



Environmentally Friendly Cities

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FOREWORD

PLEA is a global invitation to the undertaking of ecological and environmental responsibility in architecture and planning. PLEA stands for Passive and Low Energy Architecture, a commitment to the development, documentation and diffusion of the principles of bioclimatic design and the application of natural and innovative techniques. PLEA aims to establish the highest standard of research and professionalism in building science and architecture, in the cause of symbiotic human settlements. PLEA serves as an international, interdisciplinary forum to promote the discourse on environmental quality in architecture and planning.

PLEA has been regularly organizing annual conferences since 1982. Up to 1998, the list of venues was as follows:

- 1982 Passive and Low Energy Alternatives - Bermuda
- 1983 Passive and Low Energy Architecture - Crete, Greece
- 1984 Passive and Low Energy Ecotechniques Applied to Housing - Mexico City, Mexico
- 1985 Architecture of Regionalism - Venice, Italy
- 1986 Passive and Low Energy Architecture in Housing - Pécs, Hungary
- 1988 Energy and Building for Temperate Climates - Porto, Portugal
- 1989 Global Environment and Architecture in the Post-Industrial Age - Nara, Japan
- 1990 Bioclimatic Design in Architecture and Planning - Halifax, Canada
- 1991 Architecture and Urban Space - Seville, Spain
- 1992 Architectural Responses to Climate Change - Auckland, New Zealand
- 1994 Architecture of the Extremes - Dead Sea, Israel
- 1996 Building and Urban Renewal - Louvain-la-Neuve, Belgium
- 1997 Sustainable Communities and Architecture - Kushiro, Japan

EXPO 98, a World Fair in Lisbon to celebrate the Oceans and their environment, created the perfect opportunity for organizing PLEA 98. EXPO 98 is more than just a Fair. It is also a case-study of a brand-new urban development scheme, with many lessons to be learned for the future. A large area (350 hectares), including the Fair grounds, was converted from a heavily polluted, degraded industrial site to a brand new neighborhood of the city of Lisbon for 20000 residents and 30000 workers. There, urban planning and severe building regulations relying on environmental concerns and renewable energy, have allowed only energy efficient building designs to be licensed. The whole site is served by the first district heating and cooling system in Portugal, removing outdoor air-conditioning units from the buildings themselves. Several buildings have already been selected as Energy Demonstration projects for Portugal and for the European Community (Project THERMIE).

This made Lisbon the ideal venue for PLEA 98. In addition to the usual scientific exchanges that always take place in PLEA Conferences, interesting site visits always provide an excellent complement to the scientific program.

Once this decision was made and PLEA International awarded this event to the Local Organizing Committee, the usual steps were taken and contributions were offered in response to the conference announcement. The respective authors are the first to be acknowledged here: without them, there would be no conference. But the contributions published in this book of Proceedings, those presented during PLEA 98, are only the cream of the offered contributions: this book contains 162 contributions selected from a total of 234 that were submitted for presentation. The Scientific Committee reviewed each contribution thoroughly, both the initial abstract and then the full version, and rejected those that it deemed not suitable or of a lower quality, often submitting comments to the authors for them to take into account, in the usual procedure associated with Peer Review. The Scientific Committee, which it was my privilege to chair, played a fundamental role, and their work must therefore be acknowledged too. Their names, in alphabetical order, are listed next for the record:

- Prof. Albert Dupagne, Univ. of Liège, Belgium
- Mr. Alexandros Tombazis, Meletitiki, Athens, Greece
- Prof. André de Herde, Univ. Louvain-la-Neuve, Belgium
- Prof. Donald Watson, Rensselaer Pol. Inst., USA
- Prof. E. de Oliveira Fernandes, Univ. of Porto, Portugal

- Dr. Helder Gonçalves, INETI, Lisbon, Portugal
- Dr. J. Douglas Balcomb, Nat. Ren. Energy Lab., USA
- Prof. J. Owen Lewis, Univ. College, Dublin, Ireland
- Prof. Matheos Santamouris, Univ. of Athens, Greece
- Prof. Servando Alvarez, Univ. of Seville, Spain
- Prof. Simos Yannas, Arch. Association, London, UK
- Prof. Steve Szokolay, Univ. Queensland, Australia
- Dr. Yuichiro Kodama, Building Research Inst., Japan

Every year, PLEA honours a distinguished scientist or a practising architect for their contribution to passive and low energy architecture in their respective fields. This year, PLEA 98 honours one of each: Architect Alexandros Tombazis, who has a long list of projects where he demonstrates in practice the principles of rational energy design of buildings; and Dr. J. Douglas Balcomb, a pioneer in the development of quantitative methods for evaluation and performance prediction of passive solar buildings, with an extensive list of published works that are almost mandatory as references for the work of many other researchers in the same area. It is a pleasure to have a lecture by each of the recipients of the PLEA 98 Award as invited contributions in this book. They are both enlightening and worth reading many times over.

A special word of thanks to the other four invited lecturers. The descriptions of the planning of EXPO 98, both in terms of Urban Planning (Arch. Luis Vassalo Rosa) and Energy Planning (Prof. E. de Oliveira Fernandes) are an excellent record of a unique effort that deserves commendation. Prof. Manfredi Nicoletti, who immediately said yes when first invited, presents an important array of works where he also demonstrates that it is possible to reconcile passive solar with award-winning architecture. And Prof. James Woods draws our attention to a very important though often ignored aspect of living in passive solar buildings: indoor air quality, a topic that, more and more, is the focus of attention, especially for the negative consequences that derive when designers ignore it.

This book also owes much to another group of young persons, students and staff that work in my group at the University of Porto, that devoted long hours and several weekends during a long month when each contribution was changed from an assortment of formats to the common format that readers will find in this book. Despite precise instructions for preparation of manuscripts, supplied by James and James, the Publishers of this book, or, maybe, exactly because of their complexity, only a handful of the contributions arrived in a format close to what had been requested, often with many spelling errors, unreadable figures, and many other problems, namely those resulting from almost incompatible software packages used in their preparation. It took a lot of dedication, ingenuity and patience to transform them into the version that was finally printed. Not everything was of course corrected, and the quality of illustrations sometimes is not ideal, but it was the best possible outcome that could be obtained from the materials that were submitted. Their names, also for the record, in alphabetical order, with my most sincere recognition: Daniel, Fernanda, José Luís, Miguel, Rosa, Sandra and Victor. Without them, many of the contributions would have been refused for being too far off the common format.

Of course, many other persons were involved in organising the conference, but the list is so long that they cannot be individually recognised here as they were not directly involved in the preparation of this book. Nevertheless, our thanks to all of them, because this book is but just one component of the conference, albeit the one that lasts as a record for posterity.

Finally, a disclaimer: the scientific committee reviewed each paper in terms of scientific value and absence of factual errors, but the contents and opinions expressed are the sole responsibility of their authors. There was absolutely no censorship, even when statements or illustrations have political or policy content that transcend the strict scientific character of this book. The role of the Editors was simply one of preparing a coherent book, selecting the appropriate contributions that met the conference and publications standards, and organising them in a reasonable sequence that the readers should find meaningful and informative. I hope that you will find it as interesting as we enjoyed putting it together.

Eduardo Maldonado
April 1998