The 2005 World Sustainable Building Conference,
Tokyo, 27-29 September 2005 (SB05Tokyo)

WORKING WITH CLIMATE – FROM THEORY TO PRACTICE

Alexandros N. TOMBAZIS, Architect

Meletitiki – Alexandros N. Tombazis and Associates Architects Ltd.
27, Monemvasias str., GR 151 25 Polydroso – Athens, Greece
e-mail: meletitiki@hol.gr

Keywords: architecture, sustainability, climate, bioclimatic design, energy-efficiency

Summary

As a result from practicing architecture for over forty years the author has developed a series of thoughts on Sustainability and Architecture leading to his basic conviction that bioclimatic design is not an option one can have or not have, but an element of vital importance in architectural design. Designing according to bioclimatic principles, then, is not only functional or energy saving, but in a true sense beautiful and complete. Some of the basic thoughts deal with:

- Buildings as living organisms
- Designing from the inside-out or from the outside-in?
- The hidden dimensions of architecture
- The skins of plants, animals, buildings
- Fictitious versus real design constraints
- Past and future – Learning from tradition
- Preventing and foreseeing instead of curing
- The notion of “Less is Beautiful”

Figure 1 Entry for the New Concert Hall Competition, Stavanger, Norway

The theoretical part of the paper is followed by a presentation of some of the office’s built examples viewed from the aspect “Working with (and not against) climate”.

Figure 2 Office Building, Syngrou Avenue, Athens, Greece

Figure 3 Power Distribution Centre, Athens, Greece

I.Introduction

Presented are some basic issues which should fundamentally effect all architectural design as a normal procedure during the design process.

1. Buildings as Living Organisms

Our approach to the design of buildings is a static one, as if a building exists in a state of constant stability. We calculate and size its components and services to meet the different conditions set out in the building regulations. This is a narrow-minded and insufficient approach. If we look into nature we will see flowers open up when the sun hits them and close again as soon as the sun is gone. We will notice the behaviour of animals change in response to climatic conditions. We ourselves will put on or take off extra clothing as necessary. But what about a building? Why shouldn't we approach the design of a building in a dynamic way, just as if a building were a **Living Organism**, just as alive as any human being? A building feels cold or hot, it should be able to protect or expose itself to the sun and wind, it should breathe and perspire. We should anticipate what a building would tell us if it would have a voice.

Figures 4 and 5 Office Building, Marousi, Athens, Greece

2. Designing from the Inside-out or the Outside-in?

We too often conceive of our buildings as positive and finite objects floating in **negative** space, which means that too often they little relate to their natural or man-made surroundings. We should, however, also conceive buildings as the left over of the **positive** exterior space. In this way we will form our structures related to and as a result of their surroundings. After all the shell of a building is just as much the shell of the outside space to which it belongs.

3. The hidden dimensions of Architecture

Architects basically use their eyes – they practice by using their eyes. And in doing so they forget about the many other senses, the many hidden dimensions of architecture. To mention a few:

Time, organises space and relates buildings to climate and nature. A simple wall is different in the morning, different at midday, different in the evening, different in summer, different in winter. It behaves differently, it looks differently. This is related to time and very often when we are designing we do not correlate the object we're designing, how it will behave and how it relates to time.

Another hidden dimension is **Air**, which allows us to feel space. We design space and we think that it's empty. But space is never empty. It is always full of air and air behaves according to the laws of physics. Warm air rises, cold air takes its place. If you have openings on one side of the space on the same wall, it's completely different to whether you have openings on two sides. So we need to think about how air behaves and how it relates to the user and to the performance of the space.

Light is life itself, architecture cannot exist but with light. We take it too much for granted and forget its true value. We abuse light with insensitive and careless solutions and by substituting it too often by too much unnecessary artificial lighting. In previous times great architecture depended on daylight by way of intuition, experience and feeling. Today, further to feeling, we have both the knowledge and tools to make an even greater and creative use of it.

Sound. Again we design space and we think it's empty. But sound floods space. A space can be really dull, it can be monotonous, it can be lively, it can behave in any way we want it to behave, depending on how we design it. So once again this hidden dimension should be a very important design factor. And it is not enough to just depend on the specialists, the acousticians to design the sound of a space. That is necessary and very important in special conditions, but in general conditions it should be the design team, it should be the architect, who should generate this aspect.

The last hidden dimension I will mention here – for there are many many more – is smell, odour. **Odour** captivates us in the most intimate of ways. One can remember a space, remember an occasion just from the smell.

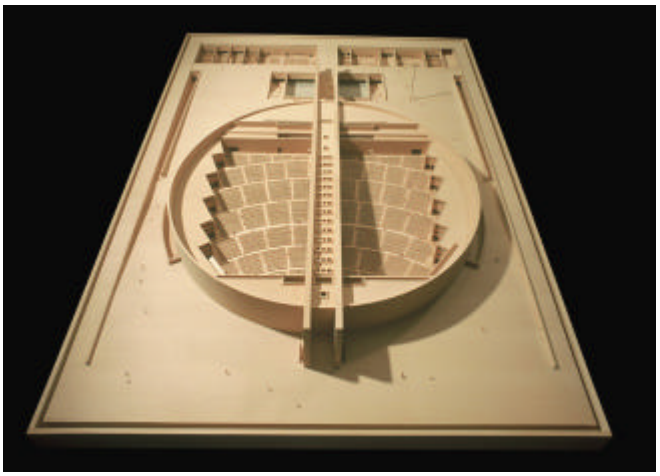
How does this relate to architectural design? How much does an architect when he's designing, walk through his space and look at it step by step from the point of view of time, air, light, etc. He may look at each of these issues independently, but then they all have to come together. This is a beautiful and important exercise. As Thales said many years ago, the wisest thing is time, because it discovers, it brings all things to light, and the biggest thing is space, because it can include everything.

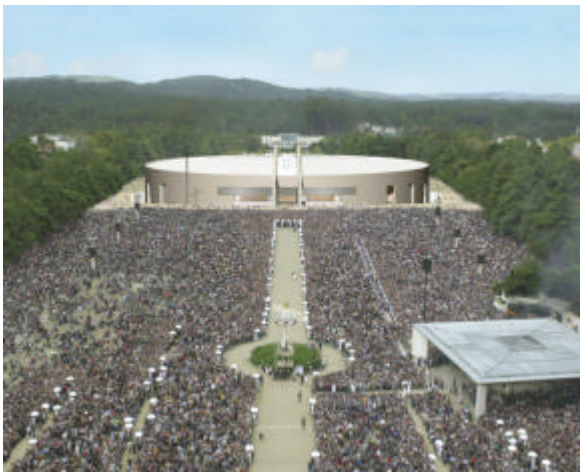
Figure 6 Electricity Authority of Cyprus Headquarters, Nicosia, Cyprus

Figure 7 Greek Refinery Headquarters, Aspropyrgos, Greece

4. The skins of plants, animals, buildings

Environmental friendly or bioclimatic buildings depend more and more on their skins. We still, however, come to develop the skins of our buildings in a far too conventional way, primarily dominated by “skin-deep” aesthetical concerns. We have a lot to learn from the skins of other living species such as plants, fruits, animals and even more so from the skin of the human being. We should learn from such comparisons and then develop the skin of our buildings in much more innovative and appropriate ways.





Figures 8 and 9 Sanctuary of Fatima, Church of the Most Holy Trinity, Fatima, Portugal

5. Fictitious versus Real Design Constraints

We are afraid of constraints as if they limit our freedom of design. Architecture cannot be created in a vacuum, it is to the contrary built up on constraints. We too often invent our own fictitious and frivolous constraints to prove our preconceived ideas, while the world around us is full of beautiful constraints, such as those related to time and place, which we have but to respond to.

6. On past and future - Learning from tradition

In order to be able to foresee the future, to plan, to design for the future, one must learn from the past. But is just a romantic approach enough? We all admire vernacular, but we look at it only with our eyes. We look at it in a romantic way. It’s not enough. What is necessary is to understand the why of everything. In past times they had the benefit of trial and error. It took a long time to develop anything, progress was very slow. So there was time to correct all the mistakes that one made. The means were limited and that forced humankind, forced designers, to think more, to be more clever than we are today with all the mechanical means we have. In the past it was scale which regulated everything, the size of everything was small and that would make it much easier than it is today to solve problems. Climate was on the side of the designer, on the side of the human being, and that was taken very much into consideration, because in the end one could not do otherwise.

7. Preventing and foreseeing instead of curing

We rely too much on heavy doses of medicine, such as the electrical and mechanical services of a building, to cure our inadequate thinking and the design mistakes that we make in the first place. We should concentrate much more on preventing and foreseeing, which means designing in the appropriate way, right from the start. Then services will be confined to their appropriate and necessary role of being complementary, back-up systems, instead of becoming the building itself.

8. The notion of “Less is Beautiful”

Mies van de Rohe in his important work had the credo that ‘‘less is more’’. It was an attitude of minimalism, of purity of design. I think this was very important and correct. Robert Venturi, as a reaction to the previous, said that ‘‘less is a bore’’, that we cannot regulate everything. Life is untidy, design should be, to a certain extent, untidy too. It was Schumacher in the time of ecology and sensitivity to the problems of the planet Earth, who said that ‘‘small is beautiful’’. We should use scale, some things should be solved at a smaller scale.

I believe we should design for **Less**, which does not mean little or an inadequate compromise, but the appropriate minimum for each case. To design and think in this way is **Beautiful** with a deeper inner meaning, as it implies that we concentrate on the essential and meaningful in the most beautiful manner.

Figures 10 and 11 Mosque, Dubai, U.A.E.

II. Working with (and not against) climate
Buildings dealing with different climatic conditions

- **Northern Europe**
  Entry for an international competition for the new concert hall in Stavanger Norway, commendment (in collaboration with H. Rostvik, architect, Stavanger) (fig.1)

Figure 12 Private Residence in the Desert, U.A.E.

- **Southern Europe - Mediterranean**

  A number of recently built office buildings in the same geographical area is presented, each demonstrating different design solutions corresponding to its specific local conditions:

  - Headquarters for the Electricity Authority of Cyprus, Nicosia, Cyprus (national competition, 2nd prize, in collaboration with A. Gabrielides, architect, Nicosia) (fig. 6)
  - Greek Refinery Headquarters, Athens, Greece (invited competition, 1st prize) (fig. 7)
  - Public Power Corporation, Refurbishment of power distribution centre and office building, Athens, Greece (fig. 3)
  - Office building, Syngrou Avenue, Athens, Greece (fig. 2)
  - Office building in the suburb of Marousi, Athens, Greece (fig. 4,5)

- **Western Europe**

  Sanctuary of Fatima, Church of the Most Holy Trinity and Assembly Hall for 9,000 pilgrims, Fatima, Portugal (international competition by invitation, 1st prize. Execution phase of design in collaboration with P. Santos, architect, Porto) (fig. 8,9)

- **Near East**
  - Mosque in Dubai, U.A.E. (fig. 10,11)
  - Private residence in the desert, Ras Al Khaimah, U.A.E. (fig. 12)

- **Far East**

  Entry for the international competition for the Kansai-Kan National Diet Library, Kansai Science City, Japan (fig. 13)

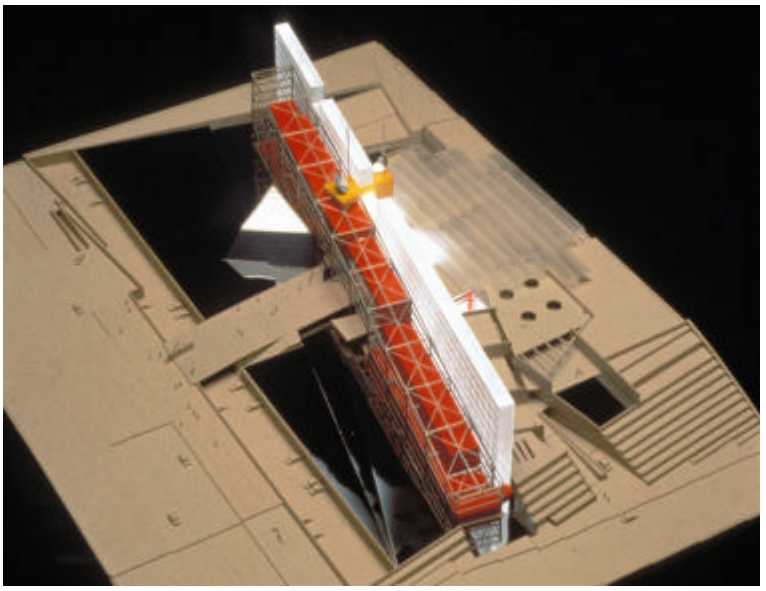


Figure 13 Entry for the Kansai-Kan National Diet Library Competition, Kansai Science City, Japan