

GREEN BOX

The sustainable Garden-House of the Future

The last prototype of house by LUIS DE GARRIDO

The architect **Luis de Garrido** is presenting his latest sustainable home prototype, **GREEN BOX**, in New York city (Tuesday 21st April, GLASSHOUSE Museum, Chelsea Arts Tower, 545 West 25th Street). The home will be built in **Barcelona** to celebrate the Construmat 2009 International Construction Fair (being presented on 23rd April, and exhibited from 20th to 25th April, in the Gran Via venue. Palacio 1. Calle Botánica 62. Fira Catalunya. Barcelona).

GREEN BOX is the first modular Garden-House that is prefabricated, reusable, transportable, has an infinite life cycle, is bioclimatic, has zero energy consumption, and does not generate waste.

Thanks to its advanced characteristics, GREEN BOX will be built in just 15 days (from 4th to 19th April), and the process can be seen in real time on the Internet.

Inside the building there is a Multimedia Exhibition on Projects about Sustainable Architecture and Social Housing, by Luis de Garrido (ISBA's "**Architect of the Year 2008**"): "Artificial Nature VI".

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The National Association for Sustainable Architecture (ANAS), together with the National Association for the Home of the Future (ANAVIF) and the National Directorate of Companies for Sustainable Architecture (DINAS) is presenting next 20th April this special home which, without a doubt, will be the centre of attention at Construmat 2009.

Designed by the architect Luis de Garrido (recently chosen as "Architect of the Year 2008" by the International Steel Building Association ISBA, and American Institute of Architects AIA), the home could be an international benchmark in sustainable architecture, as it comprehensively meets all of the known sustainable indicators. In fact, Luis de Garrido states that GREEN-BOX is the building that is nearest to his conceptual architectural model of "Artificial Nature".

In addition to its totally ecological character, the home is very economical: Building it costs half what a conventional building would cost (about 550 euros m²), so that it could become a building model for the new social and economic system.

The home has zero conventional energy consumption, and regulates itself thermally through its bioclimatic design and optimum use of geothermal and solar energy. In the same way, the home's design and construction has been carried out with the aim of reducing its energy consumption to a minimum in both its building process and its dismantling process.

All of the building's components have been designed in a modular way to be dry-assembled. Thus, just as occurs in building it, dismantling it does not generate any waste and all of its parts can be used again.

Hence, by repairing or replacing each one of the parts, the building has an infinite life cycle. That is to say, its useful life is infinite.

The supporting structure of the homes has been made with prefabricated panels of reinforced concrete, sandwich panels of cement-wood, and metallic panels. The purpose of all of this is to show in one building the three most suitable systems of modular construction (steel, wood, concrete).

Nevertheless, in spite of all of the characteristics described, no doubt the most important and unique feature of GREEN BOX is the landscaped, sloping garden roof and the vertical garden.

Both gardens have been made with autochthonous Mediterranean plant species, which ensures that they hardly need water (just rainwater) and their beauty is permanent, every day of the year. Of course they do not need maintenance.

The sloping garden-roof enables the building to be integrated into any environment, since it becomes established as an extension to the surrounding ground. On the other hand, the vertical garden stands proud, becoming the home's identifying hallmark. The same vertical garden is to be found in the home's interior patio.

Thanks to its advanced characteristics, GREEN BOX will be built in just 15 days, in the city of Barcelona.

Multimedia exhibition “Artificial Nature VI”

Inside, the home houses an exhibition on Projects involving sustainable architecture and sustainable social housing, over a total area of 200 m². In this exhibition, through 10 video projectors and multimedia effects, the conceptual bases of sustainable architecture are shown, as well as new low-cost sustainable social housing proposals of great added value.

This is a selection of 70 architectural projects created by the architect Luis de Garrido over the last eight years: single family homes, housing blocks, social housing, urban estates, urban recycling activities, office buildings, unique buildings, hotels, skyscrapers, bridges,...

It is a multimedia exhibition: 10 projectors continuously show the different projects on semi-transparent methacrylate panels. In this way the viewer can concentrate on just one projector or have a complete idea as a whole. Moreover, as the screens are semi-transparent the projects can be seen from both sides. This enables the visitor to make the most of their short tour and to see on leaving what they did not have time to see on entering.

On each one of the screens an endless video is continuously projected, showing a set of interactive images, photographs, infographics, videos, sketches, and general information on each one of the 70 projects examined. Each one of the static images is shown for two seconds, and the dynamic images (videos) last 20 seconds. On each screen there are two loudspeakers that inform the nearby visitors about the characteristics of the projects shown there.

Each one of the videos lasts a total of 10 minutes. Thus, throughout the day each video will be shown 50 times. In this way, each visitor may have a different perception of the same exhibition.

It should be taken into account that each one of the videos shows a different set of projects and lasts a different time, so that each screen has a different pace of repetition. Therefore, the same combination of images is never repeated, and if the same person were to visit the exhibition several times they would never see the same.

Each projector shows a certain kind of sustainable architecture project, so that each visitor can choose the one that most interests them.

Projector 1:	Low-cost one-family homes
Projector 2:	Medium-cost one-family homes
Projector 3:	High-cost one-family homes
Projector 4:	Experimental homes
Projector 5:	Collective housing and urban estates
Projector 6:	Social housing
Projector 7:	The GAIA project
Projector 8:	Unique buildings
Projector 9:	Eco-urban planning, and large-scale activities
Projector 10:	Skyscrapers

The exhibition includes such emblematic projects as: R4House, Vitrohouse, Green-Box, Pontmare Skyscrapers, La Llum Skyscrapers, Ecopolis 3000, Casa Mariposa house, Sayab, Tecnópolis, Berimbau Lighthouse, Mondragón Complex, Lliri Blau, etc...

GREEN-BOX has the highest possible level of sustainability

The prototype complies perfectly with the five basic pillars on which Sustainable Architecture rests:

1. Optimisation of resources and materials
2. Reduction of waste and emissions to the environment
3. Reduction of energy consumption and use of renewable energies.
4. Improvement of human quality of life and health
5. Reduction in the building's price of construction and maintenance

1. Optimisation of resources and materials

Use of recovered, reused and recycled materials.

All of the materials used in GREEN BOX are reused and recycled. In the same way, all of the materials can be recovered, reused and recycled. With no exceptions whatsoever.

Reuse

All of the prototype's components can be used again and again, so that their life cycle is infinite.

Zero toxicity.

The materials used do not have any kind of emission nor substance harmful to the environment.

High durability.

The prototype has infinite durability since it can be easily repaired.

2. Reduction of waste and emissions

In manufacturing the materials

In obtaining the materials that make up GREEN BOX no type of waste nor emissions have been generated.

In building the prototype

No kind of waste will be generated in setting up the prototype. The parts will simply be put in place by pressure, gravity or cable ties, so that all the components can be recovered and reused again.

In the building's useful life.

There is neither waste nor emissions during the prototype's useful life.

In dismantling

The prototype has been designed in such a way as not to generate any waste upon dismantling. All of the materials will remain intact and ready to be used again as many times as necessary.

3. Reduction of energy consumption and use of renewable energies.

Obtaining materials

All of the materials have been chosen due to their low energy cost. In addition, as all the materials are pre-fabricated, the necessary energy consumption has been reduced to a minimum.

Construction

Minimum energy is going to be used as a modular building system has been employed. For this reason, a team of only 5 people will be needed to set it up.

Dismantling

Dismantling is very simple and consumes very little energy, since the parts only have to be removed in reverse order from which they were placed upon setting up.

Transport of the material and workforce

The materials and workforce will be from Barcelona. There is no need for specialised labour.

Useful life

It can be said that an infinite useful life has been achieved for the prototype, since if any part breaks it is simply repaired or replaced with an alternative.

4. Improvement of human quality of life and health

There are no emissions harmful to people, animals or the environment at any stage of manufacture of any of the prototype's parts, nor during its useful life (if it is built to be permanent), nor in dismantling it.

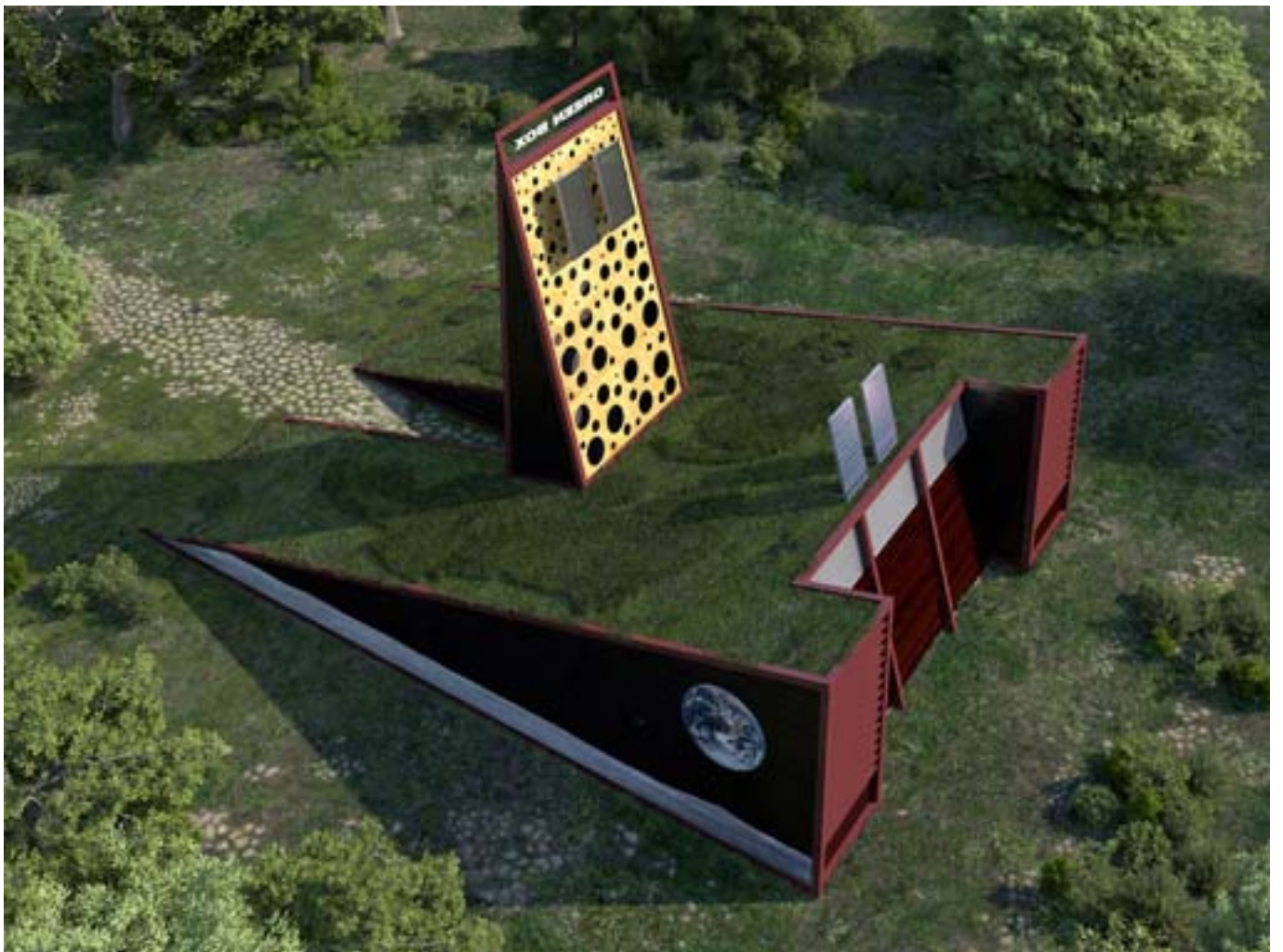
5. Reduction in the building's price of construction and maintenance

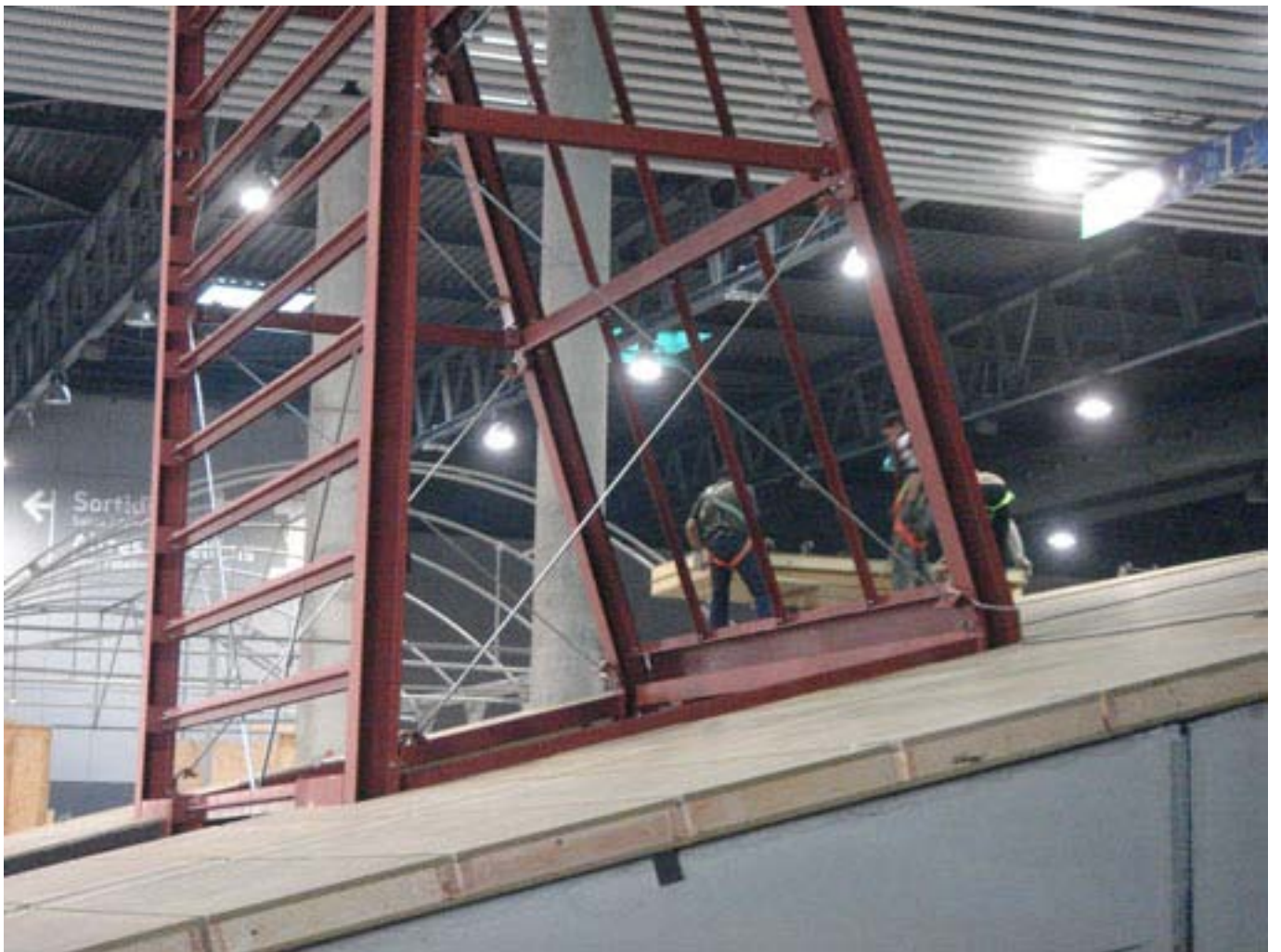
The prototype's maintenance costs are very low. The only maintenance in the short term is cleaning. As for cleaning staff, this has not been necessary for the prototype.

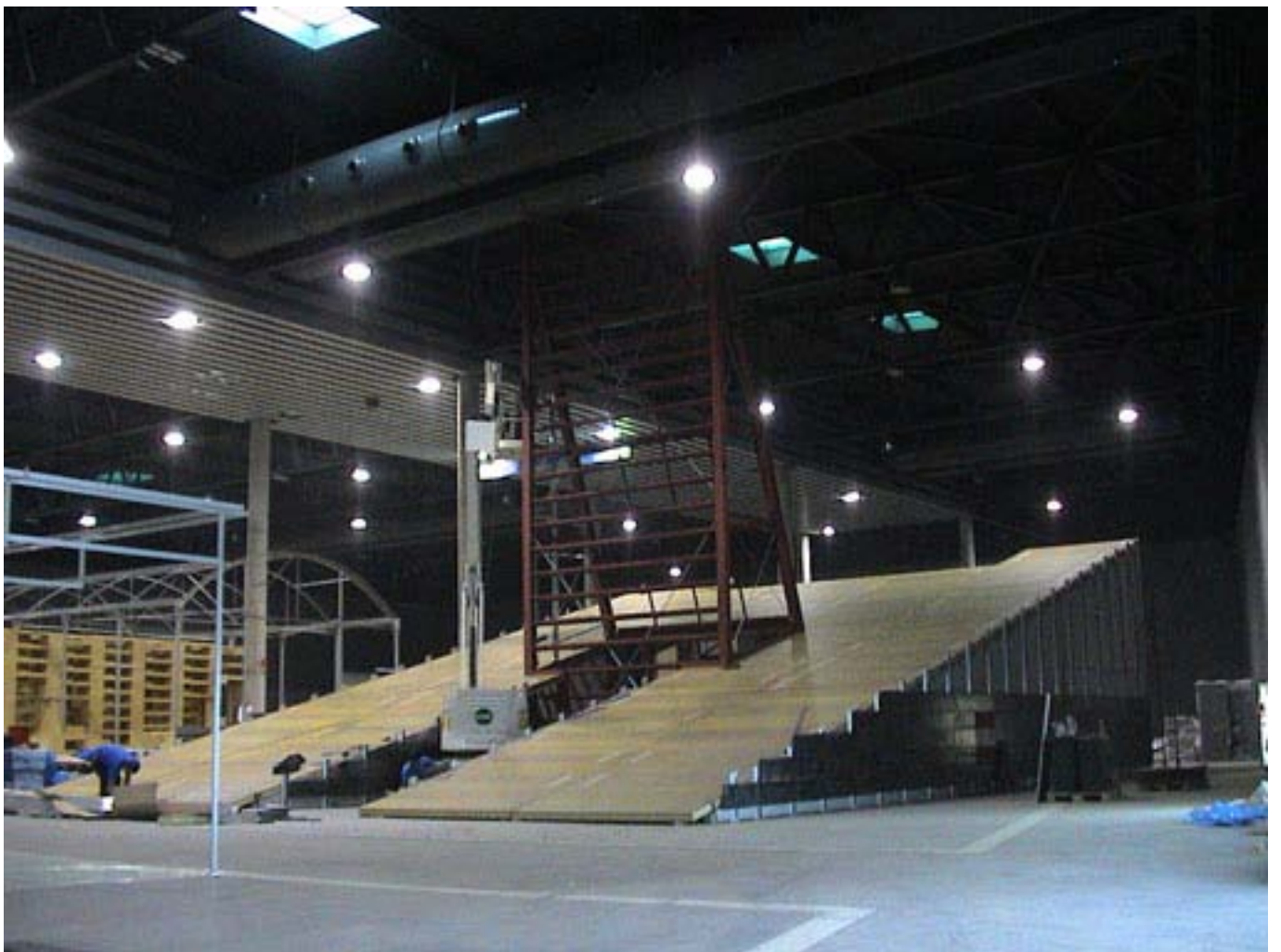




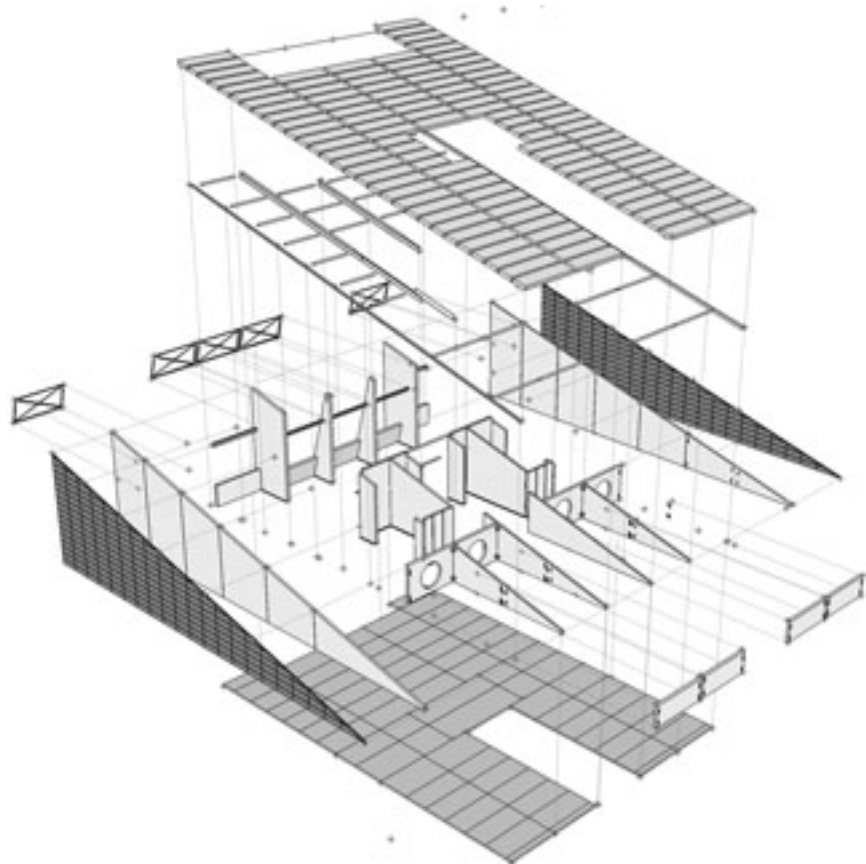
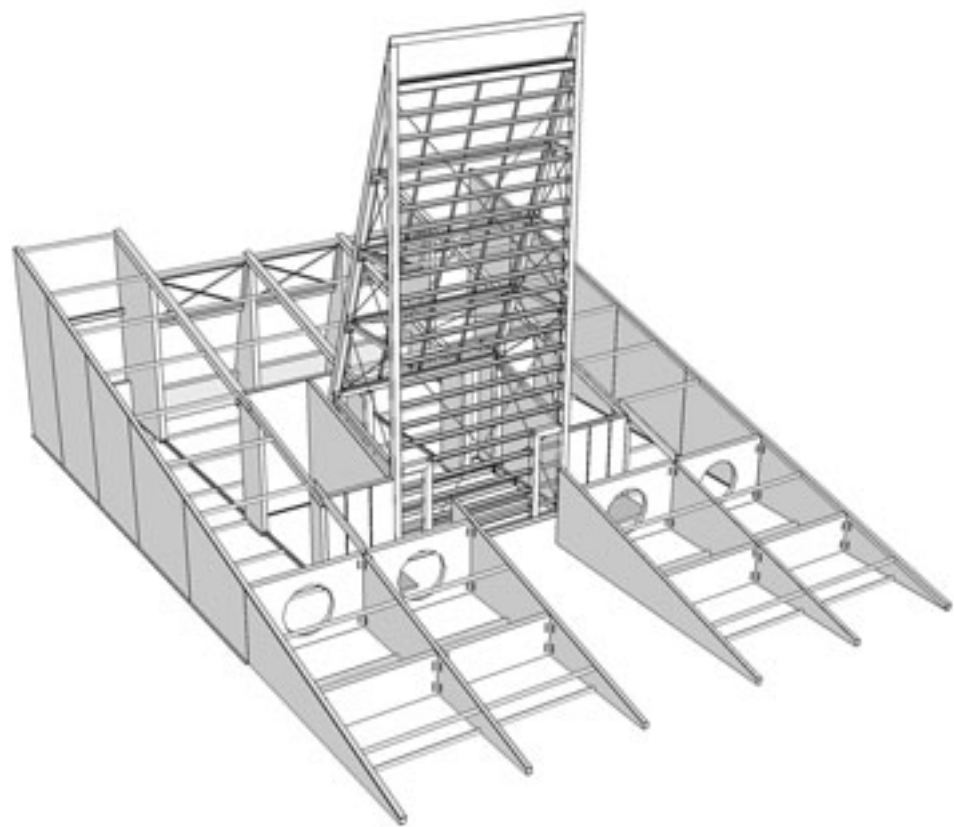












Nivel de Humedad Medio

INVIERNO

Captadores solares para la calefacción por suelo radiante de la vivienda

Panel de policarbonato muy aislante que deja pasar parte de la radiación solar directa iluminando hasta el fondo de la vivienda

Las ventanas superiores se cierran evitando que se escape el aire caliente del interior de la vivienda

Se suben los toldos interiores

Las protecciones solares cerámicas permiten que penetre la máxima radiación solar al interior de la vivienda

Se cierra la rejilla inferior para evitar que entre aire fresco al interior de la vivienda. La rejilla se regula para que entre solo aire de ventilación cuando sea necesario

El calor se acumula en los forjados y muros de carga de alta inercia térmica y mantiene caliente la vivienda durante el día y durante la noche sin apenas consumo energético

Se cierra la compuerta exterior evitando que entre aire al interior de la vivienda

Intercambiadores de calor del sistema geotérmico

Captadores solares para el agua caliente sanitaria de la vivienda

Debido a los materiales elegidos, los muros transpiran de forma natural y continua, lo que permite la ventilación natural, sin pérdidas energéticas

Iluminación cenital indirecta del interior de la torre

La radiación solar directa penetra por toda la superficie de la vivienda

La vivienda es autosuficiente desde un punto de vista energético ya que se cuenta con una combinación de energía geotérmica + energía solar

Nivel de Humedad Medio

VERANO

El aire fresco recorre toda la vivienda refrescándola a su paso

La ventana de policarbonato aislante no genera efecto invernadero por lo que no calienta la vivienda y la ilumina de forma indirecta

Se abren las ventanas superiores para que el aire caliente escape de la vivienda

Las protecciones solares protegen la vivienda de la radiación solar directa

El aire fresco penetra en la vivienda por el lado sur (el más caliente)

Iluminación solar indirecta del sur

La vivienda se refresca de noche, y debido a su alta inercia térmica, permanece fresca a lo largo del día siguiente, sin consumo energético alguno

La radiación solar calienta los paneles exteriores de la torre. Los paneles calientan el aire del interior de la torre que, al calentarse, asciende y escapa entre las perforaciones de los paneles, extrayendo el aire al interior de la vivienda y creando una corriente natural de aire en su interior

La cubierta vegetal, de alta inercia térmica, almacena el fresco de la noche y lo desprende durante el día, manteniendo fresca la vivienda

Los forjados de hormigón armado acumulan fresco del suelo y lo desprenden a la vivienda de forma continua

El aire recorre las galerías subterráneas, cediendo su calor a las masas bajo tierra y refrescándose en su recorrido

Jardín vertical

El aire caliente del interior de la vivienda se va succionando y escapa

El jardín vertical proporciona humedad al patio central, que al evaporarse refresca el ambiente

Conforme va refrescando la vivienda, el aire se va calentando y asciende

Iluminación solar indirecta cenital proveniente del patio central

La gran superficie sombreada que la torre proporciona, genera y mantiene una gran bolsa de aire fresco al norte de la vivienda

El aire fresco de la parte norte entra a la vivienda y la recorre por ventilación cruzada

El aire fresco del norte de la vivienda penetra por medio de unas rejillas al sistema arquitectónico-geotérmico de enfriamiento del aire