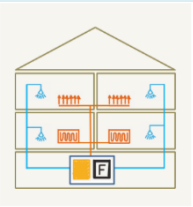
Centralized Hybrid System, Italy



A5

New Class A construction in climate zone E* with heating, air conditioning and a hot water system

Key facts

Buildings

Location	*Concorezzo, Italy*
Construction	*2023*
Project type	*newly done*
Heat distribution	*underfloor*
Heated space	*2000 m²*
No. of apartments	*20*
Level of insulation	*high thermal*

Heat pump and source

Number of	*3*
Operation mode	*hybrid*
Heat source	*air*

Heating system

Installed power	95.4 *kW HPs* *115,2 kW gas boiler*
Heating temperature	*45°C*

Domestic hot water

Type of system	*technical storage tank with instant exchanger*
Max. temperature	*55°C*

Other information

Coefficient of Performance	*3.9 (at 35°C)* *2.9 (at 45°C)*
Refrigerant	*R32*

Lessons learned

- From the simulations, we have learned that hydraulically, it is appropriate to adopt the reverse return of heat pumps in similar systems.
- This means that the first machine working on the supply part of the loop is the last machine working on the return part of the loop. This improves the balancing of the circuit, optimizing the working hours of the individual heat pump units.

The challenge in constructing this building was to create an efficient and flexible system that could simultaneously manage the production of hot and chilled water that would be usable for both heating and air conditioning (Space Heating), and for domestic hot water (DHW). Therefore, it was required to optimize consumption.

*The climate zone E in Italy is that which has a level of 2102 to 2999 heating degree days (HDD). It is located in the northern parts of Italy, along the Apennine Mountains and in the very center of inland Sicily.[1]

[1] https://www.researchgate.net/figure/Italy-Climate-Zones-Zone-E-and-Zone-F-were-chosen-in-the-building-energy-analysis_fig2_311782958

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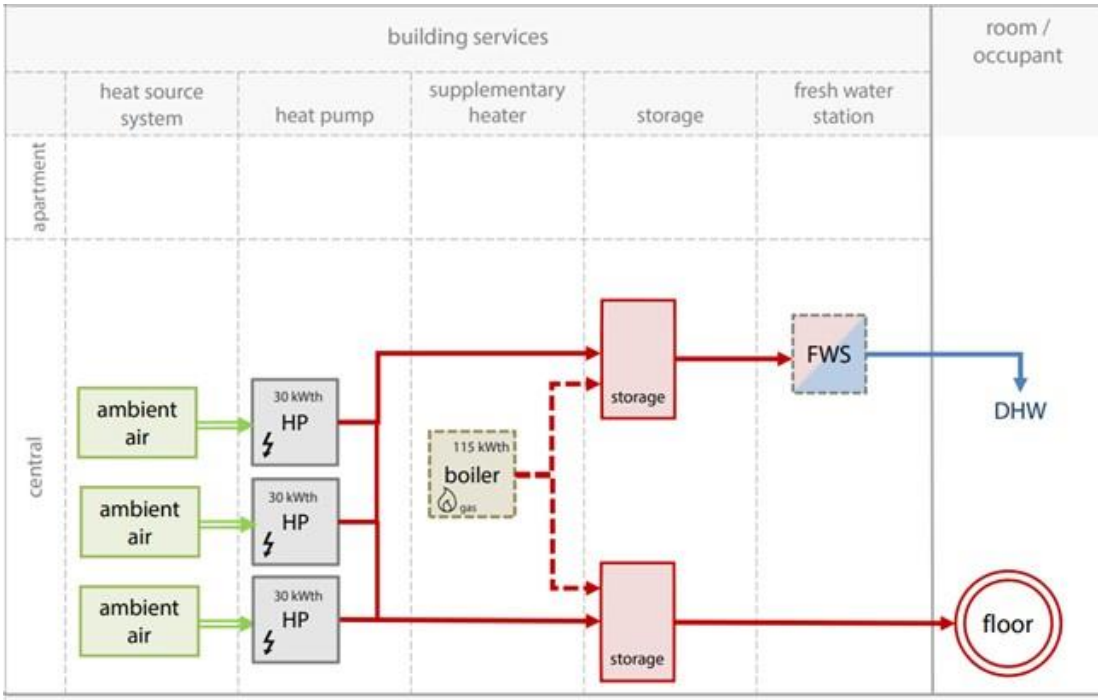

Multiple (cascade) centrilized HP system with back-up boiler and buffer storage

Concorrezzo (Milano-Italy), Clivet S.p.A

Description of the technical concept

The hybrid system works on three technical storage tanks, two of which are 1000-liter tanks each for domestic hot water and one of the same size for serving the system. The system-side technical water tank supplies hot or chilled water to the radiant underfloor systems of the individual dwellings. The production of DHW, on the other hand, takes place by means of instantaneous exchange between the water coming from the aqueduct and the water contained inside the two storage tanks.

The inertia of the three large storage tanks is exploited to reduce consumption. The heat pump, after the first boost, only has to work to compensate the temperature delta generated by the system's demand.

The temperatures in the technical storage tanks are controlled by means of dedicated temperature probes.

To reduce electricity consumption, a 100kW photovoltaic system was installed on the roof.

Installed heat pumps: *Edge EVO 14.1* (31,8kW each)