MEDICLIMA 2015
STRATEGIE ENERGETICHE E AMBIENTALI IN AREA MEDITERRANEA
ambiente - comfort - clima - acustica - illuminazione
il ruolo delle costruzioni nell' efficientamento energetico previsto dalla Rooadmap 2050

GTFA
Gruppo Fisica Tecnica Ambientale

Coherent Sustainable Architecture

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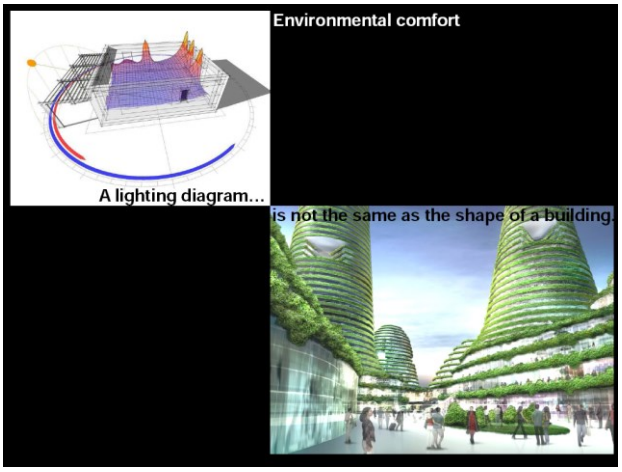
Summary
To proceed in the development of genuine sustainable architecture in the Mediterranean climate, the themes and parameters to be taken into account are diverse. Only through a comprehensive understanding of these heterogeneous criteria, we can reach a coherent desiugn method, with will obtain significant results as far as the reduction of CO2 emissions during the construction and exploitation of buildings is concerned.

1. Introduction

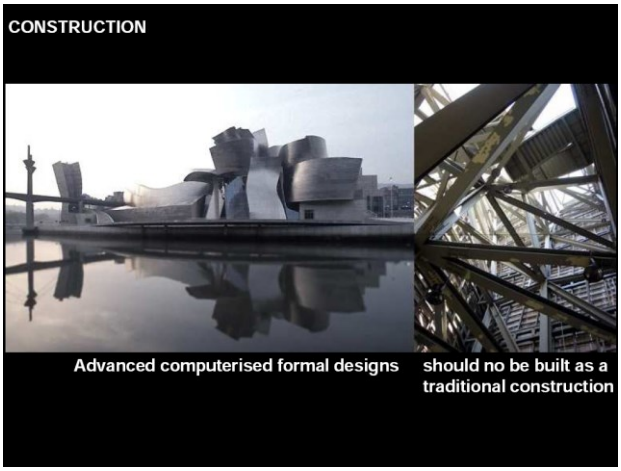
Construction in the Mediterranean climate has the potential to reach NZEB and Passive standards for a broad part of the building stock, without the application of complicated technologies. The practices of B01 Arquitectes in the region of Catalonia from over thirty year haves shown us how the architect can gradually improve building performance within coherent architectonic concepts.

1.1. Figures

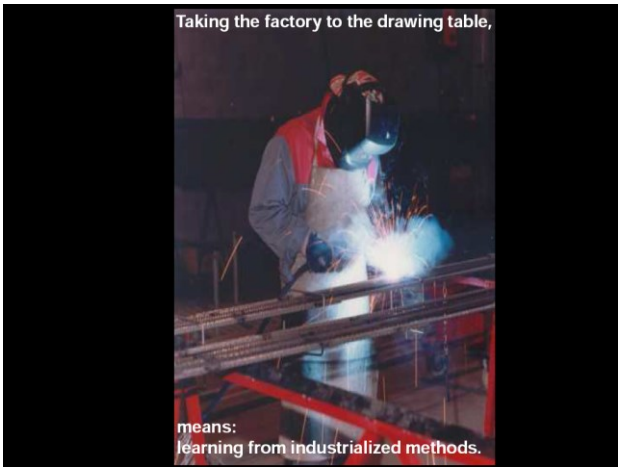
01- The main lines that defined the work of the studio have been those related to the way of construction of our buildings, the interior and environmental comfort of the users and the energy efficiency during the use of the building.



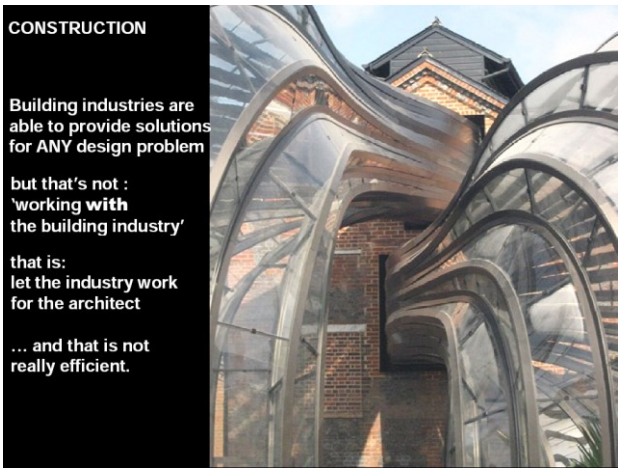
02 - In general there exists confusion about how the input of scientific data and measurments should be translated into a project. Some (MVRDV) take the outcome of software calculations as an excuse for formal design.



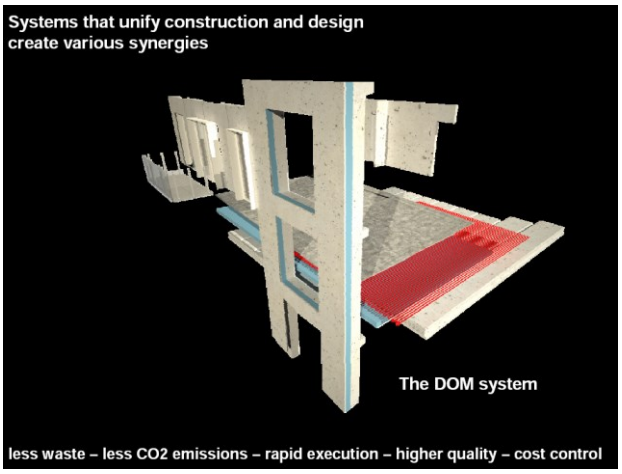
03 - Others (Gehry) use highly advanced software technologies to create the formal project that does not have any coherence with construction methods.



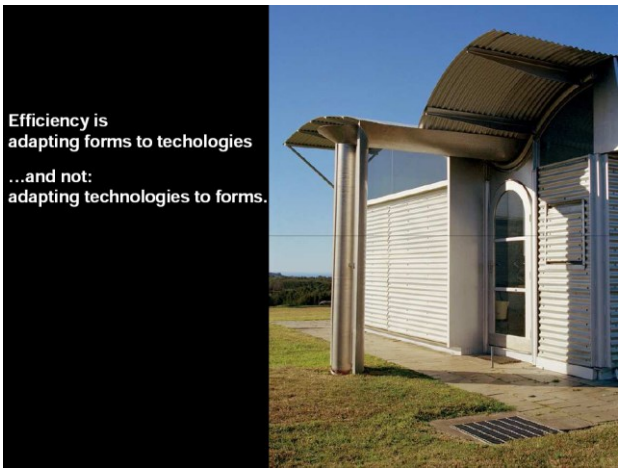
06- At the moment of design teh consequences of production of building elements should be taken into consideration.



04 - Building industries can provide solutions for any complicated design but that is not what a coherent approach to design and construction is about. Efficiency has to be obtained through other working methods.

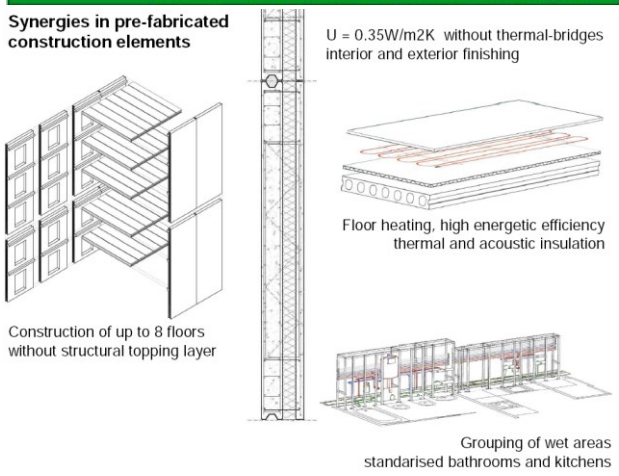


07 - Incorporating taking the industrialization of construction into the design process and using industrialized methods, the benefits are many. They are at the same time economical, qualitative and environmental.

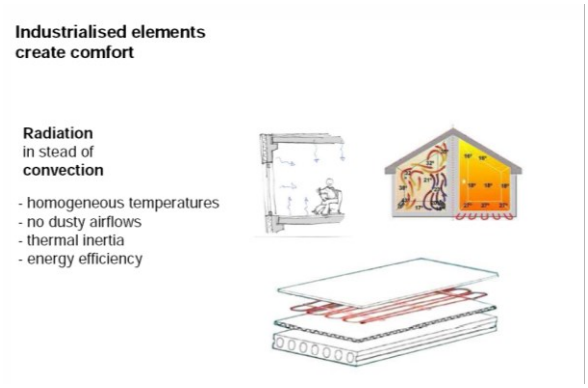


05 - This does not mean that formal possibilities are being limited. The question is just what form is apt for what technology.

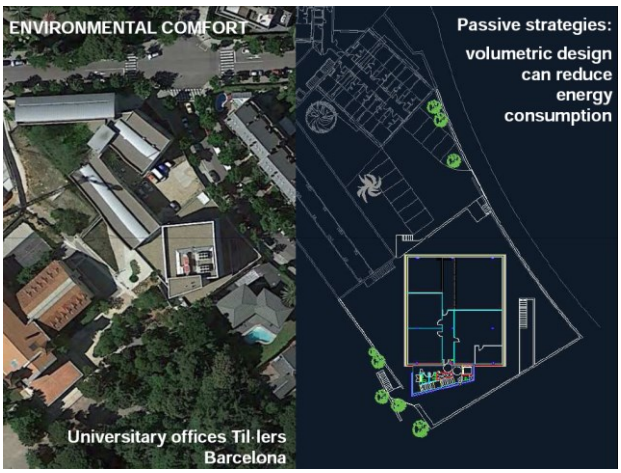
08 - These systems are apt for application in high density urban projects like social housing, where their economical benefits are evident.



09 - The synergies that industrialised systems create can affect positively in the structural conception, the climatic comfort and the interior lay-out of social dwellings simultaneously.



10 - Combining into the production of hollow-core floor slabs systems of floor heating might, for example, improve energy efficiency and thermal comfort at the same time.

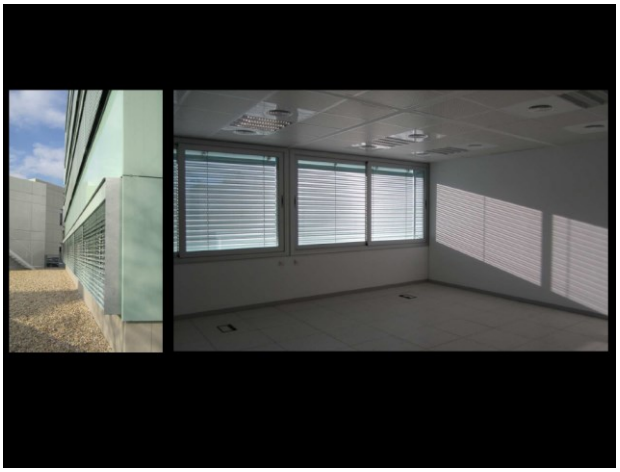


11- For our project for the Til·lers University offices, elementary formal decisions increased the possibility to use passive strategies: the orientation of the block was radically north south.

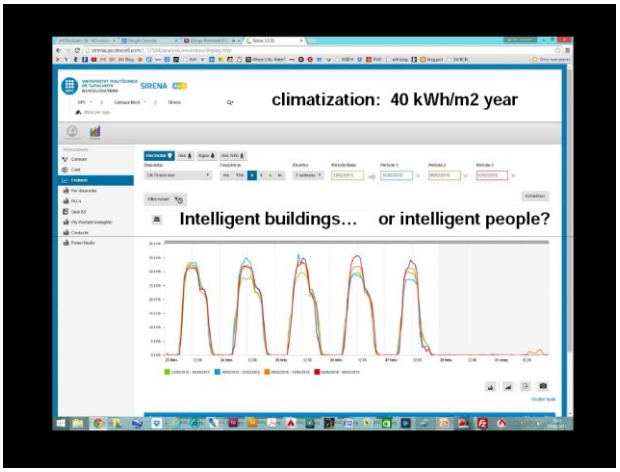
12 - While the south facade was completely opaque, the east and west facades have shading elements for solar protection, which can be regulated by the users themselves.

13 - These shading elements, micro-perforated blinds, can be lowered and orientated, and thus be adapted to overcast or sunny weather and to sun-ray inclinations throughout the year.

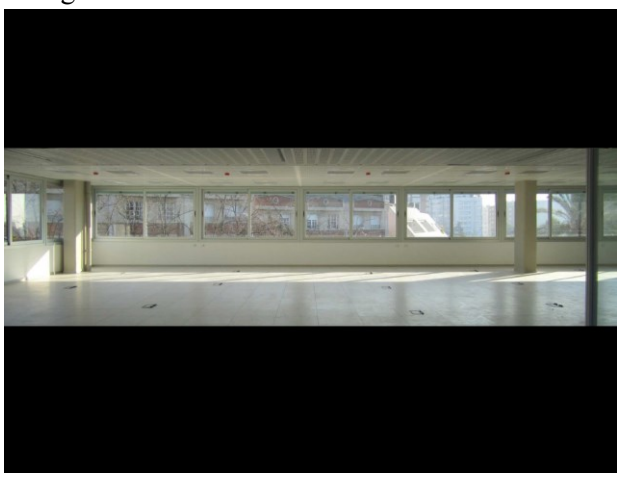
14 - The north facade is not protected by shading elements, as to create a constant entrance of indirect natural daylight.



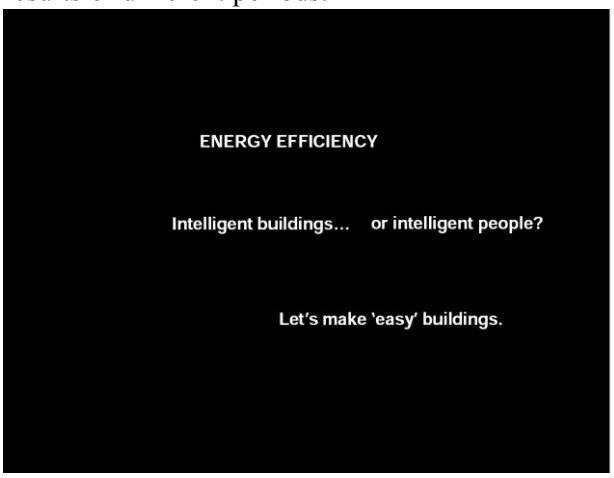
15 - The reduction of the energy demand for illumination is a substantial reduction of energy costs, especially in offices, where artificial lighting is in general used in excess.



18 - The energy consumption is, together with all other buildings of the polytechnic, monitorized through the SIRENA program, which shows the results of different periods.

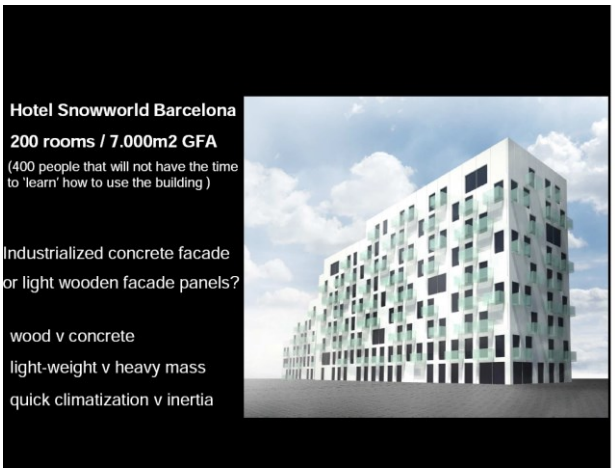


16 - The open layout of the floor-plan and the depth of the building are such that natural daylight can enter deep into the office spaces.

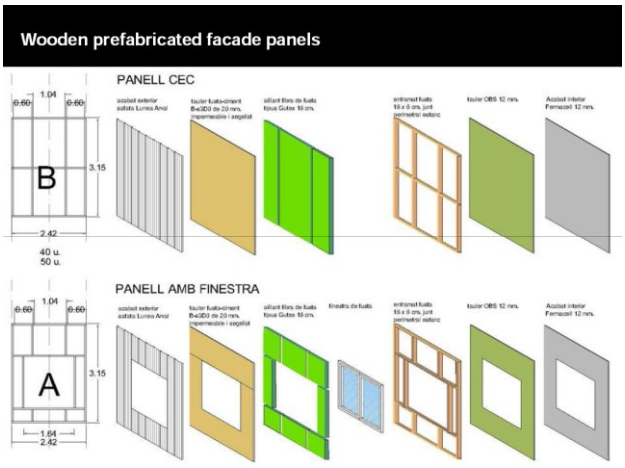


19 - Making the users conscious of the importance their behaviour, consumption has been reduced 20%. Using the building adequately is not difficult.

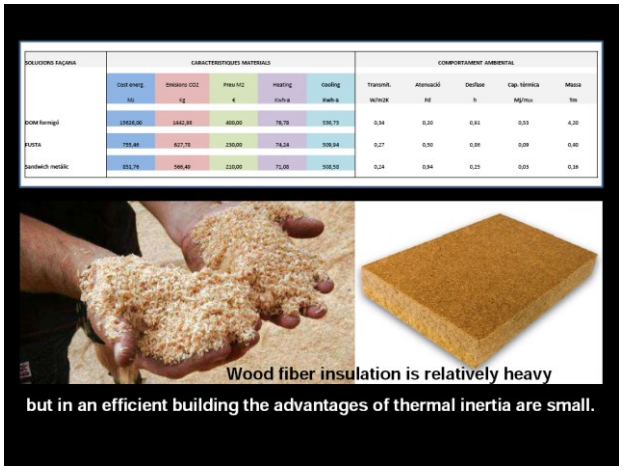
17 - The surroundings are very green and opening the windows in this environment is an example of brining natural comfort into the building.



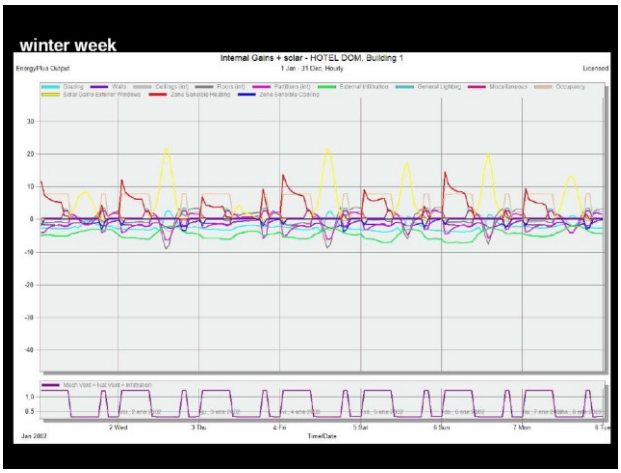
20 - For the project of a future hotel we had to deal with the doubt to use a concrete facade with big thermal mass or light wooden elements.



21 - The application of these panels obviously obeys to the aim to apply industrialised systems, reducing the ecological footprint of construction.



24 - What has been decisive for the selection of materials was then the CO2 impact of the elements during their production.

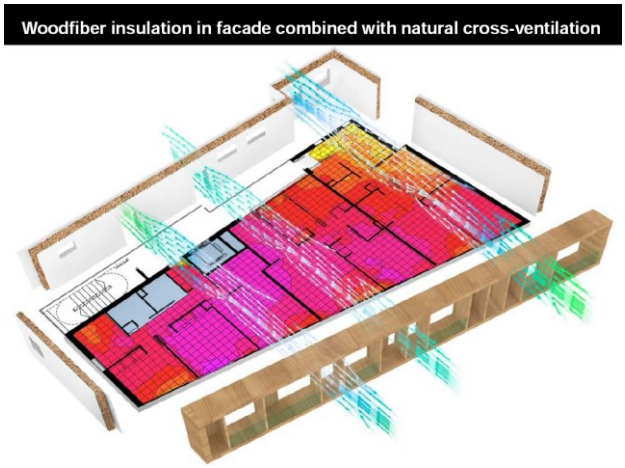


22 - But to control the consumption during the use of the hotel, dynamic analyses were made to see how energy consumption would be, supposing that the users will have no idea how to use the building.

25 - These elements might be used also in the rehabilitation of energy deficient social housing, where their design has to be adapted to the fact that they will be applied to very different buildings.

23 - It was clear that the energy consumption during summer would be more than during winter and in the end the thermal inertia, enhancing cooling, was not the most important factor in the equation.

26 - For a competition for a building with 14 social dwellings in Barcelona a preliminary computerised analysis of its solar potential, both for climate and lighting, generated the basis for the design.



27 - The result was a project, based on a combination of material, thermal, lighting, ventilation and construction criteria, all brought together in a coherent design.

28 - The criteria that in the end define the projects of B01 arquitectes can be resumed as: application of industrialised systems - easy to use and save energy - energetic computerised modelling as a basic ingredient for the concept - a rigorous analysis of the context - the use of materials with low ecological impact. It is the comprehensive understanding of these ideas that lead to coherent sustainable architecture.

2. Conclusions

The circumstances and criteria that permit the architect to realise, through his projects, his sincere sustainable objectives in building design, are of very heterogeneous. Even so they are interconnected in multiple ways, although these links might not seem evident at first. Not recognising theses mutual relationships leads to lost chances to exploit synergies.
Incorporating the influences of all these themes is admitting the relativity of the importance of each of them, which for some might seem like putting 'architecture' in a minor role. This does not count on the ability of architects to join together different inputs into a coherent whole, which is, as a matter of fact, precisely the essence of architecture, as a simultaneous response to a combination of various necessities.

Sander Laudy
Barcelona, March 2015