

Bringing energy-hungry buildings up to date

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Credit: G. Marino

As buildings evolve from energy consumers to energy producers, architecture is seeing a major paradigm shift, with building renovations becoming a real challenge. EPFL researchers explore this fundamental issue in a new book and course.

Acoustics, heating and air conditioning are key factors in a building's design – and a major conundrum for architects tasked with creating

energy-efficient buildings. Similar challenges arise when renovating older structures built when energy consumption was not a worldwide concern. Comfort and comfort-related technologies are still neglected in the history of 20th-century architecture, but EPFL intends to remedy this through a new book and course.

Two researchers from the Laboratory of Techniques and Preservation of Modern Architecture (TSAM) have created a new field of study: the "history of comfort." Giulia Marino, an EPFL scientist, was awarded the prize for best EPFL doctoral thesis in 2016 for her work in this area. Next semester, she will teach a master's course on this subject to architecture students. Associate Professor Franz Graf co-authored a book with Marino in 2016. We interviewed them to find out more.

What does the term "comfort" involve in your work?

Giulia Marino: In our thesis and book, we covered the many thermal, acoustic and light-related aspects of comfort in architecture. In addition to historical and cultural elements, we looked at comfort from the perspective of energy efficiency and heritage preservation. Twentieth century buildings make up 70% of our cities, but these buildings were designed according to energy projections that are now obsolete. They are often covered with glass and made with low-inertia materials, and they assumed an unlimited supply of energy. The question is how to bring these buildings up to today's standards without destroying their historical significance.

Franz Graf: It's a major challenge because we are currently experiencing a [paradigm shift](#) with regard to comfort – we now want new buildings to produce their own energy rather than consuming it.

What is the aim of your book and the course that will

be given next semester?

Franz Graf: We want to make architects aware of this issue by presenting interesting examples of renovations aimed at increasing the comfort of emblematic buildings that form part of our 20th-century architectural heritage. We don't think these matters should simply be left to the engineers. They need to be integrated into the architect's work as well. For architects, this means going into unexplored territory. We hope to embolden architects so that they are not afraid to delve into an area they necessarily know little about. We also want to show them that renovating comfort-related systems can offer opportunities for innovation and creativity without going against the aesthetic choices that were made in the past.

Giulia Marino: Through these case studies, the course will provide students with the tools they need to better understand the role of comfort in the history of architecture and its implications in a given project.

Have any such renovations been made in Switzerland recently?

Giulia Marino: They range from the Federal Office of Sport in Macolin to the Tscharnergut neighborhood in Bern. For our book, we chose a broad array of projects, all of which greatly respected the buildings' heritage. In the Macolin project, the original facade of the building was preserved, but its thermal performance was improved. In the Tscharnergut project, two rooms were added to each apartment through an energy-efficient renovation that involved work on the building's facade. This original approach breathed new life into this large, landmark complex from the 1960s and brought it up to modern standards.

What sparked your interest in this field?

Giulia Marino: Heating and air-conditioning systems often get in the way of an architectural project. But, paradoxically, these systems are seldom covered in the history of architecture. When analyzed, the approaches turn out to be inconsistent. We wanted to add another critical frame of reference to 20th-century architecture by showing that these systems sometimes dictated the choices made by architects. One such example is La Rinascente in Rome. The facade of this 1950s shopping center has often been compared to that of a classical palace. In fact, it is the air-conditioning system that gives it this allure. The technical constraints of integrating the system made it a decisive factor in the building's aesthetics.

Franz Graf: Whether they're hidden or in full view – like the imposing pipework on the Pompidou Center in Paris – these systems attest to a certain ambivalence about 20th-century comfort. So this subject opens up various research possibilities. It warrants a cross-disciplinary approach; one that involves, for example, both the sociology of objects – and here I'm thinking in particular about the showcasing of Le Corbusier's radiators – and the history of medicine and of construction techniques.

More information: Building Environment and Interior Comfort in 20th-Century Architecture : Understanding Issues and Developing Conservation Strategies: infoscience.epfl.ch/record/221281

Giulia Marino, "Some Like it Hot!", Le confort physiologique et ses dispositions dans l'architecture du XXème siècle: histoire et devenir d'un enjeu majeur, EPFL thesis, Lausanne, 2014.

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