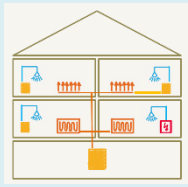
# Jardins de Llevant, Palma de Mallorca, Spain

## Positive Energy District pilot with centralized DHW via heat pumps

Centralized DHW production in a multi-family building using monovalent air-to-water heat pumps with SCADA monitoring.



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### Key facts

**Buildings**

| | |
|---|---|
| Location | *Palma, Spain* |
| Construction | *2022* |
| Project type | *Newly built* |
| Heat distribution | *FCU* |
| Heated space | *9831 m²* |
| No. of apartments | *114* |
| Level of insulation | *Very good* |

**Heat pump and source**

| | |
|---|---|
| Number of HPs | *2* |
| Operation mode | *Monovalent* |
| Heat source | Ambient air |
| HP only/ Hybrid | HP only |

**Domestic hot water**

| | |
|---|---|
| DHW demand | - |
| Type of system | *Centralized DHW with riser column distribution and hydraulic substations* |
| Max. temperature | *80°C* |

**Other information**

| | |
|---|---|
| COP (measured) | 2.8 |
| Refrigerant | *Outdoor (R410A)*<br>*Indoor (R134a)* |

**Lessons learned**

- Centralized DHW production with monovalent air-to-water heat pumps is fully operational for a new multi-family building in Mediterranean climate
- Circulation losses account for around 54% of the HP production
- SCADA integration provides valuable data for system diagnostics, control optimization and research applications.
- Deployment of MPC control enabled an estimated 18% of cost savings during one test week of May 2025

The construction of the multi-family residential complex "Jardins de Llevant," located in Palma de Mallorca, was completed in 2022. The building comprises 114 dwellings distributed across two main blocks, forming part of the new Positive Energy District (PED) of Llevant in the southeast part of the city.

This project is embedded within the ARV project (https://greendeal-arv.eu/) funded by Horizon Europe, and was selected as a pilot case to demonstrate the feasibility of centralized domestic hot water (DHW) systems based on heat pumps in warm Mediterranean climates. In this context, a smart controller (Model Predictive Control, MPC) was implemented to optimize the energy bills of the community using the PV installation as well as the dynamic pricing.

The installation features centralized air-to-water heat pumps supplying DHW to the entire complex. Energy monitoring and control are managed through a dedicated SCADA platform, enabling real-time performance tracking and data collection for analysis and optimization purposes. Space heating and cooling is provided through decentralized air-to-air heat pumps installed in each flat, however these individual heat pumps are not monitored, and the study has focused on the centralized DHW production.

ARV

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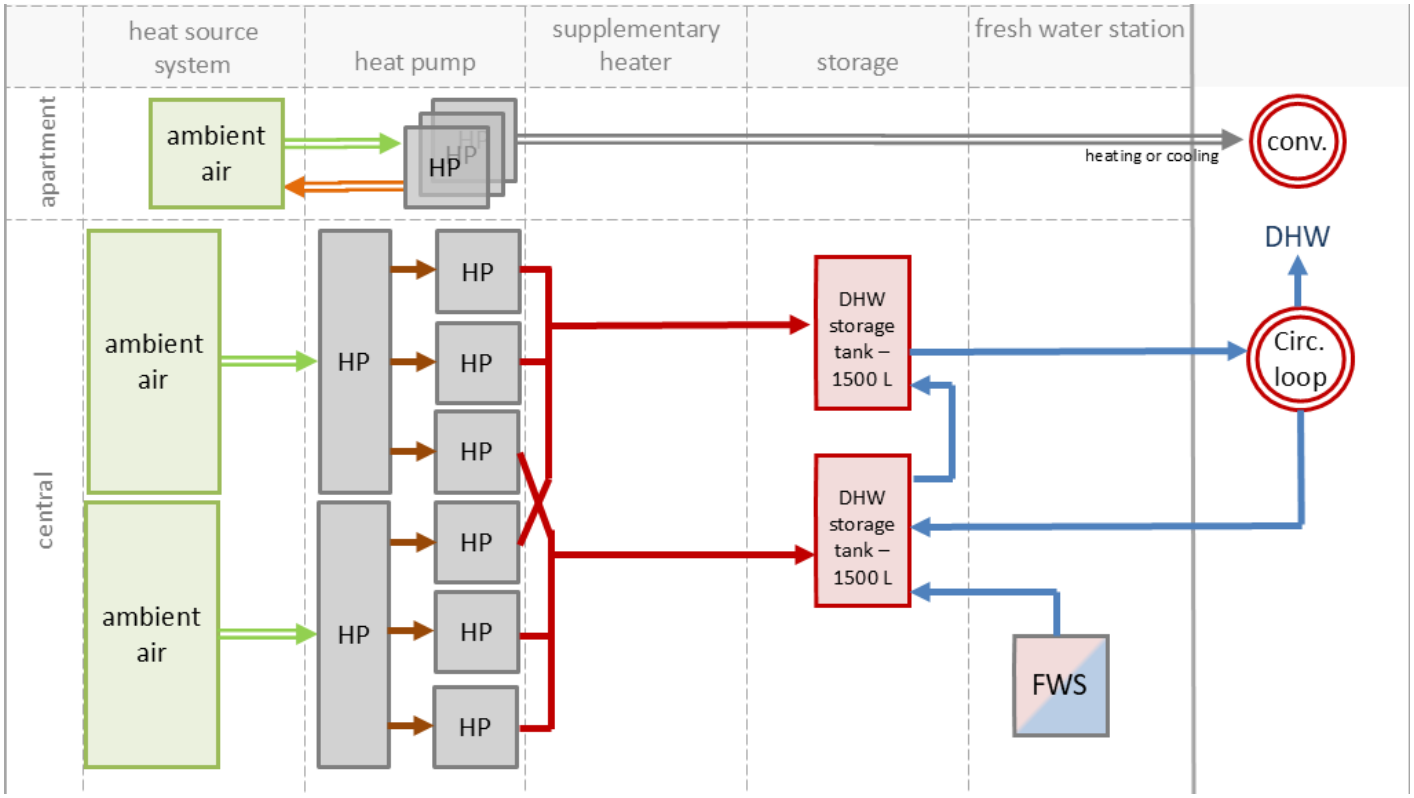


## Description of the technical concept

The DHW system in Jardins de Llevant is based on centralized air-to-water heat pumps operating in monovalent mode. The installation includes two Daikin EMRQ14ABY1 outdoor units, each connected to three indoor hydronic modules (Daikin EKHBRD016ADV17), therefore with a cascade configuration. Two independent hydraulic circuits each feed one water storage tank, which are installed in series, at different set-point temperatures (usually 50 and 55ºC). From these tanks, DHW is distributed via vertical risers to each apartment through a recirculation loop.

The monitoring system enabled to estimate some indicators for a full year of operation between June 2024 and June 2025. The DHW consumption was around 90 000 kWh (thermal), and the building community was billed for around 80 000 kWh of electricity during this period, for an average price of 0.19 €/kWh (actual price invoiced to individual households might differ). The building also benefitted from around 20 000 kWh produced by the local PV installation. The electricity used per month by the community for DHW production is represented below.