

The El Ejido (Leon) Sports Centre incorporates the biomass energy

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Three organizations have played an important role in the execution of this project: the Regional Energy Entity of Castilla and León (EREN), that assumes the technical execution of the project as well as its financing; the City council of Leon, that allows the occupation of the building and takes responsibility on the installation maintenance and on the energy consumption optimization; and the Council for Environment, which is in charge for the obtaining and provision of bio fuel, extracting the biomass, and transporting it to a processing plant to produce splinter and sending it to the consumption point.

The origin of the project comes from EREN's will to develop renewable energies and energy efficiency systems in public buildings that can serve as an example and allow to establish demonstrative experiences for the promotion of systems and facilities based on new energy means.

One of the most remarkable aspects of this project and that gives it a special relevance is that it supposes the incorporation of the biomass energy through automated systems (automatic biomass boilers KWB with remote control systems) in the urban surroundings of a provincial city.

Building description and energy demand

The El Ejido Sports Centre, located in the urban area Leon, is composed by three plants:

- Ground floor (2,600 ms²): general area (lobbies, cafeteria, kitchen, etc.), humid area (two swimming pools, sauna and whirlpool), dressing rooms and administration.
- First Plant (300 ms²): social area (rooms and lobby).
- Cellar Plant (1,700 ms²): shooting area (shooting streets, dressing rooms and lobby), facilities (heating, purification, generator set, etc.).

The building's structure and distribution are the expression of a space limitation concerning the covers that lodge the solar paddles where the biomass deposit is located. For that reason, after the analysis of the constructive and energy aspects, we chosen the implantation of a mixed solar energy and biomass system, complemented by a natural gas boiler.

Finally, the biomass is the "base energy" of the system that, thanks to two KWB boilers TDS Powerfire of 150 KW model, coupled with the input provided by the solar system, provides more than 70% of the demand.

Installation description

The project of El Ejido was executed by the Public Regional Energy Entity of Castilla and León (EREN) between 2005 and 2006. In the project, the use of renewable energies is very important. At first, was expected to use natural gas, but, instead, it was decided to integrate a mixed system of solar thermal energy, biomass and natural gas. The really interesting element of the project is the establishment of priorities between the diverse sources of energy, giving priority to the solar thermal energy over biomass and to this one over natural gas.

The EREN ordered the execution of this project to Cenit Solar Company from Valladolid, with the collaboration of HC Engineering on biomass, since it is one of the most experienced and acknowledged companies on biomass issues. Once the project was ready to advance, this one removed to contest in two parts: the solar installation and the installation of the biomass.

The solar part was assigned to the company Enerpal Group and the biomass part was jointly developed by Solar Zenith and HC Engineering. Cenit Solar contributed with its experience in assemblies and HC Engineering with the knowledge and the references in biomass, besides being the boilers supplier in the project: two KWB boilers, TDS Powerfire of 150 Kw model.

Solar thermal installation

The solar thermal power plant consists on 90 solar thermal receivers from Isofotón model Isonox II, distributed in 18 batteries of 5 receivers each. These batteries are bound in pairs, connecting the receivers within each battery in parallel. The total surface of installed receivers is 169.2 m².

Due to the free space available in the flat cover of the building, the receivers are oriented to the geographic south with a deviation of 20° towards the east and are inclined 45° in horizontal.

The solar thermal installation is suitable for the provision of air conditioning for both swimming pool and HSW (Hot Sanitary Water), required in the dressing room of the sports club.

Biomass system installation

For the installation of the biomass, has been designed a boilers room inside the building, built with resistance to fire and ventilation materials, with special attention to the emission of solid specks by chimney and to the noises of the system, since the building is located within the urban district.

The installation includes two biomass KWB boilers, TDS Powerfire model with an adjustable power of up to 150 KW, connected to a biomass storage deposit thanks to a no ending screw that, automatically, transports the bio fuel to an intermediate deposit to execute the combustion.

The combustion system is made up of a device of gasification with feeding inferior by means of a no ending screw, burner in the form of ring equipped with air ejectors, cupola of gas distribution of high temperature and complete combustion zone in turbulent flow.

The ignition is made through an air injection system, previously heated by an electrical resistance, and the boiler is equipped with a fuel level sensor that detects the required amount at all time.

Once combustion, a heat exchanger is responsible for an optimal heat distribution, achieving high efficiency of more 90%.

The boiler is equipped with a forced plug system and, thanks to an optimal ventilators regulation the system requires minimum power consumption. The biomass boilers consist on a fire security system that also includes a security system against combustion.

It has been settled two) 250 mm independent chimneys (one by boiler), with a 30 mm rock wool based insulation that does not exceed more than a meter of height of the adjacent buildings.

The installation also has an inertia deposit that allows optimizing the energy consumption and the installations wearing out, since it reduces the boilers ignition frequency by accumulating energy, solely, after having consumed all the stored energy in the deposit.

The mentioned systems are all interconnected by the corresponding hydraulic circuit with isolated pipes for all circuits, circulating pumps, expansion vase, security systems, filling, purge, valves and accessories.

The biomass boilers work in combination with a gas boiler and with the solar thermal energy system. This last one is independently linked to the conventional system, while biomass and gas boilers work in cascade.

Maintenance and control system

The biomass boilers have an internal regulation system that collect the temperature data in as it comes and goes and in an application point.

Depending on how the demand increases or decreases, we can regulate the entrance of air in the combustion system, regulating the power by boiler.

The maintenance and performance of the biomass boilers require a constant and qualified supervision. There must be a person in charge for the biomass quality control, as well as for the installation control and the cleaning and management of ashes (two or three times a year).

Gas installation

The gas installation is composed by a unique boiler with 300 kWt nominal power. The installed Boiler model is Ygnis FBG 350 with Monarch Weishaupt burner WG Natural Gas and 80/550 KW power. The installation's basic features are: boiler with great isolation (60 mm), door with ceramic fiber housing and left, right or reversible aperture (according to installation needs), a two-flame gas burner, boiler flange power-driven to the corresponding burner, ceramic fiber between burner and door, integrated viewfinder on the door, cable connection between burner/boiler, standard pressure 4 bars (test pressure 6 bars), the boiler's temperature must be over 55°C.

The boilers room has a direct exit to the outside of the building and besides boilers it also houses the recirculation pumps of the different circuits of the installation.

Remote control system implemented all over the installation

The installation's regulation and control was made by a modular industrial robot that evaluates the energetic benefits provided by three thermal sources of the building and by monitoring of all processes, obtaining the data of the different system parameters: swimming pool, application of HSW and energy integrations provided by the solar system and the total demand in both consumptions.

The robot allows its remote connection via modem for unloading and value processing of the variables previously stored, as well as its visualization in display installed in situ. In addition, the remote programming allows the continuous control of the performance of the installation.

Advantages and results of the installation

Without a doubt, the valuation of the installation in the El Ejido Sports Centre is positive, especially by enhancing the importance of energy saving and energy efficiency, as well as diverse environmental benefits, among others.

It is possible to emphasize the reduction of atmospheric emissions, the application of native energy resources, the improvement of the forests through sustainable mount management to obtain the required bio fuel, and the reduction of fire and plagues risk.