

**SUSTAINABLE PROJECTS AND TECHNOLOGICAL DEVELOPMENTS:  
A PROJECT VERIFICATION**

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In the last years the environmental issues afflicting our planet, such as global warming and air pollution, kept worsening at a fast pace. As a consequence new strategies have been identified in order to address and reduce the impact of this debated issues, well known in the political international scenario.

One of the biggest questions for researchers has been: «Which are the main causes leading the worsening of global warming and air pollution?». Data on global energy consumption and carbon dioxide (CO<sub>2</sub>) showed us that construction is one of the main sectors responsible for the phenomenon. It's responsible for consumption of about 40% of total energy production and 36% of total emissions of greenhouse gases.

This new awareness led to the rise of several initiatives, aimed at achieving sustainable buildings whose low fuel consumption may enable a reduction of the overall energy demand and the consequent production of pollutants.

The heavy role of construction sector in conjunction with the increasing scarcity of energy resources, pushed the research towards new construction models aimed at realizing Zero Energy Buildings or Nearly Zero Energy Buildings. Although the aim to reduce consumption is clear and well recognized by everybody, what is still under discussion is a punctual and agreed definition of what Zero Energy Building really means in technical terms.

This thesis investigates the current "state-of-art" of sustainable buildings construction.

It starts from a review of the context, showing as this topic has become even more discussed, after in EU and several other countries new laws introduced progressive obligations for the realization of Zero Energy Buildings. Public obligations highlighted even more the lack of a specific and agreed definition and led to several different interpretations.

Reduction of energy consumption has been identified as the fundamental requirement to pursue for the construction of a building that can be defined a Nearly Zero Energy Building.

This introduced the case of Passive Houses and in particular of the Passivhaus Standard. Those are current existing and consolidated models which show concretely how it is possible to create buildings with low energy requirements, which at the same time ensure adequate comfort conditions for users.

The research analyzes then real case studies, showing useful data monitored after the construction phase, about:

- energy consumptions optimization
- degree of user satisfaction
- user behavioral habits

which all together give a grounded measure of buildings performance.

Afterwards it treats the design of a project, concerning the construction of two multi-storey buildings with mixed-use (residential and commercial) placed in the context of the city of Cuneo, for which the objective was to design buildings that can achieve high standards of performance with low energy consumption.

The project combined traditional building techniques, innovative technologies, and the basic principles of bioclimatic architecture.

The study treats as well the issue of adaptation to a urban contest which gives a flavor of those kind limitation that architects have to cope with in daily practice.



Project: 3D view



Project: 3D view



Project: 3D view

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