URBAN AND REGIONAL DEVELOPMENT

MUR DM 118 - Shaping a Sustainable, Inclusive, and Digitally-Enabled Greener Future: Evaluation of Affordable Positive Energy Districts

Funded By	MINISTERO DELL'UNIVERSITA' E DELLA RICERCA [P.iva/CF:97429780584] Dipartimento Interateneo di Scienze, Progetto e Politiche del Territorio [P.iva/CF:00518460019]
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Context of the research activity	To achieve the EU Climate Energy Target Plan 2050, a transition in the designing, construction and retrofitting of buildings is needed. As a result, the European Green Deal considers positive energy districts and nearly energy-zero buildings a key priority. But investments for such a transformation are high, and experts wonder how socially vulnerable people who depend on affordable housing, can become part of this transformation process. In this context, the PhD research focuses on social affordable housing for smart remodeled neighborhoods across Europe. Progetto finanziato nell'ambito del PNRR – DM 118/2023 - CUP E14D23001910006
	The residential sector and the services sector in Europe used about 370 Mtoe or 42% of the total final energy consumption in 2021. The buildings sector is at the center stage of EU efforts towards a climate- neutral continent by 2050 – an economy with net-zero GHG emissions to transform buildings from being part of the problem to become part of the solution. In this direction, there is a committed targets to net- zero carbon building stock by 2050. A priority in the European Green Deal is the design and construction of retrofitting of existing buildings in Lighthouse and pocket districts, targeting nearly zero-energy buildings (nZEB) and positive energy. However, investments for such targets are substantial, and experts wonder how socially vulnerable people who depend on affordable housing can get involved in this transformation process. In this context, the EU ProLight project (https://www.prolight.eu) is demonstrating 6 refurbished demo sites of affordable housing and energy communities in 6 European countries, allowing a smart neighbourhood approach, and providing blueprints for replication. Importantly, these 6 demonstration districts are consistent with the new European Bauhaus principles by shaping more beautiful, sustainable, and inclusive forms of living together. The development of social affordable housing projects & activities

Objectives	implies a broad range of interventions, exceeding tangible assets (new or refurbished buildings, construction of new/upgrade of existing energy plants & infrastructures) and involving social & non-material resources. Therefore, the project aims to deliver new technical value propositions, including the evaluation of many advantages anticipated for raising the share of renewable energy utilized in the housing sector while lowering energy consumption per capita. In fact, the six pilots could be investigated to explore Energy Communities and Positive energy districts which are innovative in their functional scope. Simultaneously, ProLight project aims at social inclusion, increasing the quality of life of citizens, enhancing the valorisation of local social and cultural assets, protecting the environmental resources, boosting sustainable economic development, and local value chains, several impacts, costs, and benefits must be addressed within a multiple benefits approach to provide a comprehensive overview on the project activities. The ProLight project aims to contribute to the UN Sustainable Development Goals 5,7,8,9 and 11. The objective of this PhD research is to provide a digital impact mapping and multiple benefits approach designed to evaluate the project activities and to be replicated in similar situations. The key objectives and activities are: (i) definition of the concept: A review of multiple benefits concepts and their practical application towards the achievement of UN SDGs, to contribute to the inclusion of ESG criteria in social housing & urban investments is performed. This in context a maximization of interdisciplinary & inter-sectoral collaboration (urban planning, social sciences, economics, buildings physics, data analytics) is stressed. (ii) identification of most relevant benefits and related Key Performance Indicators (KPIs): A multiple benefits analysis is performed at the local level (demo scale). Thanks to stakeholders' engagement & active involvement, roadmaps to impact & multiple benefits mind maps will be locally defined & compared, to produce a shared framework and identify related KPIs. (iii) elaboration of an integrated assessment procedure: Based on the results of phase 2, and integrated assessment procedure is established, aiming to support the creation of a new value proposition, able to mobilize investors and communicate in an innovative way the potential such interventions. This PhD research will be partially conducted in the context of ProLight for which Eurac research center (https://www.eurac.edu/en) is one of the involved partners. The data collected from its relative pilot cities will be the basis of the research analysis. Therefore, the PhD activities will be joint research activities between Politecnico di Torino (POLITO) (https://www.dist.polito.it/) and Eurac. The activity will mostly take place in the (S3+Lab) "Urban Sustainability & Security Laboratory for Social Challenges" laboratory which is part of the SDG11Lab of the Interuniversity Department of Regional and Urban Studies and Planning, Politecnico di Torino, which integrates all existing relevant platforms and operating solutions for providing an infrastructure with a horizontal component, able to guarantee efficient access to general and reference data sources, and to host a variable number of vertical domains that require specific data and dedicated analysis tools. Being also a part of an Eurac Research project, the PhD candidate will spend 12 months at this research center in Bolzano (Italy) and 6 months abroad. The PhDs daily activities will be supervised by the main tutors with the contribution of the full environment of the laboratory and of Dr. Sara Torabi (POLITO) and Dr. Adriano Bisello (Eurac). This PhD research contributes to the New European Bauhaus initiative by supporting the local public administration for the digital and ecological transitions in communities' living environments through merging sustainability,

	innovation and inclusiveness.

Skills and competencies for the development of the activity	PhD candidate to be involved in this project is expected to have interest in theoretical perspective on energy communities and urban planning, KPIs evaluation and assessment and spatial analytical tools for Sustainable Smart urban planning, competencies in GIS mapping for sustainable evaluation. Moreover, the candidate should be familiar with the social and inclusive research methodologies (e.g., questionaries, surveys, and participatory approaches) to provide appropriate approaches to engage citizen in the remodeled neighborhood.