



POLITECNICO  
DI TORINO

# Honors thesis

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Architecture For The Sustainability Design

*Abstract*

**PLYWOOD ARCHITECTURE WikiHouse's case: economic and environmental feasibility study to design a module for cyclotourists made with planar elements.**

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The goal of the thesis's work is analyze planar elements, especially in poplar plywood, used as fundamental element in the definition of a constructive system.

Poplar is a great resource of Piedmont, it is clear thanks the presence of many research unit and leading company at European level.

Poplar is used especially not in architecture because of its features that, at a first analysis, are considered not sufficient to build whole building.

The exploitation of this resource in architecture is encouraged both by the Piedmont Region, for the use of regional wood in construction, and the technology that is improving in European context.

To understand how plywood could be used in construction, was important analyze the different testing in the history until the last days, where it was possible to make full use the potential of planar system, also thanks the development of CNC machines.

Consequently, it was studied the relevant constructive technologies in architecture characterized by the use of plywood panels.

From this point of view, the Britain context is the best one, especially in relation to the system developed by WikiHouse society.

This constructive technology exploits planar elements for the building's construction. It is possible thanks a system of joints that create a boxlike structure, hollow inside.

For understand WikiHouse technology, was necessary analyze how plywood was used in architecture in the past.

The first references date back to 1800, when this material was used almost exclusively to build furniture and sandwich panels. Thanks the development of the technology and the economic crisis due to wars, plywood, economic and easy to work, became a material very used both for the realization of planes, boats and naval bases for the war, and to the constructor section where plywood became an essential component, especially in American architecture.

The analysis continued both with the identifications of the issues and some technological joints connected to the WikiHouse system, and a careful analysis about the solutions connected to the energy efficiency of some buildings directly studied.

Practical application of this study is the design of a module for cyclotourists to locate near a bike lane in Piedmont.

The module is designed by respecting the rules on energy efficiency, with attention to the solution of thermic bridges, the joints connected to the water infiltration, and analyzing all the material used in order to the economic and environmental sustainability.

About the economic sustainability was calculated the construction costs and was done a cash flow analysis to understand if the assumed investments were profitable.

Instead, about the environmental sustainability, all materials were analyzed about the CO<sub>2</sub> emissions.

By cross all the results from the different analysis, it was possible to choose the best stratigraphy and technical solutions, in order to design a Nearly Zero Energy Building.

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