



PhD in ARCHITECTURAL URBAN INTERIOR DESIGN - 38th cycle

**PARTENARIATO PNRR Research Field: ARCHITECTURE AND LANDSCAPE FOR THE
POROUS CITIES OF EMILIA ROMAGNA. INTEGRATING PLANTS FOR ENERGY
PRODUCTION FROM RENEWABLE SOURCES IN URBAN GREEN SPACES**

Monthly net income of PhDscholarship (max 36 months)

€ 1195.5

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

Since 2022-23, one of the AUID Ph.D. program research lines has focused on promoting Sustainable Development and reducing Climate Change impacts. This focus fully matches the ECOSYSTEM FOR SUSTAINABLE TRANSITION IN EMILIA-ROMAGNA, promoted with the call for tender for the presentation of proposals for the Strengthening of research structures and creation of R&D "innovation ecosystems," set up of "territorial leaders in R&D" to be funded under the National Recovery and Resilience Plan (NRRP), Mission 4, Component 2 Investment 1.4, funded from the European Union - NextGenerationEU.

The research aims to define a methodological approach to architectural and urban design for Integrating plants for energy production from renewable sources in urban green spaces. An approach based on NBS that is multi-scalar, multi-disciplinary, and capable of acting simultaneously on two levels:

- the performance dimension relating to technological-environmental issues aimed at coping with the effects and preventing the causes of climate change (air pollution, dust, and CO2 emissions, heat islands, soil sealing) guaranteeing biodiversity, comfort, cost-effectiveness, and safety;
- the cultural and aesthetic dimension of architecture and city, aimed at addressing the issue of urban quality in terms of recognition and appreciation by inhabitants and



	<p>users with the specific characteristics of different contexts, as the historical stratification of the built systems, and the interaction between natural and anthropic systems within ecological processes.</p> <p>The settlement system of the Emilia Romagna region is structured around a historical framework of medium-sized towns characterized by a significant porosity of built-up areas with a background of agricultural and naturalistic areas organized around river basins, hills, and coastal zones. Over the last thirty years, this original layout has been transformed by the process of sprawl (housing, commerce, production) typical of the Po region and the Adriatic coastline.</p> <p>The research's basic assumption is that the porosity that characterizes the structures of recent transformations in the Emilia-Romagna region offers unexpected opportunities for tackling the global environmental crisis in terms of the quality of primary elements (air, water, soil, and green systems).</p>
<p>Methods and techniques that will be developed and used to carry out the research</p>	<p>The proposed research aims to identify tools, methodologies, and architectural design techniques for using Nature-Based Solutions, to be applied in degraded, marginal, abandoned urban areas. More specifically, the goal is the definition of new types of open spaces, especially green areas, allowing them to integrate plants for energy production from renewable sources within specific urban contexts. Open spaces are designed to generate a series of benefits and ecosystem services such as providing leisure/recreation opportunities to improve the quality of life, increasing air quality (by intercepting particulate matter and other atmospheric pollutants), regulating the urban microclimate, reducing heat island effects, regulating rainwater flows, preserving biodiversity, absorbing greenhouse gases.</p> <p>The candidate will develop a research methodology starting from the lectures and assignments of the AUID courses and the courses of the Polimi Ph.D. School. Within the ECOSYSTEM FOR SUSTAINABLE TRANSITION IN EMILIA-ROMAGNA, the present research proposal refers to Spoke 4, whose overall objective is to contribute to the economic, social, and</p>



	<p>environmental sustainability of urban development. More specifically, its aim is to define strategies and tools for improving ecosystem services and promote an approach to architectural and urban design based on NBS to tackle problems related to climate change and city biodiversity loss, increasing energy production from renewable sources.</p> <p>The general objective is to elaborate operational tools to enhance the relationship between urban morphology and sustainable development goals, contemporary mobility infrastructures and urban development, green/blue infrastructures, and the control of climate change effects. Starting from a careful analysis of the environmental characteristics of the Emilia-Romagna urban settlements, the proposed activity aims at defining operational tools (skills and know-how) necessary not only to identify the most appropriate and feasible morphological and techno-typological solutions but also to assess the actual benefits of NBSs in terms of quality and healthiness of the urban environment and its usability.</p> <p>Activity Program in months</p> <p>(0-6) State of the art: a scientific literature survey on the subject and definition of the leading research questions.</p> <p>(6-12) Selection and analysis of significant case studies in the Emilia-Romagna region, identifying criticalities and potentials, and formulating the objectives compared with international case studies.</p> <p>(12-24) Experiments on pilot projects also agree with administrations, agencies, and companies in Emilia Romagna.</p> <p>(24-36) Guidelines for integrating plants for energy production from renewable sources with the urban, environmental, economic, social, and cultural contexts of the Emilia-Romagna region.</p>
<p>Educational objectives</p>	<p>Educational objectives focus on the deep understanding of a well-selected and defined topic oriented to sustainable development.</p> <p>The candidate will define specific research containing a comprehensive overview of the scientific question and an original track and output.</p>



	The candidate will acquire the skill to organize a consistent analysis of case studies, formulate a clear proposal for an original approach to a question, and elaborate innovative strategies and research methods.
Job opportunities	<p>The Program aims to train highly qualified researchers and professionals who will work in academic institutions, research centers, and public administration, as well as in the private sector in the fields of architectural, urban, and interior design:</p> <ul style="list-style-type: none"> • University researchers and lecturers in the scientific fields of the Ph.D. Program; • Researchers with an excellent scientific profile in the field of complex architectural developments and interventions of recovery and transformation; • Researcher with an excellent scientific profile in the field of International Cooperation Agency, UN Agency, and private international company; • Independent professionals qualified in the management of highly complex design processes; <p>- Designers with high responsibility in institutions and professional structures and leading manufacturers engaged in traditional residential and special utilities, cultural institutions (museums, libraries, universities, schools, cultural centers), public and private services, commercial networks, accommodation, and leisure.</p>
Composition of the research group	<p>15 Full Professors 23 Associated Professors 7 Assistant Professors 64 PhD Students</p>
Name of the research directors	Sara Protasoni

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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	637.5 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information

Universities that are cooperating in the research

- Katholieke Universiteit Leuven, Campus Sint-Lucas, Ghent
- HafenCity Universitaet Hamburg
- TU Delft, School of Architecture
- TU Berlin, Institute for Architecture
- Université Paris-Saclay

Educational activities (purchase of study books and material, funding for participation in courses, summer schools, workshops, and conferences)

Total Budget for research costs per three years: **5.342.74 euro**

Workspace

In the AUID hall, on the 4th floor of Bldg 12 in Leonardo Campus, is available workstations for shared use.

All Ph.D. students can use their laptops with a wireless connection.