



# PhD in ARCHITETTURA, INGEGNERIA DELLE COSTRUZIONI E AMBIENTE COSTRUITO / ARCHITECTURE, BUILT ENVIRONMENT AND CONSTRUCTION ENGINEERING - 40th cycle

**PNRR 630 Research Field: CIRCULAR PRODUCTS AND PROCESSES. INNOVATIVE  
APPROACHES IN THE CONSTRUCTION SECTOR**

Monthly net income of PhDscholarship (max 36 months)
<b>€ 1400.0</b>
In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity	
<p><b>Motivation and objectives of the research in this field</b></p>	<p>The theme of the circular economy (CE) applied to the built environment opens to a multiplicity of interpretative keys within the vast scenarios related to the European Green deal, which has brought the CE into the EU policies, and the Action Plan for the European Circular Economy, which outlines a plurality of strategies, to develop with respect to the main value chains of various categories of products considered more critical.</p> <p>Among the different sectors, the construction sector is certainly recognized as critical for the consumption of energy and materials, greenhouse gas emissions and the production of waste in the phases of construction, use and disposal of buildings. As regards waste production, the numbers in the construction sector are also relevant compared to other sectors. At European level, construction and demolition waste represent, in absolute terms, the largest flow of waste produced.</p> <p>Remanufacturing, Reconditioning, Repurposing, Reuse, Recycling (the 5R) represent, also for the construction sector, strategic circular actions to apply in an integrated way in order to extend the life cycle and use of the resources incorporated in the buildings.</p> <p>The application of the circular activities can be pursued at different levels: micro level (product design, end of life</p>



	<p>strategy, materials recycling, etc.), meso level (business and organizational model, network design, circular supply chain, etc.), macro level (waste management, resource management policies, city circularity policies, etc.).</p> <p>This doctoral research intends to focus on the micro and meso levels with the objective to apply on the field and for specific categories of building elements the 5R in order to investigate the technical, productive and organizational conditions for the feasibility of the circular strategies and pushing the market towards circular products and solutions.</p> <p>The research will address and deepen several aspects of circularity:</p> <ul style="list-style-type: none"> <li>•circular design: (at the scale of building and technological systems) the various approach of design for adaptability, design for reuse, design for disassembly, modular design;</li> <li>•circular production: the ways for improving the circular manufacture processes;</li> <li>•circular use: the subject of the value chain and the various models of organization (pay for use, performance procurement, product-service systems, etc.);</li> <li>•circular recovery: the various actions for lengthening the cycles of life/use and the valorization of the residual value of products and existing materials; investigation of various forms of adaptive reuse of the existing real estate and the models of supply chain (operators and industry relations).</li> </ul> <p>PNRR line interested by this proposal is : MISSION 2: GREEN REVOLUTION AND ECOLOGICAL TRANSITION - Waste recycling enhancement.</p>
<p><b>Methods and techniques that will be developed and used to carry out the research</b></p>	<p>The theme of circularity, as it is declined in the objectives of the research, is characterized by multi-scalarity and requires approaches characterized by inter-disciplinarity and trans-disciplinarity. The research - assumed as a prerequisite the constant interaction of typological, technical and procedural aspects - intends to develop investigations through knowledge mapping methods,</p>



	<p>investigations through knowledge mapping methods, stakeholder mapping, case-based learning, semi-structured interviews for privileged clustered interlocutors and multidisciplinary working groups, focusing on pilot cases.</p> <p>The PhD thesis will be developed with the industrial funding of Transpack Group Service Spa, with particular reference to the company Nesite. The latter is a manufacturer of raised flooring systems operating on an international scale. Nesite will provide the case study for the development of the PhD thesis, starting from their experience and knowledge on raised floor systems. Nesite will host the PhD student in its headquarters to allow the on-field study of design, production and marketing processes of raised floor products.</p> <p>The PhD candidate will take part in a multidisciplinary team conducting activities related to: product design, certification processes for environmental sustainability and circularity (e.g. cradle-to-cradle), technical-economic evaluations of products, assessment of circular business models to identify the most suitable strategy for placing circular products on the market.</p> <p>The doctoral path will therefore include an alternation of the PhD student between Politecnico di Milano (Piazza Leonardo da Vinci, 32, Milano), with the supervision of Prof. Cinzia Talamo, and Nesite headquarters.</p> <p>During the Phd path, the candidate will spend a period of maximum six months abroad, in a host location to be defined, in order to enrich the knowledge on the topic of the doctoral thesis and broaden the panels of experiences and case studies.</p>
<p><b>Educational objectives</b></p>	<p>The researcher will acquire skills in the field of circular economy applied to the building sector about: international standards, regulations and certification protocols dealing with sustainability; approaches of design for circularity; indicators for measuring circularity. The investigation and application tasks will give the research the ability to map and represent processes, stakeholders, supply chain relations and support tools.</p>



<b>Job opportunities</b>	The researcher can have job opportunities in various contexts in the AEC industry for topics dealing with sustainability and circular economy with the possibility of consulting or being employed in different categories of stakeholders: clients, design firms, construction companies, facility management companies, building products manufacturers, remanufacturers, etc.
<b>Composition of the research group</b>	1 Full Professors 1 Associated Professors 1 Assistant Professors 3 PhD Students
<b>Name of the research directors</b>	Cinzia Maria Luisa Talamo

<b>Contacts</b>	
Email: <i>cinzia.talamo@polimi.it</i>	

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

<b>Scholarship Increase for a period abroad</b>	
<b>Amount monthly</b>	700.0 €
<b>By number of months</b>	6

<b>National Operational Program for Research and Innovation</b>	
<b>Company where the candidate will attend the stage (name and brief description)</b>	Transpack Group Service Spa (Nesite)
<b>By number of months at the company</b>	6
<b>Institution or company where the candidate will spend the period abroad (name and brief description)</b>	to be defined
<b>By number of months abroad</b>	6

<b>Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information</b>	
<b>Additional support:</b>	
<b>Budget for the research activity (only for positions supported by scholarship):</b>	
total amount Euro 5707.20 per student	
In detail:	
- 1st year Euro 1902.40	



- 2nd year Euro 1902.40
- 3rd year Euro 1902.40

**Additional information about the organization and regulations of ABC-PhD programme can be found in the Regulations for the 40th Cycle of ABC-PhD:**

download is available at link:

<https://www.dottorato.polimi.it/corsi-di-dottorato/architettura/architettura-ingegneria-delle-costruzioni-e-ambiente-costruito>

**Additional information about ABC department and ABC-PhD programme:**

available at link:

<https://www.dabc.polimi.it/>

**Desk availability:**

The ABC department provides non-permanent desks to be temporarily booked in common PhD rooms.