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Supervisor Expression of Interest MSCA - Marie Skłodowska Curie Action - (PF) Postdoctoral Fellowship 2022

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Link “Pagina docente”:	https://www4.ceda.polimi.it/manifesti/manifesti/controller/ricerche/RicercaPerDocentiPublic.do?evn_didattica=evento&k_doc=202785&polij_device_category=DESKTOP&_pj0=0&_pj1=2170dfabf4885a5dd6b507d3bbdbd29f https://www.dabc.polimi.it/persona/francesco-pittau/
Department Name:	Architecture, Built Environment Construction Engineering
Research topic:	Long-term sustainability of the built environment
MSCA-PF Research Area Panels:	<input type="checkbox"/> CHE_Chemistry <input type="checkbox"/> ECO_Economic Sciences <input checked="" type="checkbox"/> ENG_Information Science and Engineering <input type="checkbox"/> ENV_Environmental and Geosciences <input type="checkbox"/> LIF_Life Sciences <input type="checkbox"/> MAT_Mathematics <input type="checkbox"/> PHY_Physics <input type="checkbox"/> SOC_Social Sciences and Humanities
Politecnico di Milano Areas:	<input type="checkbox"/> Cultural Heritage <input checked="" type="checkbox"/> Smart Cities <input checked="" type="checkbox"/> Horizon Europe Missions <input type="checkbox"/> Health <input type="checkbox"/> Industry 4.0
Brief description of the Department and Research Group (including URL if applicable):	<p>The Department of Architecture, Built Environment and Construction Engineering (DABC) has consolidated research and training experience in the design, production, construction, management, maintenance, transformation and decommissioning of buildings and the built environment, and in the management of building processes and related information flows.</p> <p>DABC collaborates with industry, Public Administrations, Ministries, non-profit organisations, research centres and national and international Universities to pursue excellence in research and quality in education.</p> <p>The mission of the DABC is to respond responsibly, scientifically, and creatively to the challenges affecting the entire construction, architecture and built environment sector.</p> <p>DABC's research (basic, applied and industrial) is organised in small multi-disciplinary clusters that are formed to address complex multi-scale and multi-factor research issues related to design and process, with reference to six strategic lines: 1) Innovative projects for architecture, spaces and services; 2) Digital, energy and technological transformation for the built environment and the</p>



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	<p>construction industry; 3) Advanced materials and components, clean tech and innovative manufacturing and construction technologies; 4) Risk reduction strategies for the built environment; 5) History, science, technology, management and development of cultural heritage and landscape; 6) Cooperation and technology transfer for emerging countries.</p> <p>In this context, the proposing research group covers expertise related to the development of low-carbon technologies and regenerative construction materials to support the stakeholders in the selection of sustainable options for new building and renovation. The research activities are conducted in collaboration with colleagues from other departments and within international collaborations with university partners.</p>
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Title	Healing the built environment with regenerative materials: development of bio-based clay components for healthy and comfortable buildings
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Brief project description:
(max 1 page)

In the Global South, 80% of the population lives in urban centers and settlements largely represented by low-quality buildings with hygrothermal performance that often do not meet the minimal standard requirements. This leads to an intense use of energy for heating ventilation and air conditioning (HVAC) systems to improve the internal comfort, with serious environmental consequences in terms of carbon emissions. Additionally, the increasing purchasing power of emerging economies and developing countries is supposed to rapidly grow in the next years, with a risk of an intensification of energy use for HVAC. Thus, the promotion of local construction materials, which require less energy for production and can significantly improve the hygrothermal performance of the envelope to decrease the operational energy of buildings, is a challenge that needs to be tackled fast to achieve a sustainable growth.

This project proposes the development of novel bio-based clay components (BBCC) for construction based on new cement-free mixtures of clay, pozzolan and bamboo particles. The use of biomass and clay in building components increases the open porosity, facilitating the water vapor exchange, decreasing its thermal conductivity, helping to regulate the hygrothermal performance of the building and improving the human health quality. Besides, BBCCs present a potential reduction of the carbon footprint when compared with traditional cement-based materials largely used both in western and emerging Countries due to its low energy need for processing and the capacity of massively store carbon. A Dynamic Life Cycle Assessment (DLCA) methodology will be used to benchmark the carbon accounting of the BBCC in relation to conventional solutions. The main expected result from this work is a deeper understanding of the potential benefits of BBCC on energy consumption, human health, and wellbeing. The obtained components are expected to be implemented at large scale and cover the demand of construction materials especially in the Global South, which largely benefits of a great availability of bamboo.