

POLYTECHNIC OF TORINO
FACULTY OF ARCHITECTURE 2
Degree in Architecture
Honors theses

**Environmental and energetical performances evaluation in architectural project
Methodology and application to a case study**

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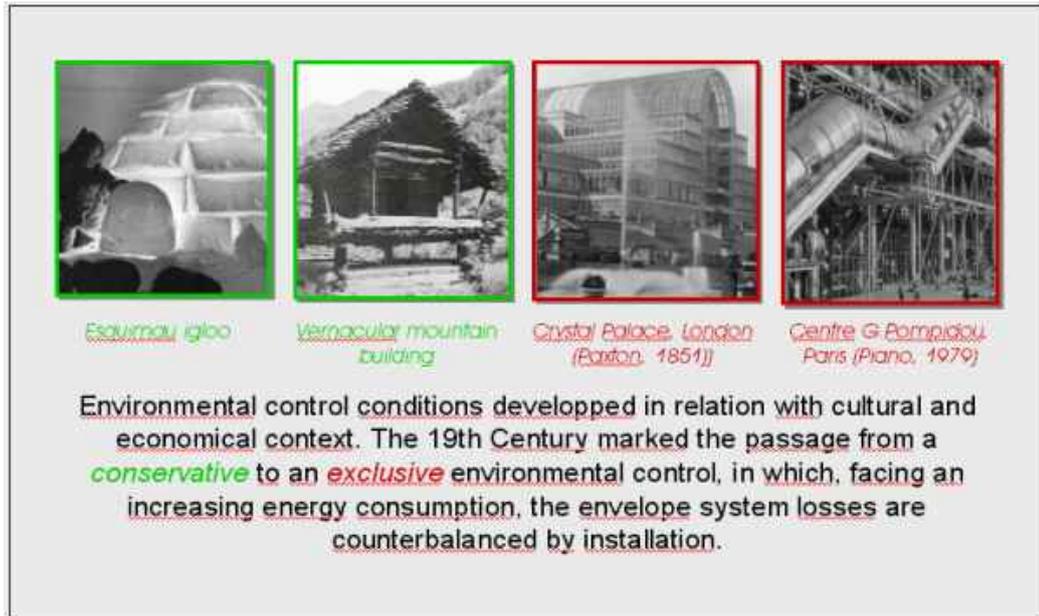
The profession practice asks the architect for specific attentions and competences aimed to combine within a project different aspects, such as esthetical-functional, technological, perceptive-sensorial... .

In this sphere buildings environmental and energetical performances evaluation finds its place, becoming a useful tool to elaborate building energetically sustainable oriented strategies.

This thesis is structured on three parts and is aimed to examine the environmental and energetical performances evaluation theme, through a critical analysis of the actual and developing rules situation and a theoretical and methodological support, applicable to architectural project.

PART ONE – It deepens the building environmental problems debate, which generates new important documents regarding Italy, too, in the European and international context.

The Kyoto protocol, as a consequence of climatic changes, brought to a renewed attention for environmental problems, in every field. In Europe the building sphere is concerned by the 2002/91/CE instruction about buildings energetical efficiency. This is a foreground aspect today, and its evaluation brought on the one hand to calculation procedures review and integration, on the other hand to elaborate indicators through which synthetically describe buildings energetical behaviour. The explicit reference is to the European Standards (today under public inquiry – July 2005) ordered to the CEN in order to put in practice the instruction, and to indicators such as the environmental and energetical efficiency factor which can be found in UNI guidelines (in course of publication – July 2005) for environmentally friendly projects.

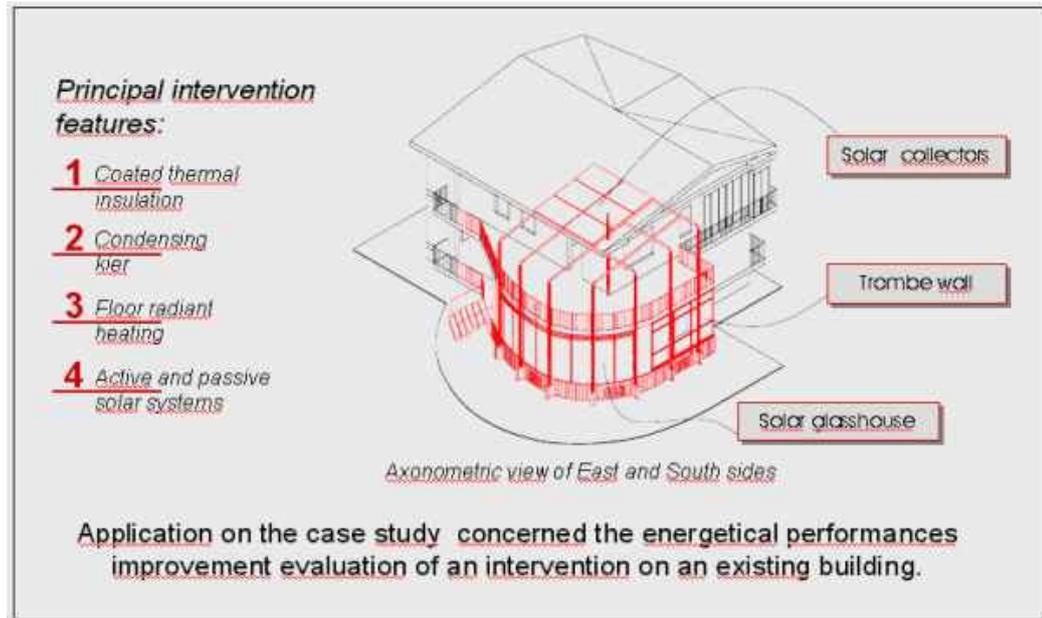


PART TWO – It carries out an analysis of the building as a thermodynamical system and outlines the intervention strategies aimed to buildings energetical performances optimization; an operative calculation procedure is given as support tool.

A building, following the different conditions we can find between internal and external environment, shapes like a thermodynamical system concerned by continuous and complex thermal relations. The energetical balance is the analysis tool through which we can outline strategies to cut down energetical needs, to make use of renewable energy sources and to increase installations efficiency. New European Standards directions have been organised in an operative calculation procedure suggesting a consequential series of equations, rule references and tables to manage the treated data.

PART THREE – It concerns the calculation procedure application to foresee the energetical need for climatization and to obtain the performance evaluation index, on a real case study.

The chosen case study is a project elaborated for the “TO-E³” announcement, promoted by Turin district to grant contributions aimed to elaborate and realize environmentally friendly and energetically sustainable projects. The operative calculation procedure developed for the thesis has been applied to this project, regarding the restoration of a monofamiliar villa in Fiano (Turin), and the results have been compared with the ones obtained with the L10/91 methodology.



The application to the case study permitted to confirm the importance of energetical performances evaluation since a project preliminary steps. As a matter of fact, control of project elements related to volumes, envelopes and installations is essential for energetical efficiency and have to join building environmental and technological performances to esthetical and functional aspects.

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