Category: Sustainable Office Buildings

Case Study: Abengoa Headquarters “Campus Palmas Altas”

Project cofinanced by
European Regional Development Fund

Lead Partner
Provincia di savona

Sustainable Construction in Rural and Fragile Areas for Energy efficiency

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Client: Abengoa S.A.
Project : Rogers Stirk Harbour & Partners/Vidal y Asociados (Architecture), ARUP (Engineers) and D-Fine (Quantity Surveyor)
Project Management: Bovis Lend Lease and Facilitec
Technical assistance: Rogers Stirk Harbour and Partners / Vidal y Asociados (Architecture), ARUP (Engineers) and Novotec (Health and safety)
Consultants: ARUP Facades, ARUP Fire, Gleeds, Vorsevi, María Medina Muro, Estudio 28, Arquitectura Fernández Carbonell, Jones Lang Lasalle, Adioscan
Contractors and suppliers: Heliopol, Ingeconser, Prasur, Danosa, Enviai, Imesa, Alumafel, Vermalu, Interpa
Oppening Year: 2009

Context

Abengoa is a technological company from Seville that applies innovative solutions for sustainable development in infrastructures, environment and energy.

“Palmas Altas Campus” in Seville, is the first business park dedicated to innovation in Andalusia and the biggest technological complex of private enterprise in southern Spain. The center, which rises promoted jointly with the City, brings together all the activity that Abengoa develops in Seville around the most advanced technologies, environmental excellence and sustainable development, which were earlier produced in various parts of the city.

In its location, the Campus will enhance an area of strong technological and urban development in the south of the city and attract other companies partner or synergistic with Abengoa, institutions, agencies attached to universities or training centers, and public entities. Thus, the Campus Palmas Altas seeks to establish itself as an international reference in R + D + I.

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Above: detail of buildings

Left: Aerial view of the Campus

Description

The new Campus Palmas Altas is the best example of Abengoa's commitment in the fight against climate change and therefore to sustainable architecture, a space identified with the symbols of the highest technology and an example of excellence in environmental management which incorporates the latest advances in energy conservation and efficiency, thereby reducing energy consumption and CO_2 emissions gradually.

With a building area of 50.000 m2 and 1.300 parking spaces underground, the new center consists of seven buildings arranged around the central plaza and optimized to maximize the effect of shadow and control the temperature by creating a system of outdoor spaces, gardens and recreational areas that mimic the vernacular Andalusian architecture and respond to local weather variables.

The project consists of last generation environmental technologies as photovoltaic panels, a trigeneration plant, hydrogen cells or efficient air conditioning systems and lighting. Criteria apply in addition to saving energy in all aspects of design, from the geometry of the building based on compact forms of wide bays, the building envelope composition or layout and design of solar control devices to the choice of materials that contribute to a more sustainable use of the energy and supply system.

The facades of the buildings are fully glazed to facilitate the entry of a large amount of natural light inside the offices. The columns of sunlight access to the deepest parts of the building in a controlled and stable way using small courts located in the farthest part of the facade of the complex. This pursues one goal: to encourage the use of natural light while reducing the use of artificial light.

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Solar Panels

Stirling disk

Chilled beams Air-Conditioning

Solar collectors

66% of the energy consumed on campus is produced on site, which has photovoltaic solar panels located on the roof of the buildings, which contribute also to enhance the shaded areas between the different sectors. These solar panels have 400 kilowatts of power.

Another important element is the parabolic solar disk with Stirling engine connected to a hydrogen disruptive plus the fuel cell. It is responsible for storing solar energy as hydrogen, that is used as the fuel for the battery, which provides night lighting to both the central square and outside the complex.

It also has a tri-generation plant with a natural gas-powered motor connected to an electrical generator, which is responsible for generating electricity for the entire complex and is located at the entrance of the enclosure. The residual thermal energy of the engine exhaust gases and its cooling, are lead to an absorption machine to produce cold water and to air-condition the buildings. Its energy efficiency is designed to reduce CO2 emissions by up to 1.670 tons per year.

Assuming that one of the most common energy costs in buildings is air conditioning, Abengoa has incorporated to the Technology Center a distinctly avant-garde system which stands as the most efficient way to cool spaces offices closed: the system of chilled beams.

The cooling system of chilled beams consists on radiators installed on the roofs of the office as a beam, circulating cold water inside them that by direct radiation and taking advantage of the higher density of cold air, air-conditioned spaces, reducing energy consumption by not require fans or fan coil, even with a 40 degrees outside temperature. At the same time, it provides a greater comfort to the offices eliminating noise and drafts of the standard fan coil.

Also, rainwater is collected on large covers on roofs of the buildings and stored in underground tanks to be used later for the irrigation system, so that the complex vegetation is self-sustaining. This system limits the dependence of the urban water only for bathrooms and cooking.

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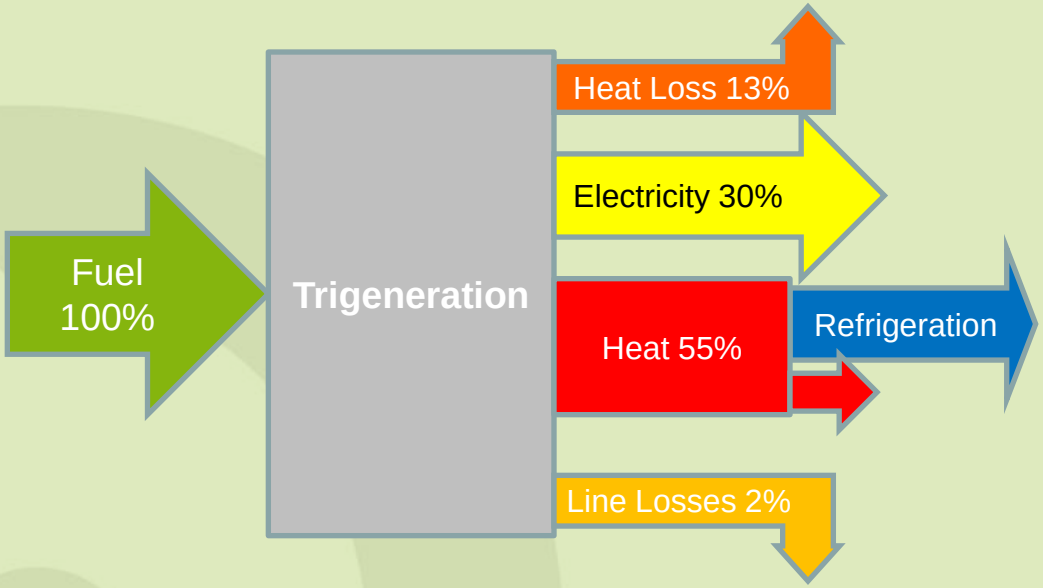

Trigeneration combined with distric cooling

Pedestrian walkway

Evaluation

The Abengoa´s Technology Center was raised with clear overall goals: to respect the environment and to be a model of sustainability, which is precisely the basis of the business of the company.

The building combines principles of traditional Andalusian architecture with the latest technologies in sustainability being specially adapted to extreme weather conditions in Andalusia in the summer months.

The project achieves tits goals with austere energy consumption and an economically competitive level. The design principles were based to optimize a series of passive systems designed to minimize energy demand through optimal energy sources.:

- Minimize the energy requirements of buildings by limiting solar heat gain, reducing heating and cooling loads and building intelligent enclosures.
- Controlling energy use in buildings to optimize efficiency and minimize consumption.
- Use the largest possible proportion of "clean" energy from renewable sources.

Active strategies were also used to optimize energy efficiency in systems designed for the habitability of buildings and their occupants. The air conditioning system with chilled beam systems, heat in the air recovery systems or energy optimization of illumination. Active measures include renewable and alternative energy as part of the project's sustainable energy strategy.

A pedestrian access that connects also with public transport was basic to reduce CO_2 emissions because without it employees could only reach the center by car.

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Climate data for Seville

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average high ºC	15,9	17,9	21,2	22,7	26,4	31,0	35,3	35,0	31,6	25,6	20,1	16,6	24,9
Daily mean ºC	10,6	12,2	14,7	16,4	19,7	23,9	27,4	27,2	24,5	19,6	14,8	11,8	18,6
Average low ºC	5,2	6,7	8,2	10,1	13,1	16,7	19,4	19,5	17,5	13,5	9,3	6,9	12,7
Precipitation mm	65	54	38	57	34	13	2	6	23	62	84	95	533
Avg.Precip. Days	6	6	5	7	4	2	0	0	2	6	6	8	52
Sunshine hours	179	183	224	234	287	312	351	328	250	218	186	154	2.898

Source: World Meteorological Organization – Spanish Meteorological Agency

Potential for transferability

This construction is a model of sustainable business park that respects the environment. The project reflects the spirit of excellence Abengoa being at the forefront of technology and observing strict respect for the environment. All this was achieved with an adjusted cost of construction, limited time frames and a careful study of the best solutions for each part of the project.

Thus, the project may not be transferable totally because of its intimate relationship with the environment where it has been built but there is a huge potential of transferability in the process that has been continued to design the building and many of the solutions that have been adopted in it, especially in the Mediterranean where in many areas the climatic conditions are similar to the city of Seville.

Others

The LEED Platinum certification, was granted to this facility in 2008. Created by the U.S. Building Council (USGBC), considered Campus Palmas Altas the most sustainable building in Europe.

Palmas Altas Technology Center has been awarded the prize for architectural excellence from the Royal Institute of British Architects (RIBA). In the 2010 edition involved 102 projects in the UK and rest of Europe.

The complex was granted also by the American of Institute of Architects (AIA) in the UK, which in this case was given to environmental excellence. The Technology Center received the highest distinction as Green Building in the category of "Office Buildings".

References and bibliography

Abengoa – www.abengoa.com

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Vidal & Asociados Architects – www.luisvidal.com

Project cofinanced by

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Lead Partner

- Province of Savona (ITALY)

Project Partner

- Region of South Aegean (GREECE)
- Read S.A. (GREECE)
- Local Energy Agency Pomurje (SLOVENIE)
- Agência Regional de Energia do Centro e Baixo - Alentejo (PORTUGAL)
- Official Chamber of Commerce, Industry and Shipping of Seville (SPAIN)
- Rhône Chamber of Crafts (FRANCE)
- Development Company of Kefalonia & Ithaki S.A. - Kefalonia (GREECE)
- Chamber of Commerce and Industry Drôme (FRANCE)
- Cyprus Chamber Of Commerce and Industry (CYPRUS)
- Chamber of Commerce & Industry Marseille Provence (FRANCE)

SCORE

Sustainable Construction in Rural and Fragile Areas for Energy efficiency