ENERGETICS

DM629/PA - Decarbonisation of the stationary energy sector towards climate-neutral cities

Funded By	MINISTERO DELL'UNIVERSITA' E DELLA RICERCA [P.iva/CF:97429780584] Politecnico di TORINO [P.iva/CF:00518460019]
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Context of the research activity	The research is focused on methods and models for defining actions and decarbonization scenarios for the building sector (stationary energy) to support the development of strategies for cities' climate-neutrality and the planning and actuation of the Climate City Contracts in the context of the EU Mission "100 climate-neutral cities by 2030" - Progetto finanziato dal PNRR a valere sul DM 629/2024 - Pubblica Amministrazione - CUP E14D24002270006
	EU has selected 100 pilot cities to develop integrated and feasible plans to reach climate neutrality. The Polytechnic University of Turin is collaborating with the city Municipality of Turin to create methods, models, and analyses for supporting the definition of urban sustainability policies and in particular the actuation of the Climate City Contract. In this context, the proposed PhD focuses on defining and optmising decarbonization actions in the building sector (Stationary Energy sector) with the aim of developing models that describe their single and combined impact on energy consumptions and greenhouse gas emissions at the urban level. This includes examining the interdependence with other actions in the sectors of transportation and Agriculture, Forestry, and Other Land Use, also considering air pollutant emissions, acknowledging that comprehensive climate neutrality strategies must integrate multiple aspects of urban energy planning and infrastructure. The support to the design of appropriate digital tools is a key component of this project. These tools should enable the development and assessment of sets of combined actions and policies, allowing for sophisticated decision-

Objectives	making processes based on "what if" analyses. Such analyses will help predict the outcomes of various scenarios, facilitating informed decisions on the best strategies to pursue. Additionally, these tools will support the ongoing detailed monitoring of the transition to a decarbonized urban environment, tracking progress over both time and space to ensure that goals are being met effectively and efficiently. The activity will be carried out within the Energy Security and Transition lab - ESTlab@Energy Center of the Politecnico di Torino, where the possibility to exchange knowledge and collaborate with other researchers with different backgrounds in Energy Engineering, Environmental Engineering, Computer Science and Architecture will ensure the necessary multidisciplinary approach to this complex challenge. Collaboration across these fields will foster innovative solutions and comprehensive strategies that address the multifaceted nature of urban decarbonization. The skills acquired through this PhD program will be enhanced by practical experience gained during periods of activity in Public Administration bodies (City Municipality of Turin) and abroad, in order to acquire knowledge, experiences and best practices from other cities participating in the EU Mission. The project will support to create professionals capable of combining technical knowledge with institutional design, involving various models of multilevel governance (municipal, state, European) and using digital tools and innovative technologies for addressing the systemic nature of urban energy transitions. The Public Administration will be significantly strengthened in its ability to design and implement urban energy policies. This includes all stages of policy-making: problem definition and resolution, decision-making, policy implementation, and the subsequent monitoring and evaluation. By enhancing these competencies, the project aims to ensure that the Public Administration is provided effective methods, tools and abilities to effectively lead and support the transition to a sustainable, decarbonized urban future.

Skills and competencies for the development of the activity	Background in Architecture / Engineering with demonstrated expertise in building energy design and renewable energy systems integration. Preferred work and/or research experience in the fields of building energy modeling and estimation of carbon emissions of the built environment, from single building to city scales. Good knowledge of the current EU and Italian legislation on energy performance classification of buildings. Excellent ability to work in a multidisciplinary team environment.