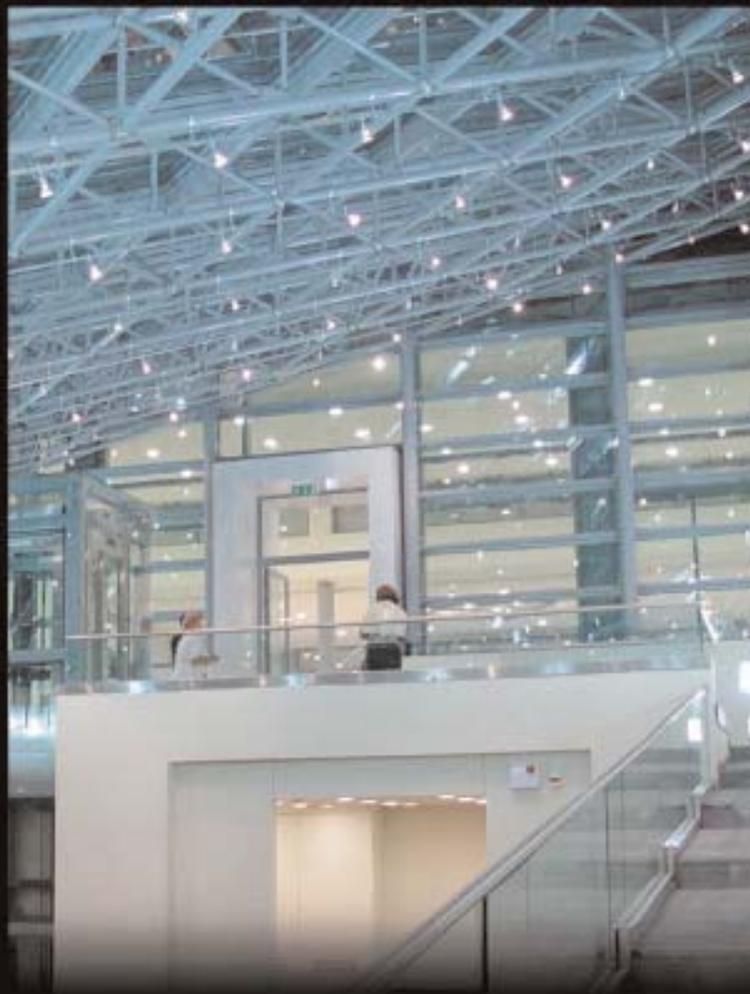


BUILDINGS | ENERGY | SOLAR TECHNOLOGY



advances in passive cooling

EDITOR M. Santamouris

# Advances in Passive Cooling



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# Advances in Passive Cooling

Edited by Mat Santamouris

Series Editor M. Santamouris

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# Preface: Why Passive Cooling?

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*Mat Santamouris*

The use of air conditioning in the buildings sector is increasing rapidly. Almost 46 per cent of houses in the Organisation for Economic Co-operation and Development (OECD) countries have air conditioning, and this level has been rising by 7 per cent each year. In addition, energy consumption for residential cooling in the OECD countries grew by close to 13 per cent between 1990 and 2000, and accounted for 6.4 per cent of the total electricity requirements of these countries in 2000 (IEA, 2003). In Japan, as mentioned by Waide (2006), the use of air conditioning in the service sector is estimated to be close to 100 per cent, compared with 63 per cent in the US and 27 per cent in Europe.

Intensive use of air conditioning is the result of many processes, in particular:

- adoption of a universal style of buildings that does not consider climatic issues and results in increasing energy demands during the summer period;
- increase of ambient temperature, particularly in the urban environment, owing to the heat island phenomenon, which exacerbates cooling demand in buildings;
- changes in comfort culture, consumer behaviour and expectations;
- improvement of living standards and increased affluence of consumers; and
- increase in buildings' internal loads.

## UNIVERSAL BUILDING STYLES

Adopting a universal style of buildings may have a very important impact on the cooling demand of buildings. Modern architectural styles that are poorly adapted to local climatic conditions do not allow efficient solar and thermal control, while the potential for efficient natural ventilation is seriously limited.

It is characteristic that universal-style glazed office buildings in Greece have a cooling consumption close to 200 kilowatt hours per square metre per