



Matter, form and energy

ARCHITECTS

DATE & PLACE

DEVELOPER

CONSTRUCTOR

AREA

INDUSTRIAL COMPANIES

Ruiz-Larrea & Asociados

2012, Sevilla (Spain)

Agencia Andaluza de la Energía

UTE GEABENSA

11.187,32 m2




Lledó iluminación
Cricursa S.A.
Sistemas TDM
ABC Rotomotor

CONCEPT

The building as an organism or energy machine.

The building is the result of a PROCESS that, paying attention to energy and spacial cryteria, allowing to achieve an architectural result free from any formal apriority. In this sense, the fundamental standards that fed the process had been:

1. Exhaust the edificability, thereby the original geometry of the project can be understood as the maximun capable volume, whose voids and subtractions respond to functional and energy requirements.
2. Design whit special attention the interior spaces of the building, attending to lighting, thermal and acoustic confort of its users.
3. Reinterpret the forms of traditional Andalusí architecture, understanding them as passive systems of great efficiency, supplemented by active low consumption energy sysems.
4. Obtain an energy behaviour with lower demands, also using the preexistent infrastructures (water network to disipate the heat), and capable of being double sided used through the year, taking into account the extreme conditions in summer, but studying with detail its behaviour in winter and midseason climate.
5. Design a industrialized and energy active skin system: a bio-perfectible skin that would be developed for the building as a first example of its application.




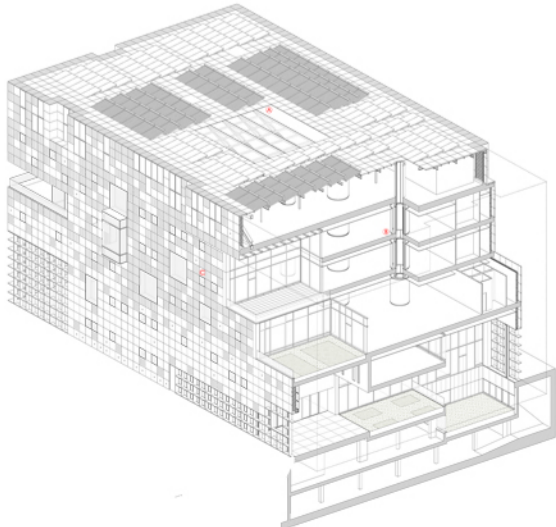
Technology and development

INNOVATION

The Pattern. By the use of a pattern the energy solicitations of the close environment are geometrically translated from the geometry of the lot, the structural efficiency and the relationship whit sun lighting and dominant winds, originating a mesh that allows to shape spatially the building.

Therefore, the configuration of the pattern can be understood as the superposition of three layers: urban and structural layer, attraction of fresh wind direction and the best solar orientation. Applied over the maximun capable volume of the building -a parallelepiped with optimal form-factor coefficient- this mesh creates an ENERGY SPATIAL PATTERN capable of solving in its framework the skin of the building, as well as its interior spaces.

The Skin. The envelope of the building, regulator system as well as controller of the interior environment, is constitute by a skin two layers with an air chamber. The external layer constitute a protective or permeable finish to the building, according to the different moments of the year. This skin is self regulated by the air chamber, which remains open or close according to the exterior climate conditions.



SYSTEMS

▲ Sectioned Axonometric view of the Building

A) SKYLIGHT

B) LIGHTWELL

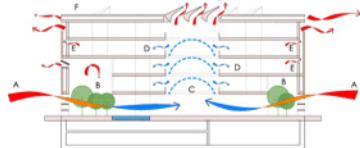
C) BIOPIX

▲ Energy mesh (application of the patern)



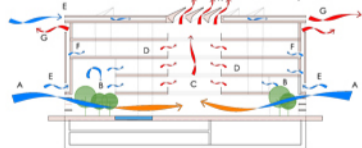
Energetic performance

▼ Natural ventilation / day - summer time




A. Wind entries during day hours, mainly with SO and NE direction
B. Air cooling boxes by humidity input in patios and shadow spaces
C. Fresh air confined in the atrium space, protectec from solar radiation
D. Fresh air entries, helping the air renovation system
E. Viced ir ejection by solar chimneys sourrounding the envelope
F. Ventilated rooftop, disipation of high solar radiation
G. Hot air exit through the atrium roof

▼ Natural ventilation / night - summer time



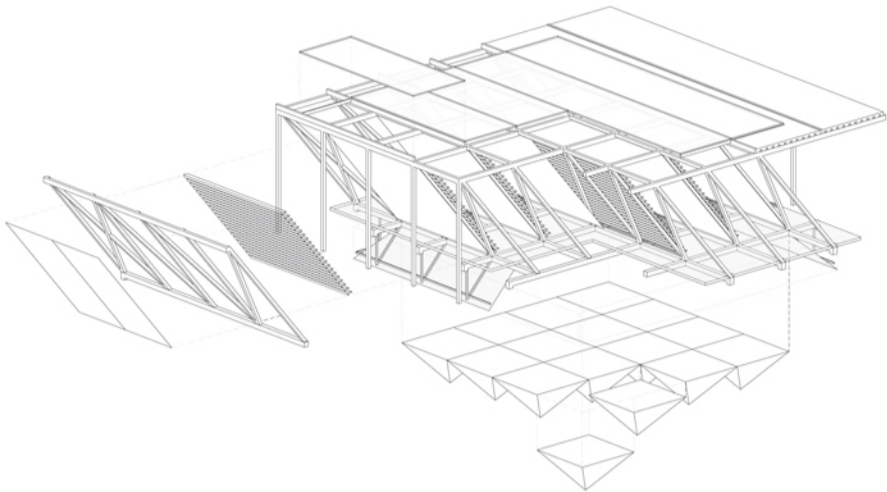
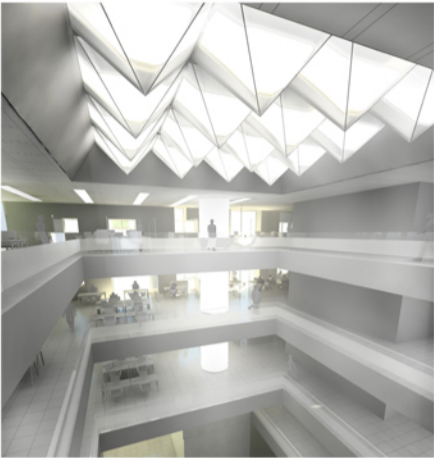
A. Wind entries during day hours, mainly with SO and NE direction
B. Air cooling boxe. Accumulation of fresh air during day.
C. Fresh air suction by atrium space
D. Cooling in different levels
E. Ventilation of the envelope in roof and façades. Morning fresh wind entries
F. Fresh air entries through the two layer façade
G. Hot air exit through
H. Hot air exitth through the atrium, produced by chimney effect



Skylight

The mocarable skylight, following invariants of Andalusian tradition, is an architectural feature designed as well to allow as much light to enter the building with natural overhead optimally depending on the season cycle, as the evacuation of stale air from inside the building.
The skylight allows: recruitment of light during the winter through the south facing slope, radiation protection during

summer time and diffuse light capture (the mocarabe as a reflection) and radiation avoidance in south and south-east orientation. Its constructed with reflective materials such as white plaster and aluminum, as well as other with high thermal inertia. The camera inside the skylight is used as a thermal mattres for the interior of the building.

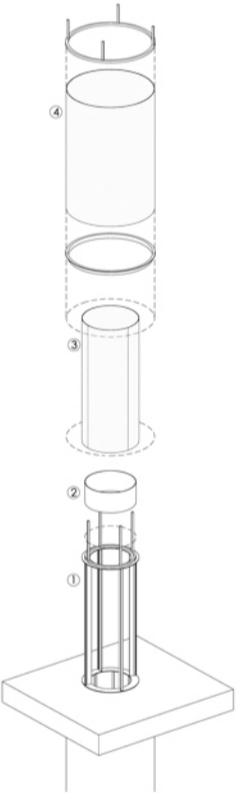


▲ Exploited Axonometric view of the Skylight

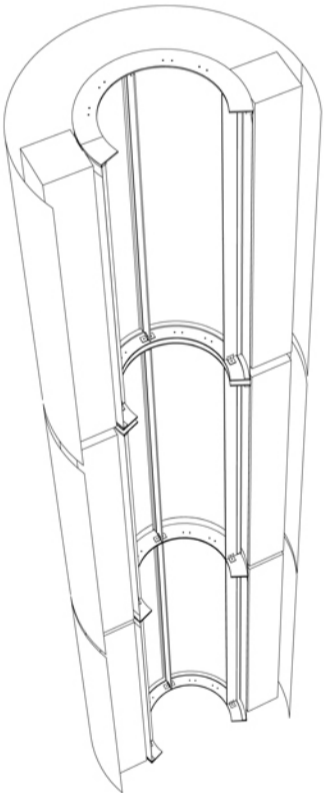
Lightwell

The lightwell is a lighting system composed by pipes capable of transfer in an efficient way natural light from an upper focal point to various inferior spaces. Agains other similar systems, known and availables in the market (solar tubes), the lightwell colimates the light beam in an efficient way, delivering it keeping adequate lighting levels not only vertically, but also horizontally. The vertical pipe, by which surface the light is transmitted, it's not, as in conventional

systems, opaque, but completely transclucid., putting together the undoubtable advantages of the system in the energy consumption field with a new image. The lightwells can become into adequate elements in order to create lighting atmospheres inside a building, occupying less useable space than traditional lighting patios and, at the same time, allowing a strict control of the illumination levels.



▲ Exploited Axonometric view of the Lightwell

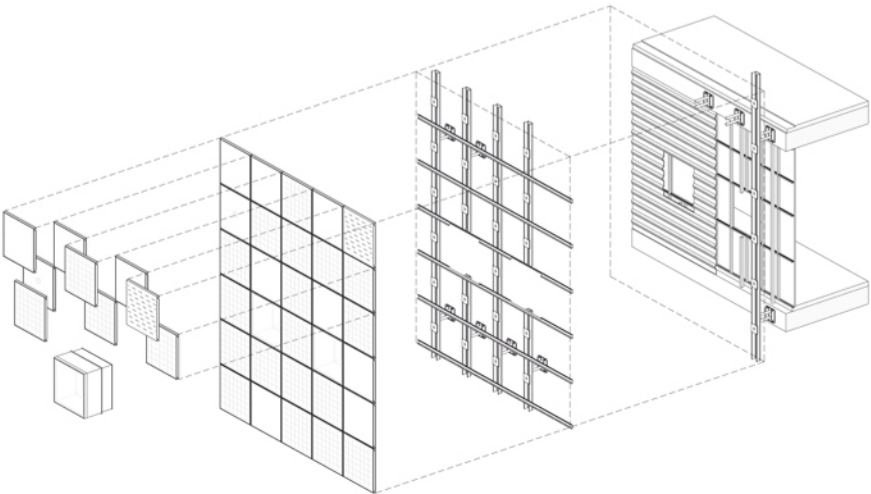


▲ Sectioned Axonometric view of the Lightwell

Biopix Façade

The Biopix façade is a flexible system which allows to configure different kinds of building envelopes, integrating both traditional cladding elements as other more sophisticated systems like photovoltaic panels, LED displays, etc...
The configuration of the envelope responds to the specific conditions of each place and the functional needs of economic availability of each property. The system allows flexible and adaptable constructive solutions, configured with a simple and low maintenance. As an alive organism, the skin is adapted depending on its physical location.

The pattern of the skin appears by the composition of individual, industrialized and highly specialized elements. This skin is developed differently depending of the requirements of each project, putting together the energetic functions of passive protection with the active energy generation.
The Biopix façade doesn't need the occupation of rooftop surface, minimum in urban zones, taking advantage of the façade instead. It improves the energy efficiency of the original building and generates electricity, which can be sold to the Electric Company.



▲ Exploited Axonometric view of the Biopix façade