

Timber Houses and CO₂ Reduction: Building and Capturing Carbon at Once

Wood is one of the few construction materials that stores carbon rather than emitting it. That is the environmental logic of the Eskimohaus model, quantified tonne by tonne.

Few project decisions have as direct an environmental effect as the choice of structural material. Building a passive house while reducing its carbon footprint is not a contradiction: it is exactly what wood makes possible when it replaces concrete as the primary structure. At PAPIK Group this is the principle that underpins Eskimohaus houses, and it can be expressed in figures.

The environmental benefits of building with wood: the Eskimohaus model

Building with a timber structure and natural materials, as the Eskimohaus houses do, offers a twofold environmental advantage. On one hand it avoids the emissions tied to conventional systems; on the other, it creates a mechanism to capture and fix atmospheric carbon, what the technical literature calls a **carbon sink**. Compared with concrete and traditional systems, which carry a considerably higher carbon footprint, wood is an environmentally responsible alternative.

The key lies in the nature of the material itself. Wood retains roughly 50% of its dry weight as carbon. Using it in construction not only avoids the emissions linked to materials such as concrete, but turns the building into a long-term store of CO₂.

Where that carbon comes from

Obtaining wood means planting a tree and letting it grow for between 15 and 30 years. Throughout that growth period the tree captures CO₂ from the atmosphere and incorporates it into its trunk, fixing atmospheric carbon before it ever reaches the building site.

The carbon balance, quantified

Every cubic metre of wood used stores 0.9 tonnes of CO₂. Building with traditional materials such as concrete, by contrast, can mean emissions of up to 0.5 tonnes of CO₂ per cubic metre. Put another way: a cubic metre of wood pollutes -0.9 tonnes of CO₂, while the traditional-construction equivalent pollutes 0.5.

The sum of both effects is what makes the model significant. Building sustainable Eskimohaus houses like the ones we build at PAPIK Group delivers a total environmental benefit of 1.4 tonnes of CO₂ per cubic metre: the tonnes removed from the atmosphere and fixed as the wood forms, plus the tonnes saved by avoiding highly polluting materials.

At building scale the effect is amplified. Replacing concrete with wood can cut emissions by 69% across a building's life cycle. A study published in **Nature Sustainability** notes that, if buildings were constructed primarily with wood, more than 100 gigatonnes of CO₂ emissions could be avoided globally by the year 2100, thanks to lower emissions from cement and steel production, materials with high embodied emissions.

Embodied energy, proximity and forest management

Unlike concrete, which demands energy-intensive processes for cement production, wood has a much lower embodied energy and can often be produced locally, which also reduces transport-related emissions. This low-impact logic is the same one that guides our construction and energy retrofit processes.

The sustainability of the cycle also depends on where the wood comes from. Using certified wood, for example FSC-labelled, supports sustainable forest management and guarantees forest regeneration, ensuring the continuity of the carbon-capture cycle.

The impact on a real project

In a typical Eskimohaus project, with a predominantly timber structure, more than 50 tonnes of CO₂ can be saved compared with a similar building made from traditional materials. These homes also contribute positively to the environment by acting as long-term carbon stores, with easily reabsorbed materials that generate very little waste. The approximate tonnes of CO₂ absorbed and saved can be consulted for each project in the list of completed passive houses.

Conclusion

In the current climate emergency it is hard to find accounts that show sustainable alternatives to processes traditionally based on highly polluting systems. Showing this reality is necessary: it demonstrates that the transition to a sustainable system is possible and that measures are needed to accelerate the change.

Building with wood, as the Eskimohaus houses do, not only reduces the immediate environmental impact but offers long-term climate benefits. This is not greenwashing, but a business model grounded in sustainability that avoids emissions and actively absorbs CO₂.

A material that stores more carbon than it emits turns every house into part of the solution, not the problem.

Sources and reference studies

- Ministry for the Ecological Transition and the Demographic Challenge, building section.
- **Nature Sustainability:** global impact of timber construction, with the estimate of up to 100 gigatonnes of CO₂ avoided over the twenty-first century.
- Comparison of concrete and wood emissions (0.9 tonnes of CO₂ stored per m³ of wood versus 0.5 tonnes emitted per m³ of concrete), reported by ScienceDaily.
- Wood Products Council carbon guide (WoodWorks), with tools to calculate emission savings in timber buildings.