



Research subjects proposed – XXXIII cycle

Curriculum D: Architecture and Planning, Landscape

(ref. D2 – for topic of reserved scholarships – EURAC research fellowship)

Indoor environmental quality as the main driver for energy efficiency in the residential sector: measures, technology and concepts

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The research on energy efficiency in residential buildings performed over the last 20 years has highlighted the impact that users have on building performances. Occupants' energy behavior has a strong effect on energy efficient technologies and it is key for a successful implementation of passive solutions.

It has been proved that the sole increased energy costs associated to an improper operation of the building is a weak motivation to promote a wiser behavior. However, where the economic reasons seems to fail, the prospective of a better indoor environment got interesting results, becoming the main leverage to convince building users to change their habits. It is now clear the importance of evaluating buildings and technologies not only from an energy prospective, but also based on the quality level of the indoor environment that is achievable with the used energy.

The main objective of this research is to define methods and tools to easily analyze the indoor environment, and with them studying which are the most energy effective technology to guarantee comfortable homes.

The main issues to be faced are:

- to develop (or advance existing) tools to characterize the indoor environmental quality in the residential sector;
- to analyze different building envelopes and construction technologies based on IEQ and costs;
- to make a comparison among few possible solutions to provide comfort in summer and winter conditions.

The main idea is to perform the research monitoring existing houses chosen as suitable for the scope, and using the EURAC Research new climatic chamber.

- The existing houses will serve as a living lab.
- EURAC climatic chamber is capable to control the indoor environment at different air temperatures, operative temperatures and humidity levels, using various terminal units.

Expected research outcomes:

- a clear definition of the most important parameter to evaluate IEQ in houses;
- a tool to easily and economically measure the above mention parameters;
- the definition of the most comfortable and the most energy effective solutions for the building envelope and to control the indoor thermal conditions in the residential sector;
- definition of comfort value: effectiveness of the energy consumption in term of well-being