T +34 943 105 300 (International calls)
javier.garciajaca@tecnalia.com | tecnalia.com



basajaun-horizon.eu



company/basajaun



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