

## PRIVATE HOUSE

Imola, Bologna - Italy

Detached house

System retrofit

ELFOSystem GAIA Edition

Year 2010



Situated in a rural location this two storey residential property was constructed in the mid 60s.

Purchased in 1999 by a civil technological system installer the property has been upgraded and modernized including the installation of a comfort cooling and heating system utilizing a LPG condensing boiler for the top up of the water heating in severe low temperature conditions and a WSAN air cooled heat pump for the comfort cooling ,domestic water and heating requirements, the distribution being via an existing fan coil system.

In January 2010 the air conditioning system was upgraded by replacing the two existing units with a glycolbased system linked to four 80 metre geothermal bore holes.

The house is situated in PO Valley, an area which experiences sub zero temperatures at night time in the winter, with the temperature only approaching zero at midday, an additional problem is the formation of fog within the area.

### The challenge

The main challenge was to upgrade the system and reduce the energy costs with out modifying what was effectively a listed building, some of the 20 rooms remained unused for long

periods so a critical aspect was zone control in the individual areas.

A further consideration and critical issue was noise break out from the installed plant.



Private house – Exterior view and drilling for vertical geothermal probe positioning

### The climate

- Continental climate (2.292 degree days / Climatic area E, according to the Italian regulations))
- Winter project temperature -5°C

### The building

- Built in 1960
- Detached house on 2 floors
- 20 rooms

### The size

- 400 m<sup>2</sup> in total

### The team

- Project Studio S.I.T., Imola (BO)
- System realization: B.R.T. di Berti Francesco, Imola (BO)
- Vertical geothermal probes Geo-Net s.r.l., Imola (BO)
- Air conditioning supplier Agenzia Tecnodelta (BO)

## The solution

For the modernization of the system, the air cooled heat pump and the LPG boiler were substituted by a water water-glycoled heat pump with DC inverter technology GAIA Acqua with vertical close loop probes. The new heat pump, that includes the main elements of the boiler, among which the pumping groups and the sanitary tank from 200 lt, and the predisposition to a possible connection to the solar panels, it covers by itself the heating, cooling and domestic hot water production needs, assure the highest seasonal efficiency.

The internal system is unchanged.

For the distribution the 22 fan coils ELFORoom, installed in 1999 were maintained, since they are the perfect solution to cover the high dispersions, saving energy and assuring at the same time the highest low noise and good design. These fan coils the heating and cooling of the rooms, using the fan only at the min speed and using water at very low temperatures in winter (30-35°).

Also the original control system, progenitor of the centralized control system ELFOControl was maintained, it manages the 22 fan coils, assuring the temperature control room by room and the heating and cooling Energy distribution, produced by Gaia only in the rooms where it is necessary and in the requested quantity, allowing the unused rooms to be excluded.

The operation of the whole system is monitored by a system realized by the installer, that allows to verify in real time by the B.R.T., <http://www.brt.it/casa3.swf> website, the external conditions, the operation and the consumptions.

## The results

The installer says:

"I started up my GAIA Acqua at midnight on the 27th of January 2010 with external temperatures of -15 degrees, and it continues for many days. After a quickly start-up, GAIA supplied all the energy necessary to my system (between 15 and 16 kW) absorbing by the network 3,5 – 4 kW, with a COP of 4 - 4,3 and with outdoor temperature of 40°C! NOT BAD!"

Comparing the consumptions of the new packaged unit detected by the monitoring system during the first three months of operation (from 27th January 2010 to 27th April 2010) with those of the same period of the previous year you can easily quantify the obtained saving. Management costs are reduced of 46% passing from 1.077€ to 604€ with a saving of 473€ in just 3 months. Then you have to add a further saving coming from the cost elimination of the ordinary maintenance operation of the boiler.

With GAIA Acqua we eliminated the local CO<sub>2</sub> emissions connected to the combustion improving the environment.

GAIA Acqua compactness and the fact that it integrates all system components in itself, allows the simplification of the systems and the reduction of the space, dedicating the boiler room to the closet.

The result was a compact, simple, efficient and low noise system perfectly integrated with the building, in which the new geothermal heat pump efficiency is connected to the ELFORoom fan coil efficiency, that equipped with a DC motor with an advanced electronics, allow the fan cost reduction of 80%, assuring a further annual saving of about 100€ than a traditional fan coil.

The system assures the max comfort both for temperature and humidity, and for an efficient management of the rooms.

*For further information about Clivet systems*  
**[www.clivet.com](http://www.clivet.com)**



Private house – Heat pump in the cellar and fan coil in the living room

### About GAIA Acqua

GAIA Acqua is the unit-system that includes in itself the main elements of a central plant, that is to say the components for the sanitary hot water production (included tank from 200 liters), those for the solar panel connection, and those for the hydronics. The DC technology applied to compressor, fan, system circulator and sanitary circulator maximize the seasonal efficiency. GAIA Acqua allows to use the sun Energy both in direct form by solar panels and indirect form, taking it from the ground. Using also these two Energy forms of GAIA Acqua assures each system need, deciding the opportunity to keeping from a source than another, always preferring the min consumption and the max efficiency.

### The System

- A heat pump for geothermal installation Clivet GAIA Acqua 61, with DC technology, integrated tank of 200 lt and a predisposition for the connection to the integrated solar panels
- Distribution: 22 fan coil ELFORoom OUT
- Control of the different rooms by Clivet management and control system
- Four vertical geothermal probes from 80 mt