



PhD in CONSERVAZIONE DEI BENI ARCHITETTONICI / PRESERVATION OF THE ARCHITECTURAL HERITAGE - 37th cycle

**PON - GREEN Research Field: : ITALIAN RESIDENTIAL BUILDINGS (1945-1973).
SUSTAINABILITY AND UPGRADING**

Monthly net income of PhDscholarship (max 36 months)

€ 1180.0

In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity

**Motivation and objectives of the research
in this field**

The period after World War II to the energy crisis of 1973 was characterised in Italy by intense building work, in which educated professionals and internationally known architects took part. The socio-economic dynamics, scarce public funding and often backward conditions in the construction sector defined a way of building concentrating its energies on interpreting the building of between 5 and 15 storeys high in many typological, distributional and constructional variants. Heavy and light prefabrication, exposed concrete, synthetic materials, new finishes and systems, glass façades were characteristics of a heritage that today is a significant economic resource as well as an important presence in the Italian 20th century city. The research proposed here intends to focus on the fragility and potential of Italian residential buildings built from 1945 to 1973, verifying their real physical and performative conditions starting from sample buildings selected from those that express the excellence of architectural research in the period and the recurrent themes and problems also in widespread construction. The goal is to promote the maintenance, enhancement and performance improvement (upgrading) of a large and significant heritage, contributing to environmental sustainability and the well-being of the inhabitants. Inspired by the Sustainable Development Goals (SDGs) defined by the United Nations 2030 Agenda



	for Sustainable Development, by Goal 11 (making cities and human settlements inclusive, safe, enduring and sustainable) and Goal 12 (ensuring sustainable models of production and consumption), this research project will show the feasibility, in the case of residential buildings built from 1945 to 1973, of interventions aimed at guaranteeing the containment of energy consumption for buildings considered to be highly energy-intensive, and it will be preceded by microclimatic monitoring that will measure actual thermal dispersion, accepting the challenge of minimising demolition work and conversions while reducing waste and discards, as is typical of a conservational approach. This will also make it possible to reduce design and management costs, so that the impact on the environment will be highly beneficial and innovative. The Sustainable Development Goals of the 2030 Agenda, the numerous European directives on the energy upgrading of the built heritage (2018/844/EU and 2012/27/EU implemented in Italy with Legislative Decree 48/2020); economic incentives (Ecobonus 2020) have multiplied the interventions in recent historic buildings, which are at risk of insensitive operations, in which the achievement of strictly performative objectives leads to profound alterations, irreversible transformations, and even their demolition. By adopting an interdisciplinary approach it will develop methodological and operational guidelines capable of combining the requirements of conservation with technical features and responses to mandatory legislation.
Methods and techniques that will be developed and used to carry out the research	The needs of contemporary society, with the evolution of regulatory and reference frameworks have led to the need to intervene in buildings designed and built to logics and rules different from those now in force (the earliest law on energy efficiency was L. 373/76). However most are not subject to verification of cultural interest and/or conservation policies: consequently, maintenance, restructuring and adaptation to current standards are done without the necessary knowledge of the characteristics and conditions of the artefacts, and without taking advantage of the exemptions ensured when working on listed buildings. The research intend to adopt



	a multidisciplinary approach to reinterpret the theme of performance levels and energy efficiency on the basis of a deep knowledge of their architectural, spatial, distributional and material characteristics. The issue of improving performance is one of the main areas of intervention in existing assets. In the period of construction considered, although the qualities related to livability and comfort, including perceptual values, of the architectural artefacts were not neglected, the achievement of energy performance levels was not a priority, nor was there a widespread awareness of the impact of buildings on the environment. Given the changed relationship between buildings and the environment (energy consumption due to building work, the longer use of buildings, the environmental impact of anthropogenic artefacts, etc.), it is now necessary to consider energy efficiency projects as essential factors in their upgrading. This is particularly true of heating adaptations to reduce consumption, which are closely related to the well-being of the inhabitants. The methods to be applied will involve supplementing experiments conducted in the various disciplinary fields involved in the research: historical-documentary knowledge, integrated survey, information modelling, technical and technological analysis of building components, value-based analysis of historical and testimonial values, etc. Deficiencies in performance are often associated with signs of deterioration in structural components and related materials, factors now addressed partly by work carried out with high-performance innovative materials and technologies, but which ignore the needs and purposes of conservation.
Educational objectives	The research is placed in a very broad context of studies and research into architecture, housing and cities in the first decades of the second half of the 20th century: studies characterised, however, by specific disciplinary objectives and approaches respectively linked to the history of architecture, durability of materials, restoration of 20th-century architecture, energy efficiency techniques. Over time, the regulations have developed a framework of objectives and strategies, to



	which academic studies have contributed by developing methods and operational tools for their achievement and advancement. The research will advance of knowledge precisely because of its inter/multidisciplinary character and aim of systematising studies conducted in different and sometimes distant perspectives, selecting virtuous practices and then proposing an innovative method capable of combining cultural, regulatory and technical issues. Looking at the residential buildings erected in the boom years in the light of the interconnected contributions of the history of architecture, conservation, technology, civil engineering, materials engineering and representation will advance our knowledge of the architectural project, the building site, the lives of individual buildings and their effective duration, conditions of fragility, prospects and methods of improvement and durability. This will lead to a significant reinterpretation of a heritage that has scarcely been investigated, even if it is before everyone's eyes and a part of their experience. A new awareness on the part of operators in the sector will lead to a specific approach that can easily be embodied in the various cases. The elaboration of the guidelines will advance knowledge in the service of the various actors in the processes that take as their object the built heritage (architects, engineers, contractors, clients, public and private bodies). The knowledge of a methodological and operational process designed for buildings of excellence and to minimise demolitions, replacements and rubble, will in turn represent, a useful tool for guiding projects and interventions intended for general construction, the outcome of the great wave of production de masse in post-war decades.
Job opportunities	Graduates of the PhD programme have often found employment in public sector and conservation institutions, as well as in professional practices and in the business world, in specific specialized fields. PhD candidates from abroad find job in their native countries at University or in Cultural Heritage Institutions. As regards Italy, the relationship with Italian Ministry of Cultural Heritage (Mibact), has been definitely fruitful.



Composition of the research group	11 Full Professors 13 Associated Professors 0 Assistant Professors 38 PhD Students
Name of the research directors	Francesca Albani

Contacts
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Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad	
Amount monthly	566.36 €
By number of months	0

National Operational Program for Research and Innovation	
Company where the candidate will attend the stage (name and brief description)	Belluschi 1911 srl
By number of months at the company	6
Institution or company where the candidate will spend the period abroad (name and brief description)	
By number of months abroad	0

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
Educational activities (purchase of study books and material, funding for participation in courses, summer schools, workshops and conferences): financial aid per PhD student per year ("DOTE"): 1st year: max 0 euro; 2nd year: max 1.534,33 euros; 3rd year: max 1.534,33 euros Computer availability: In the PhD room workstations for shared use are available, connected with the printer. All the



PhD students can use their own laptop with the wireless connection.

Workstations and other equipment are available in the various laboratories linked with the doctoral program.