

Intervento realizzato da



Politecnico
di Torino



In consideration of the determination of the Regione Piemonte – Direzione Istruzione, formazione e lavoro No. 218 of 2022, May 3 and s.m.i. which listed the higher institutions authorized to activate PhD positions in the apprenticeship format for the years 2022-2024 in the framework of a specific regional call for proposals (Apprendistato di Alta Formazione e Ricerca - Avviso Pubblico 2022-2026 per l'individuazione e la gestione dell'offerta formativa pubblica approvato con Determinazione 114 del 3/3/2022, modificato con D.D. n. 451 del 17/08/2022 e prorogato con D.D. n. 807 del 24/12/2024)

DESIGN AND TECHNOLOGY. PEOPLE, ENVIRONMENT, SYSTEMS

Digital Twins and Adaptive Design for Building LCA

Company	AI ENGINEERING S.R.L. [Piva/CF:06764910011]
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Context of the research activity	<p>The research focuses on developing an integrated model combining digital twins, adaptive design and Life Cycle Assessment (LCA) to assess and mitigate CO2 emissions across the building lifecycle. It aims to link BIM-based tools with predictive environmental modelling, enabling early-stage decision support and whole-life carbon assessment, with particular attention to embodied emissions and the definition of comparable sustainability indicators.</p> <p>The Company Ai Engineering has planned for the winner of this position a collaboration within a contract of high apprenticeship according to the Italian Legislative Decree 81/2015, art. 45.</p>
	<p>The research aims to develop an integrated model combining digital twins, adaptive design, and Life Cycle Assessment to measure and reduce CO2 emissions across a building's life cycle.</p> <p>Specifically, the objectives of the research are:</p> <ul style="list-style-type: none"> • define a methodological framework for integrating BIM/digital twin tools and LCA analysis; • develop predictive models capable of simulating the environmental impact of design alternatives in the preliminary and final phases;

<p>Objectives</p>	<ul style="list-style-type: none"> • extend the environmental assessment beyond the operational phase; • identify synthetic and comparable indicators, with a particular focus on embodied carbon; • test the application of the model on one or more case studies. <p>The expected results are:</p> <ul style="list-style-type: none"> • development of an integrated operational model combining digital twins and LCA applicable to design processes; • definition of guidelines for design aimed at reducing CO2 emissions throughout the life cycle; • consolidation of corporate know-how on adaptive design and measurable sustainability; • production of replicable indicators and tools for future projects.
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<p>Skills and competencies for the development of the activity</p>	<p>The candidate shall be less than 30 years old at the moment of the hiring from the company.</p> <p>The research topic is aimed at graduates in Architecture or Engineering with expertise and interest in:</p> <ul style="list-style-type: none"> • sustainable design and architectural technologies; • energy and environmental analysis of buildings; • life cycle assessment methodologies; <p>Interest or experience in data modelling and predictive simulation tools, integrated environmental assessment, digital design, and carbon impact reduction in the construction sector will also be considered a preferential qualification for evaluation.</p>
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