The role of radiant-based energy systems technologies in deep and effective retrofitting of the urban building stock

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The new EPBD (Energy Performance of Buildings Directive) regulation is a pivotal step in the EU's energy transition, shifting focus from individual buildings to districts and cities, to the entire building stock. This comprehensive approach mandates significant reductions in energy consumption and emissions, presenting challenges, particularly in countries like Italy, where historical heritage imposes constraints on building envelope retrofits. Radiant system, as part of system strategies integrating reversible heat pumps, mechanical ventilation, integration with renewable energy sources and enhanced energy distribution networks are key to maximise the overall energy system efficiency, offering optimal solutions for both heating and cooling needs in a changing climate. Demonstrating that these technologies can significantly improve the energy performance of buildings in cities without direct intervention on building envelopes, shows the importance of system efficiency, intelligent energy use, and advanced automation. The role of such technological solutions in enabling deep and rapid retrofitting of existng residential building stock will be explored as a fundamental component in achieving EPBD’s ambitious goals and driving energy transition.