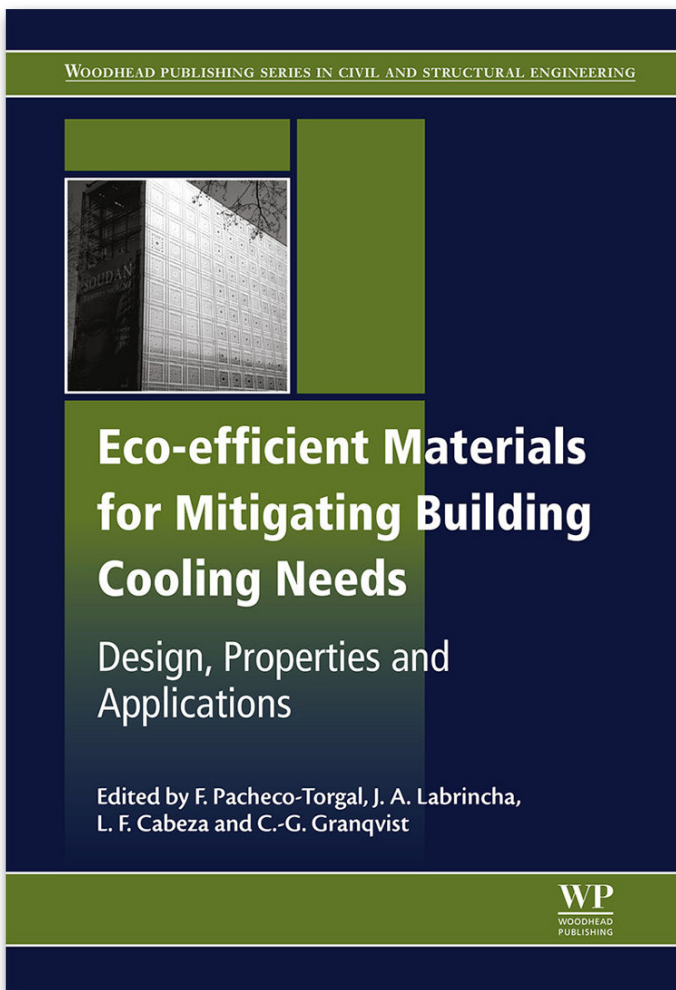


## Eco-efficient Materials for Mitigating Building Cooling Needs

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ISBN 9781782423805



The increasingly attention to environmental issues, the need to allow a future for the planet and for the next generations, more cynical expectations concerning difficulties in energy supply and cost of energy vectors, at today, have made non-negotiable a common goal of sustainability for the coming years. In this regard, the last years have been characterized, all around the world, by new awareness and loyalty in matter of reduction of the anthropogenic impact due to the building construction, the building use and, more in general, all aspects concerning the building sector.

According to the new targets of overall sustainability, in different ways and by means of several criteria, all around the world the future construction activity is oriented toward new

concepts of zero, net zero or, because of the relatively highest feasibility, nearly zero-energy buildings.

At European level, these targets have been established, for the first time in the history at a continental level, by the Recast version of the European EPBD (Energy Performance of Building Directive) 2010/31/EC and by the Directive 2010/27/EC. These documents introduce orientations and guidelines to be received by each national legislation. Only as reference, among the main defined goals, these standards established that, by 31 December 2020 - all new buildings should demand nearly zero-energy. Furthermore, a demonstrative role has been attributed to buildings occupied and/or owned by public authorities, so that the date of new nearly-zero energy buildings is anticipated, for these, at January 2018.

In the same direction, the Directive 2012/27/EC dedicated a key attention to the exemplary role of public bodies' buildings, establishing that each Member State shall provide periodical renovations of the owned building stock in order to meet at least the minimum energy performance requirements. Other prescriptions concern the necessity of long-term strategy for pushing (i) investments in the renovation of each national stock of residential and commercial buildings, (ii) policies and (iii) economical measures to stimulate cost-effective refurbishments, as well as "forward-looking perspective to guide investment decisions".

Even if only few things have been cited, it is quite clear that we are talking about very ambitious goals that, firstly, require a new approach in matter of energy efficiency in buildings. More in detail, an epochal change becomes mandatory in terms of a cultural, rather than technical, innovative point of view: the research of a synergic cooperation for an integrated work, involving different professionals, competences and stakeholders. In fact, the energy efficiency in the building industry is not only represented by some centimeters of thermal insulation panels, temperature of the gases of condensing boilers, or the energy efficiency ratio of a direct-expansion based cooling device.

It is, first of all, an enhancement of interactions between indoor and outdoor environment in the best possible way, under the perspectives of energy conservation, thermal comfort, valorization of historical heritage, livability and quality of life. In this regard, it is a matter of thermodynamics and architecture, urban planning and engineering.

Probably, these are the main motivations behind a book such as "Eco-efficient Materials for Mitigating Building Cooling Needs".

Thirty-seven scientists, of important Universities and research Institutions from all around the world, contributed by means of an up-to-date state of art in matter of materials, technologies and measures for reducing the active energy demand for the mechanical cooling of buildings. According to the large diffusion of cooling systems and by considering the more and more intensive use of these - because of the progressive phenomena of global warming and urban heat islands and the overall increase of indoor heating gains produced by the appliances - the new challenge is the reduction of the energy demand for the air-conditioning during the summer season.

This handbook presents four parts, starting from the description of materials and technologies for the mitigation of the phenomenon of the heat islands effects, and arriving to the most recent researches about phase change materials as energy efficiency strategy for allowing the latent heat storage. Of course, all most promising technologies in matter of new and refurbished walls and roofing solutions are also presented, in the parts three and four of the manual, respectively.

Because of the academic skills of the authors, the eighteen chapters are provided with exhaustive information concerning the literature state of art, with reference to the specific energy efficiency solutions and measures described in each section of the book. At the same way, after the presentation of such technologies, a discussion of the achievable performances and the thermodynamic scientific background is provided when necessary. Moreover, a proper section dealing with conclusions and future trends is also proposed in the

body of chapters.

The effects of vegetation integrated in roof structures and facades, the suitability of cool materials, nanotechnologies and PCMs, high-albedo pavements and evaporative cooling walls, as well as large sets of innovative fenestration systems (i.e., electro-chromic, thermos-chromic and spectral selective glasses are widely presented) are in-deep described and explained. Finally, the target behind this book was lofty. It is, according to us (note that we are authors of chapters, so that our opinion could be influenced by the great effort that we have spent for it), a first step toward a common work aimed at joining several complementary competences. For this reason, we prefer to finish this review with the words of one of the most important world scientist in matter of building energy efficiency, Hashem Akbari, professor at the Concordia University (Canada). He says that *"this book promotes a cool scenario by wide-scale utilization of advanced materials to reduce cooling energy use in buildings...it is recommended as a good read to both academics and policy makers"*.

As said, we are too much involved for subscribing completely these words. For sure, some months ago, when we accepted the commitment, just this was our aim.

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