

53rd AiCARR International Conference – From NZEB to ZEB: the buildings of the next decades for a healthy and sustainable future

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Preface

The adopted revision of the European Energy Performance of Buildings Directive (EPBD) requires that by 2028 all newly constructed buildings will be zero emission (ZEB, Zero Emission Building), and all existing buildings will have to become zero emissions by 2050. Such obligations will concern all residential and non-residential buildings (with some exceptions) and will provide for the achievement of challenging energy classes: residential buildings will have to reach class E by 2030 and class D by 2033; the other buildings, including those owned by public bodies, will be class E from 2027 and class D from 2030. The directive requires the Member States to present national plans for the energy requalification of buildings, leaving 15% of the most energy-intensive ones in the lowest energy class. According to Istat data, there are approximately 1.8 million residential buildings in Italy in class G out of a total of 12 million.

The expected exemptions will be able to mitigate the impact of this obligation, but the effects of the directive will be very important in countries like Italy. Here, a large part of the residential building stock was built before 1991 and the deep renovation of the older buildings would require significantly longer times than those expected at the European level, with higher costs.

At the same time, the increasing diffusion of renewable energy sources and the electrification of energy uses introduce urgent issues concerning the optimization of hybrid systems, the use of multi-source heat pump systems, different types of energy storage (including the use of new energy carriers such as hydrogen) in the context of an ever-increasing decarbonisation of buildings.

In this context, it is suitable to investigate, through the contribution of a wide-ranging analysis and more specialized studies, the opportunities provided by the integration of technologies, systems and building design in the transition from NZEB to ZEB, also considering the quality of the internal environment.

Based on these items, the 53rd AiCARR International Conference will present contributions of interest to the HVAC sector, relating to innovative design approaches, new monitoring and control systems, new components and systems, with related insights into their

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impact on energy consumption, comfort (thermal-hygrometric, acoustic, visual, air quality), and on the healthiness of internal environments.

Topics:

- Regulations and legislation: the European context, evolution of Italian legislation and regulations
- Innovation in components and plant technologies: hybrid systems, multi-source heat pumps, new refrigerants, new energy carriers, evolution of ventilation systems, renewable energy sources
- Innovation in building components and technologies: evolution of opaque and transparent structures, new building systems, air quality technologies
- Integration of control and home automation systems: energy efficiency, smart buildings, building automation control systems, artificial intelligence applications
- Interaction between people and building: indoor environment quality (thermo-hygrometric, acoustic, visual, air quality) in a holistic approach
- Buildings in an urban scale: energy communities, collective self-consumption groups, urban heat islands, district heating/cooling networks