CREAS (Resource Centre for Environmental Education for Sustainability)

by CREAS Ayuntamiento de Pozuelo de Alarcón / 2015-06-27 12:38:00 / España / 21814 / ES

New Construction

Primary energy need :

267.89 kWhpe/m^2.year

(Calculation method : RD: 47/2007)

ENERGY CONSUMPTION

Economical building — *Building*: **A**

< 50	A
51 à 90	B
91 à 150	C
151 à 230	D
231 à 330	E
331 à 450	F
> 450	G

Energy-intensive building

Building Type : Other building
Construction Year : 2008
Delivery year : 2010
Address 1 - street : 28223 POZUELO DE ALARCóN (MADRID), España
Climate zone :

Net Floor Area : 382 m^2 Other
Construction/refurbishment cost : 528 450 €
Cost/m2 : 1383.38 €/m^2

Proposed by :

BECSA, Ayuntamiento de POZUELO DE ALARCÓN, Ayuntamiento de POZUELO DE ALARCÓN, CREAS

General information

CREAS has two main objectives: on the one hand, construction of a building capable of hosting activities for knowledge and dissemination of the values and principles of sustainability; and on the other hand, the nature of its arquitectural characteristics, i.e.:

- Energy efficiency
- Use of materials and building systems with low environmental impact
- Effective management of constuction and demolition waste
- Ease of maintenance, and flexibilty of spaces and uses
- Adequate water treatment

It also contemplates the possibility of disposing of construction waste via its three target principles (reuse, recycling or disposal), offering alternative courses of action for further effective management.

The CREAS buildings are grouped into four blocks, all south-facing:

- The first block houses a classroom for 55-60 students, and an adjacent classroom/ workshop for about 25 more students

- The second, central one, connected to the first and third ones, houses the entrance to the complex, with reception and information point. Here is the working area for three people, with other small rooms and the library sharing this space.

- The third one, with direct access from the central block, concentrates all the wet rooms, centralising the plumbing and sanitation. It also has rooms designed to accomodate facilities connected to the other blocks: a battery of vacuum collector tubes that filter light and glare, plus tanks, boilers and control pumps to regulate the thermal confort of the building.

- The fourth block, separate from the other three, warehouses and stores garden machinery and equipment. It has its own photovoltaic electricity generation system.

The orientation of the whole building complex is designed to respond to the effective management of resources and energy.

See more details about this project

http://www.movilizared.es/es/index.asp?MP=44&MS=102&MN=1
http://www.construction21.org/articles/fr/userschoice-award-tied-winner-2015-creas-spain.html

Data reliability

Self-declared

Stakeholders

Stakeholders

Function : Construction Manager

BECSA

http://www.becsa.es

Function : Designer

Antonio Baño Nieva

Function : Developer

Concejalía de Educación y Juventud- Ayto. de Pozuelo de Alarcón

http://www.pozuelodealarcon.org/

Contracting method

General Contractor

Owner approach of sustainability

CREAS represents a substantial step in the local commitment to address sustainability through visible education. This is not only a space for the environmental work of the educational community; it also aims to be at the forefront of sustainable and eco-efficient construction. The Environmental Education section of the Education Department of the town of Pozuelo de Alarcon, where CREAS is located, sets teaching proposals adapted for students from two years old to the end of mandatory and non-mandatory schooling stages. Its philosophy is reflected in: - Providing educational resources for the implementation of environmental education in the new challenges of social, economic and environmental sustainability, in line with different curricular projects - Improving participation in local development and environmental conservation through active educational proposals - Supporting schools to encourage all initiatives of a social or environmental nature that can be undertaken - Developing educational projects based on School Agenda 21 , the international eco-schools programme - Promoting the active participation of individuals and groups in the objectives of environmental education and in building a more sustainable future.

Architectural description

Architectural description: Spatial, visual, atmospheric and noise pollution: In designing the CREAS building, functionalilty, purpose and the effect it would have on the environment in which it is located were all analysed in their various aspects. The energy strategy, to narrow down the parameters of interior comfort, passed through a search for suitable alternatives to achieve this via external environmental conditions and the contribution of renewable energy. Only when these are not sufficient, will it resort to conventional sources of energy. The building is focused on a concept that aims to lighten covered areas yet be solid or massive where required (e.g. floors and walls). The structure of wooden supports, on which the roof beams rest, runs above and is embedded in these walls and has no load-bearing function. Also envisaged is the possibility of dismantling the building and reusing, recycling or disposing of its component parts, while offering alternatives and guidelines for further effective management.

If you had to do it again?

The experience gained in giving actual shape to the projected building has made us realise the benefits and difficulties of carrying it out, and possible improvements in both aesthetics and construction technologies. The building has never been considered as totally finished, in that passive and new technologies may be added to improve strategies. In this scenario, the collaboration of regular users of the building has been crucial in learning how the building performs.

Building users opinion

The experiential nature of the teaching proposals that are carried out daily in the environmental education classroom by the educational community has generated an emotional relationship with their immediate environment, and facilitated the incorporation of new services related to environmental practices. This fact allows teachers to reinforce and assess the basic skills required by students in their schools, while participation and commitment of students in all aspects of the environment is encouraged.

Energy

Energy consumption

Primary energy need : 267,89 kWhpe/m^2.year

Primary energy need for standard building : 388,25 kWhpe/m^2.year

Calculation method : RD: 47/2007

CEEB : 0.0002

Envelope performance

Envelope U-Value : 0,51 W.m^{-2}.K^{-1}

More information :

Vegetation cover 0.28 W / m2 · K with land north wall 0.74 W / m2 · K Wall facade 0.51 W / m2 · K Doors 2.29 W / m2 · K floor slab 0.49 W / m2 · K

Building Compactness Coefficient : 127,30

Renewables & systems

Systems

Heating system :

- Canadian well

Hot water system :

- Other hot water system

Cooling system :

- No cooling system

Ventilation system :

- Natural ventilation
- Canadian well

Renewable systems :

- Solar photovoltaic
- Solar Thermal
- Micro wind
- Biomass boiler
- Other, specify

Renewable energy production : 100,00 %

Other information on HVAC :

The factors taken into account in the CREAS systems are the bioclimatic environment, floor heating and forced air system.

Bioclimatic environment: in this case, primarily the relationship between the direction of the sun in each season of the year, building orientation and the shape and evolution of deciduous trees surrounding the CREAS main building, so that the higher the solar radiation incidence (in Summer), the greater the coverage of trees to shield it. Furthermore, the height / angle of the sun itself is offset by the building´s shape, being tilted forwards. In Winter, the lower height / angle of the sun and lack of leaves allow solar energy to reach a larger area inside the building, providing energy that is stored in the internal thermal mass.

Heating – by greenhouse: in the building there are four modules of different types, based on the greenhouse effect – premises with a single sheet of glass, as in module 4; rooms with double glazing consisting of glass separated by significant spaces (modules 1 and 2); and areas added to the Trombe wall (module 3). Each of these areas are associated with ways of collecting and distributing the energy captured.

Heating - floors: this system complements the thermal energy required for interior comfort in the event that the energy provided by direct capture of solar radiation, the greenhouse effect and forced ventilation do not cover the needs. It requires an associated generator to produce thermal energy. At CREAS, the system is powered by a biomass boiler supplemented with solar thermal panels. When the sun provides heat, it is stored in the ground; when the sun goes down and heat is

still required indoors, the boiler complements the work done by the sun.
Forced air conditioning system: it relies on the transport of warm air (in Winter) or cooled / cold and humidified air (in Summer) to hot and dry areas. The physical process is similar to the displacement effect produced by different densities that air acquires when heated or cooled. When heat spikes occur – and this is expected during the months of July and August in the middle of the day – and existing systems inadequate, air is forced throughts ducts from the north facade, which is a shaded area with plants, an area of about 15 square meters above the sanitary block, and downloaded to modules 1 and 2 through openings provided in the roof. This air flow can be five or six degrees lower than that of the main facade. It is an auxiliary, timed resource, but it could become part of the refurbishment of the buildings, depending on the severity of the external conditions. It performs equally well in Winter, as an auxiliary system and resource use; fans connecting the greenhouse areas with adjacent spaces transfer the hot air stored in said area, the indoor environment. For these circumstances, the outlet nozzles of warm air are arranged in module 2, near ground level.

Some of them will be explained as a product.

Solutions enhancing nature free gains :
All systems described above are oriented in this direction.

Environment

GHG emissions

GHG in use : 6,88 $KgCO_2/m^2$/year

Methodology used :
Simplified procedure CE3X

Building lifetime : 60,00 year(s)

Life Cycle Analysis

Life-cycle assessment applied to all materials used in the building, using all the choice of criteria to analyze their life cycle from extraction of material to the demolition or demolition. From the data Shutter

Water management

Consumption of grey water : 100,00 m^3

Consumption of harvested rainwater : 100,00 m^3

Our building has a number of peculiarities: it is isolated but in the vicinity of a sewage treatment plant. It is committed to a system whereby all independent purification of rain, grey and black water receives appropriate treatment, minimising the impact on the environment and the drinking water needs of the building. The project involves the separation of the grey and black sewage stormwater, through a separate sanitation system. Wastewater plant treatment leads to total oxidation, and the water can then be returned to the ground through filtration ditches. Rainwater is collected into a tank and can then be distributed to various applications where it is not necessary to use drinking water: irrigation, toilets, cleaning or filter discharge to the ground. The capacity of the treatment plant is determined by the intended use of water, the unit of measurement is equivalent to number of inhabitants, in our case 10 units. Rainwater flows from the roofs and collection elements and is stored in an underground polyethylene tank with 20,000 litres capacity.

Indoor Air quality

The outside air quality is acceptable for ventilating the rooms at CREAS, and given its location in a rural area near a residential area of low population density, may be considered to be category ODA1, similar to the concentration of substances that can be assimilated in a small town. PM 10, particulate matter of diameter up to 10 mm., is typically between 10 and 30. Indoor air quality required by this type of building (offices, reading rooms, classrooms and the like) is category IDA 2, with a ventilation rate greater than 0.83 litres /second per square metre. Circumstantial ventilation requirements are fulfilled in all areas. The placement of voids and skylights forces the air to circulate throughout the building, ventilating and cooling the lived-in spaces. It is necessary to achieve comfortable temperatures in Summer, and the pressure and temperature differences between the north and south sides complements the natural flow of convected air inside the building and local winds outside. When the emergent native plants, deciduous ones right next to the the south facade, reach their final size, this will introduce fresher and moister air, and protection from the heat of the sun will be extended by several metres. In this situation, sliding wooden doors and windows can be opened to promote air communication between inside and outside. The privileged and peaceful environment allows this without disturbance.

Comfort

Health & comfort : Particular attention has been paid to natural lighting in designing the CREAS building, maintaining the objective of maximising visual comfort and reducing the use of electricity. It takes full adavantage of natural light through windows and skylights. The windows on the sunny side, at least, receive direct sunlight on any sunny day of the year, during all the hours it is there. So they are effective in lighting the areas next to the windows of the building. But in mid-winter, light incidence is highly directional and casts shadows. This may be partially improved through light and diffusion reflecting from the inner surfaces and skylights. The situation of the eaves and protected gaps deployed in the building are particularly relevant at CREAS, as well as the extensions of the cover on the side walls. For example, in the classroom/workshop module, the west front juts out further than the opposite one, aiming to protect the building from the rigour of the sun in Madrid summer evenings. This is due to the combined action of the strategies described above together with the emissions and other issues such as the operation of the skylights mechanism.

Calculated indoor CO2 concentration :
530 ppm de CO2 de media en todos los recintos interiores.

Measured indoor CO2 concentration :
530 ppm de CO2 de media en todos los recintos interiores.

Calculated thermal comfort : 25º es una temperatura que se suele alcanzar tanto en verano como en invierno en el interior del edificio sólo con la acción de las estrategias pasivas.
Measured thermal comfort : 25º es una temperatura que se suele alcanzar tanto en verano como en invierno en el interior del edificio sólo con la acción de las estrategias pasivas.

Acoustic comfort : The materials used, the half-buried situation, vegetation covering walls, roofs and environment, as well as the very limited presence of noise sources at all times, ensure compliance with the requirements of noise protection.

Products

Product

Fujisol C-15

Fujisol

fujisol@fujisol.com

http://www.fujisol.com/

Product category :

The collectors of solar radiation to produce hot water are available in the market, and at CREAS there are vacuum tubes, consisting of two concentric tubes hardened with borisilicate, between which is air space. On the outer surface of the inner tube there is a highly selective absorber layer that traps the radiation, letting out only 5% of losses thanks to excellent insulation that provides the vacuum, regardless of the outside weather. Heat would be transferred to the copper tube located therein, within which is located the vapourising fluid (a mixture of alcohol and distilled water). This vapour must travel to reach the tube part which is being bathed by cooler heat transfer fluid in the primary circuit, where condensation occurs and consequent release of latent heat associated with the change of state. The vapourising fluid returns due to the action of gravity to its initial position, and the evaporation-condensation cycle is repeated.

Within the strategy of meeting demand with full DHW systems using renewable energy, we can estimate an approximate contribution of 65% satisfaction of the demand for ACS. In practice, this means that there is no need for an auxiliary boiler most of the time, which is important both in the design phase and in subsequent use.

KWB Easy Fire

KWB

info@hcib.es

http://www.hcib.es

Product category :

A boiler does not need to use energy from fossil fuels. Biomass energy is a type of renewable energy from the use of organic matter formed in a biological process; generally, from living organisms or their remains or waste products. The use of biomass energy may be direct (for example, by combustion) or by conversion into other substances that can be exploited later as fuel. The pellet is a type of elongated fuel granule, derived from wood.

From the design phase, our building based its energy performance on three factors: SAVING + RENEWABLE ENERGY = EFFICIENCY. Therefore the use of a boiler of this type is highly desirable.

Tapial calicastrado

BECSA

becsa@becsa.es

http://www.becsa.es

Product category :

Retaining walls in contact with the ground, supported with rammed earth, ensuring adequate strength for loads under the ground. As can be seen, the optimal materials would be derived from the ground, or in this case, the wall.

The general idea is that possible minor earthworks might be required, outside the scope of the intervention, given excavated earth will be moved a few metres, and manipulated to adapt to its new role, as products that will not cause environmental damage. For this, the construction would be bricks and walls in traditional architecture, but this new experience with compressed earth blocks provides sufficient grounds for the return of earth to the site from which it was extracted. Initial tests (with some corrections) and subsequent studies support its benefit; it may even be unfairly undervalued.

Brick BTC

CREAS

educacionambiental@pozuelodealarcon.org

http://www.movilizared.es/es/index.asp?MP=44&MS=102&MN=1

Product category :

Retaining walls in contact with the ground, supported with rammed earth, ensuring adequate strength for loads under the ground. As can be seen, the optimal materials would be derived from the ground or, in this case, the wall.

The BTC is a parallel-piped solid block made of the earth itself, from the earthworks of the building. The difference with earth/mud is manipulation of the medium for optimal compactness. The BTC has been placed in the third Trombe Wall and greenhouse section of the second module, taking advantage in both cases of thermal storage capacity. The commissioning work has been in the ½ foot position with mud/mortar from our own land to hold it together, plus some lime mortar.

Costs

Construction and exploitation costs

Reference global cost : 1 100,00 €

Reference global cost/none : 1100

Total cost of the building : 528 450 €

Subsidies : 528 450 €

Urban environment

The CREAS site is adjacent to the village of Humera in the town of Pozuelo de Alarcon. The building is next to the Adolfo Suarez Forest Park and forms part of the Environmental Education department of Pozuelo. It sits in a south – southeast orientated hillside. Both aspects speak, on the one hand, of the high quality of the environment and on the other, the bioclimatic potential of such a situation. Directions: http//isuuu.com/milabarrio/docs/comollegaralauladeeducacionambientaldepozuelo (click on adjacent icon).

Land plot area

Land plot area : 7 500,00 m^2

Built-up area

Built-up area : 10,00 %

Green space

Green space : 7 000,00

Parking spaces

Parking spaces: easy parking in the surrounding residential area.

Building Environmenental Quality

Building Environmental Quality

- biodiversity
- consultation - cooperation
- water management
- energy efficiency
- renewable energies
- maintenance
- building end of life management
- integration in the land
- products and materials

Contest

Reasons for participating in the competition(s)

El edificio del CREAS es un ejemplo de que la sostenibilidad puede ir de la mano de la edificación. Y es que el ritmo de consumo de recursos no puede superar la capacidad de los sistemas naturales para reponerlos. Este edificio consume del orden de 15 kWh. El conjunto del edificio se orienta hacia el sur, y el semi-enterramiento de la fachada norte, aprovechando el talud natural del terreno, permite en primera instancia reducirlas pérdidas energéticas en su parte más desfavorable, así como disponer de masa térmica como almacénenergético.
El edificio emplea una batería de medidas que contribuyen a la mejora de la eficiencia de los sistemas:

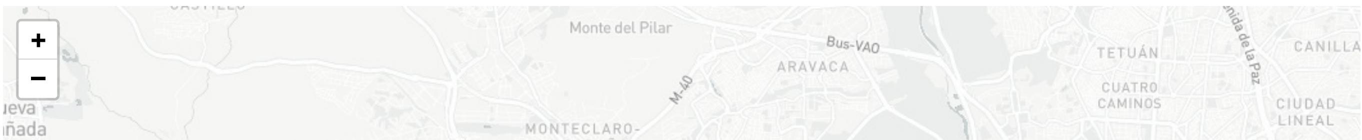
1. Uso de la luz natural,
2. generación de energía solar fotovoltaica y eólica,
3. empleo de lámparas de bajo consumo en los equipos de iluminación,
4. calefacción por invernaderos y muro Trombecomplementados por caldera de biomasa de alta eficiencia y sistema de distribución de calor de baja temperatura por suelo radiante,
5. refrigeración por inercia térmica complementada por convección natural del aire de ventilación cruzada del edificio y ventilación inducida a través de tubos enterrados,
6. gestión del agua eficiente ya quelas aguas residuales son conducidas a un filtro verde de plantas macrófitas para que, tras su depuración, sean devueltas al terreno a través de zanjas filtrantes.

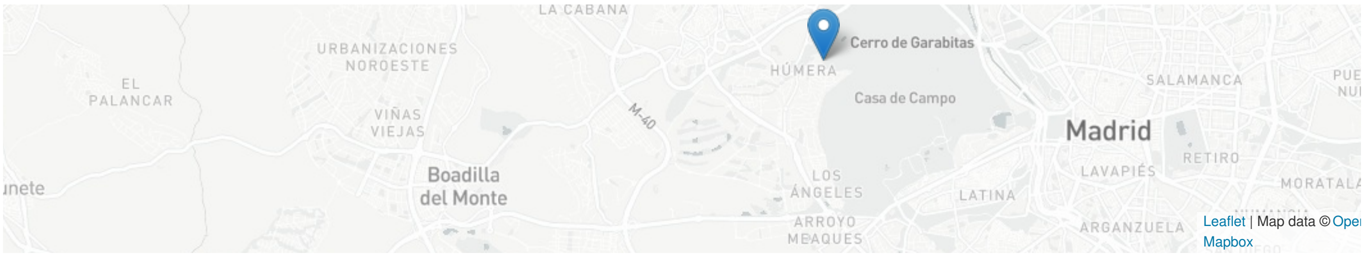
Building candidate in the category

Materiales de origen biológico

Energías renovables

Green Building Solutions Awards 2015
powered by Construction21





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