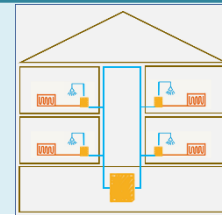


Project HAPPENING Public Social Housing, Spain**Eight dwellings near San Sebastian on the Bay of Biscay**

The EU-funded project HAPPENING's concept is based on cascade heat pumps in refurbished multi-family buildings in order to allow for 'tailor-made solutions'.



B3

Key facts Buildings

Location	<i>Pasaia, Spain</i>
Construction	<i>2008</i>
Project type	<i>retrofit</i>
Heat distribution	<i>radiators</i>
Heated space	<i>approx. 600m²</i>
No. of apartments	<i>8</i>
Level of insulation	<i>average</i>

Heat pump and source

Number of	<i>2 central, 8 decentral</i>
Installed power	<i>2 x 18 kW 8 x 6 kW</i>
Operation mode	<i>monoenergetic</i>
Heat source	<i>air, internal loop</i>
Cooling	<i>no</i>

Heating system

Heating temperature	<i>19 °C distribution, 55 °C SH</i>
Thermal Energy Storage (TES)	<i>2000 l</i>

Domestic hot water

Type of system	<i>individual HP fed by internal loop fed by central HP</i>
Max. temperature	<i>70 °C (nominal capacity, 50 °C used as SP)</i>

Other information

Coefficient of Performance	<i>5.5 A/W, 3.5 W/W (considering all water circulation in their electric consumption)</i>
Refrigerant	<i>R290</i>
Additional components	<i>PV + electric Battery</i>
Climate zone	<i>Cfb (Temperate oceanic climate)</i>

Lessons learned

- **Versatility**, as each single dwelling can decide the configuration that better fits their needs and interests.



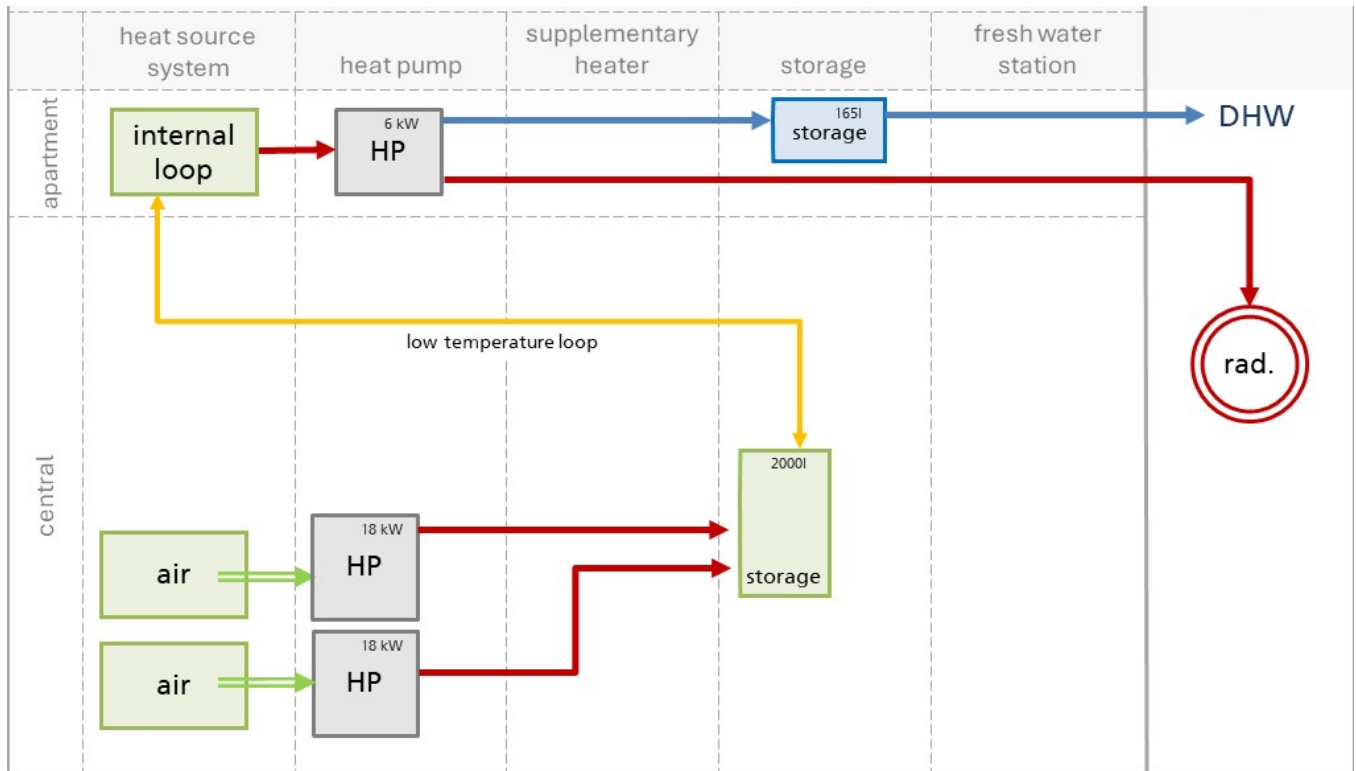
In the North of Spain, next to San Sebastian lies the small town of Pasaia. In this mild climate zone, a multi-family building was constructed in 2008. It consists of eight dwellings, each of which has an approximate size of 75 square meters.

The (Basque Country) state funded company *Alokabide* owns this building which was built with renewable energies in mind as it had Solar Thermal components installed but still drew both Domestic Hot Water (DHW) and Space Heating (SH) from individual gas boilers with 100l TES in each dwelling.

By the time of refurbishment, the Solar Thermal parts were out of order. Still, the building is owned by the aforementioned company as part of the public social housing policies of the region.

Before refurbishment the building had an energy consumption of ~32,3 MWh/y (SH & DHW) + 12,8 MWh/y (electricity consumption)

Project HAPPENING Public Social Housing, Spain



Description of the technical concept

As part of the HAPPENING project the refurbishment of the building involved installing a new heating system that relied on a central-decentral heat pump (HP) mix.

Centrally, two 18 kW air-to-water HPs were installed. By means of a 2000 l TES, they feed a low-temperature water-loop (internal loop) inside the building. On the dwelling level, individual HPs use this internal loop as their heat source for both DHW (incl. DHW tank) and SH (using the previously existing radiators).

A PV installation connected to an electric battery delivers electricity. Its RES self-consumption is maximized by the central HP + TES + controls.



Pictures: HAPPENING Project

