COMPLESSO DELLA TORRE

Savona - Italy

Multipurpose complex

Hotel****, Offices, Shops and Apartments

Oceano-thermal WSHP System + ELFOSystem

Year 2007

The Spanish architect Ricardo Bofill has been inspired by naval architecture to design the new housing estate that overlooks Savona's dock, near Genoa.

Comprising of two modern buildings, a nineteen-floor tower and a large pedestrian yard, the structure has an hotel, shops, offices and luxurious residences.

The Challenge

The main objectives of investors and town and port authorities was providing a new image for the city of Savona and recovering and transforming radically the degraded area of the old dock.

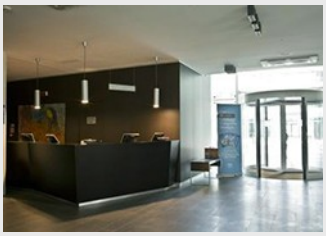
The new area would have high visibility structures for different types of end users, from tourists to traders and residents. The integration with the urban and maritime surroundings should be both architectural and environmental.

The new buildings façades would be formed by large glass surfaces with different exposures to the sun: this could require simultaneous heating and cooling in different rooms.

This behaviour would be further amplified by the different uses and variable occupancy for each area.

On the other hand external technical areas, such as roofs and balconies, would not be available because of architectural constraints imposed by the building linear design.

Naturally the customer wanted all options to increase the value of the investment, both for energy savings and for installation and management simplicity. The operation autonomy of all users and the ease in consumption accounting were in fact among the specific objectives.



Complesso della Torre – Aereal view of the area and hall of the hotel NH Savona Darsena
www.nh-hotels.it
www.savonafilodacqua.it

The Building

- Volume 69.000 m^3

The size

- NH Hotel **** with 96 rooms and conference centre
- 103 flats of various measurements
- 20 offices and 31 shops

The team

- Investor GF Group, Italy
- Architectural project Ricardo Bofill Studio, Spain
- Plant project Ing. Marco Gaminara, Italy
- Exec. project and architectural project management Arch. Armellino and Poggio, Italy

About Ricardo Bofill

World-famous Spanish architect, Ricardo Bofill is the founder of *Taller de Arquitectura* Studio. For over 40 years Bofill has coordinated a multidisciplinary team that create worldwide designs, ranging from urban design to public buildings, housing and commercial, up to interior design.

The Solution

After deep analysis, the air conditioning and domestic hot water production of the whole Complesso della Torre was entrusted to an oceano-thermal WSHP system based on heat pump technology.

The energy source is sea water. It is a renewable and lasting resource, with temperatures that vary from 14°C in winter to 24° C in summer. Moreover it is easily available, as the Complesso della Torre faces directly the sea

Sea water is drawn by a concrete duct with an air intake grill and a shut-off damper, that flows trough a 60-m^3 settling tank. By means of electric pumps, water is sent to filtering devices and then to three titanium steel exchangers with the same capacity. Water is finally returned to the source with 3°C difference in temperature.

The exchanger utility side is represented by the WSHP water loop with reverse return circuiting, that supplies several water-to-water heat pumps serving the different users.

The hotel has a centralized solution with two heat pumps of 400 kW each for the production of cooled water, hot water and domestic hot water at 55°C. The distribution is committed to 190 ductable water terminal units. Air exchange is managed by four air-to-air heat pumps with thermodynamic heat recovery and by four hydronic air handling units.

The air conditioning of residential and commercial users is provided by 150 individual water-to-water heat pumps that supply more than 680 ductable water terminal units. The centralized domestic hot water production is realized by other heat pumps.

Each residential and commercial unit is provided with its own ELFOControl device for its automatic air conditioning management. All devices are connected to the Clivet centralized control and management system.

The results

Each user has independent heating or cooling throughout the year, with immediate accounting on its own electricity meter.

The use of heat pumps for domestic hot water avoided the construction of heating plants with the associated bureaucracy and costs of installing gas pipes.

Areas reserved for plant rooms were reduced to a minimum, consequently the commercialized surfaces, and the Complesso della Torre value, increased.

Thanks to the use of sea water as the heat pumps' energy source, design analysis over a one year period highlighted an average saving of 70% with respect to a traditional system that uses methane gas as an energy source for heating. For a conventional plant life cycle, about 15 years, savings are equal to 2,5 millions euros, including maintenance and energy costs.

Environmental impact too has been drastically reduced, as direct CO_2 emissions have been thoroughly eliminated and indirect have been practically halved.

For further information about Clivet systems:
www.clivet.com

Complesso della Torre – Titanium steel oceano-thermal exchangers and a high efficiency water-to water heat pump serving a flat

The System

- 4 Clivet water-to-water heat pumps for the hotel air conditioning and domestic hot water production
- 150 Clivet ELFOEnergy water-to-water heat pumps for the commercial and residential units air conditioning
- 4 make-up units ELFOFresh Large and 4 air handling units by Clivet for the hotel common areas
- More than 800 Clivet hydronic terminal units
- 150 Clivet ELFOControl devices for the automatic management of each commercial and residential system
- 2 storage tanks for domestic hot water
- About 7,4 MW overall heating capacity

About oceano-thermal air conditioning

The oceano-thermal air conditioning system is based on heat pumps that use sea water as a renewable energy source. Heat pumps are connected by means of one or more water loops with energy transfer, providing the cooling or heating energy necessary to maintain the required conditions. Oceano-thermal air conditioning is often included in WSHP systems (*Water Source Heat Pump*), a version of WLHP systems.

Clivet S.p.A. - Via Camp Lonc, 25 - Z.I. Villapaiera - 32032 Feltre (BL) ITALY - Tel.: +39 0439 3131 - Fax: +39 0439 313300
www.clivet.com - info@clivet.it