INTRODUCTION

An integrated project to improve building performance

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Energy retrofitting does not mean simply replacing a system, but designing an **integrated** solution in which building and technologies work together.

In the case analyzed, a home built in the 1960s in Fano was moved from a critical condition (**energy class G** – **288 kWh/m²·year**) to a high-efficiency configuration (**energy class A3** – **37 kWh/m²·year**).

The result comes from an **integrated system** in which heat pump, radiant system and photovoltaic are not isolated elements, but part of a **single energy project**.

The result comes from an **integrated system,** not from individual technologies.

HOW MUCH DOES A CLASS G HOME CONSUME?

Our experience in this real case

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The energy consumption of a class G home also depends on the area, local climate and heating demand.
In this real case, we are talking about a home located in **Fano**, in a **climatic zone E**:
this means the building is in an area with fairly rigid winters and a significant heating demand.

In the case analyzed, the initial energy demand was equal to **288 kWh/m² year.**
The home was built in the 1960s and started from a critical energy condition:
outdated system and no real integration with renewable energy sources.

The pre-renovation EPC certified an **energy class G**, with a non-renewable primary energy demand of **288.65 kWh/m² year.**
The document also indicates a winter heating system based on a standard boiler (built in 1995), powered by natural gas or fuel oil, with a nominal power of **51 kW.**

1960s HOME

FANO (PU)

CLIMATIC ZONE E

INITIAL ENERGY DEMAND

288

kWh/m² year

ENERGY CLASS

G

Winter heating system: standard boiler (built in 1995)
Fuel: natural gas or fuel oil
Nominal power: **51 kW**

These data show that the issue does not only concern the age of the generator, but **the lack of balance between building, system and consumption.**

IMPORTANT HEAT LOSSES + OUTDATED SYSTEM + NO REAL INTEGRATION WITH RENEWABLE SOURCES → HIGH CONSUMPTION AND LOW EFFICIENCY

HOW THE SYSTEM WORKS

INTEGRATED, EFFICIENT, SUSTAINABLE.

An integrated system that combines heat pump, radiant system and photovoltaic to provide heating, cooling and domestic hot water with renewable energy and maximum efficiency.

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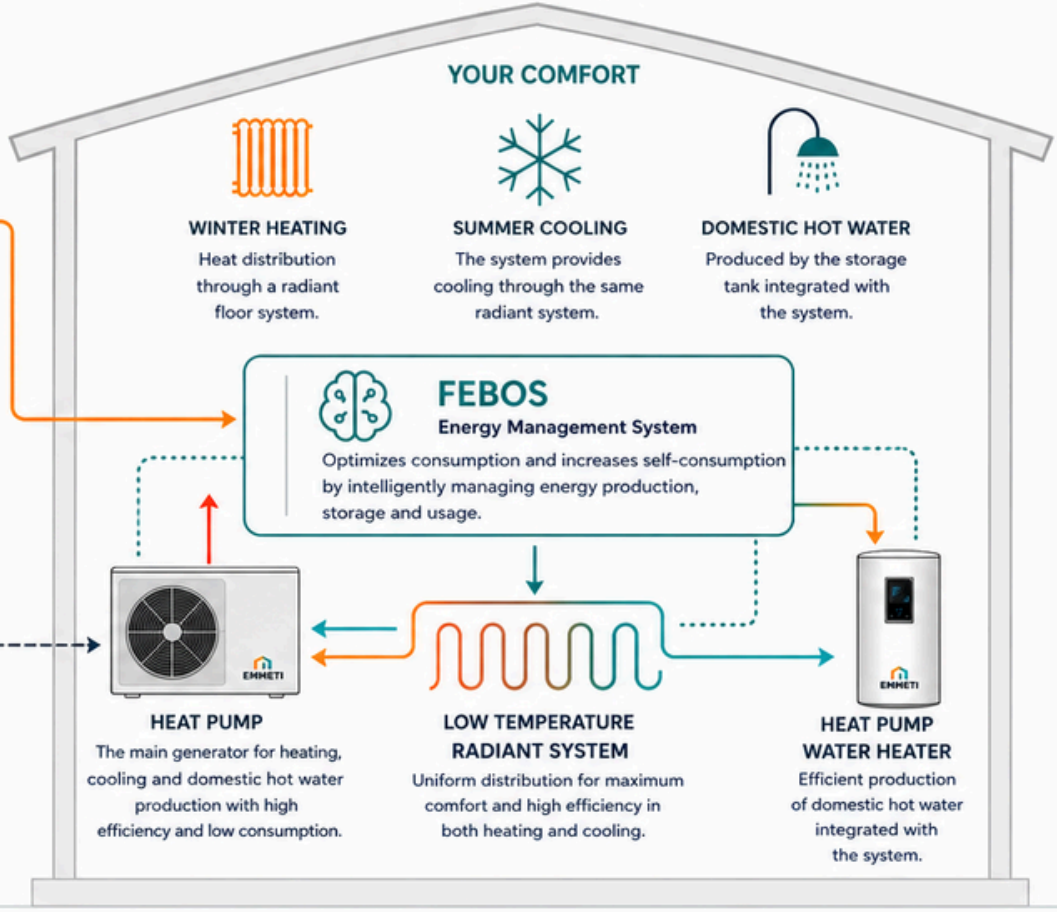
ENERGY SOURCES

PHOTOVOLTAIC SYSTEM
6.00 kWp
Produces electrical energy from a renewable source.

POWER GRID
Energy is drawn from and supplied back to the grid when needed.



HOW IT WORKS

1. PRODUCTION
The photovoltaic system generates electricity to power the home's consumption.

2. SUPPLY
The heat pump uses electricity to produce heat, cooling and domestic hot water.

3. DISTRIBUTION
Energy is distributed through the radiant system for heating and cooling.

4. EFFICIENCY
The integrated system optimizes consumption, reduces waste and increases energy independence.

5. MANAGEMENT
FEBOS coordinates energy flows to reduce waste and maximize overall efficiency.

THE BENEFITS OF THE SYSTEM

REDUCED CONSUMPTION
Up to 87% reduction in energy demand.

RENEWABLE ENERGY
Greater use of energy produced on site.

TOTAL COMFORT
Well-being in every season with uniform temperatures.

SAVINGS OVER TIME
Lower management costs and higher efficiency.

SMART MANAGEMENT
More self-consumption, less waste, better performance.

FROM CLASS G A A3: PROJECT RESULTS

Real energy savings achieved through an integrated system

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The intervention led to a **significant improvement** in the building's energy performance, certified by the post-renovation EPC, with a transition from energy class **G** to **A3**.

Energy demand was **reduced by approximately 87%**, transforming an energy-intensive home into a high-efficiency building.

BEFORE
ENERGY CLASS
G

288,65
kWh/m² year

AFTER
ENERGY CLASS
A3

37,62
kWh/m² year

ENERGY COST BEFORE THE INTERVENTION

Estimated energy cost before renovation
€ 5.980 / year
for electricity and diesel

ENERGY COST AFTER THE INTERVENTION

Estimated cost for the heat pump operation after renovation
€ 437 / year
thanks also to the energy produced by the photovoltaic system

ANNUAL SAVINGS

€ 5.543 / year
-92,7%
reduction in energy costs

BEFORE THE INTERVENTION

288,65 kWh/m² year
Energy Class **G**
Fossil fuel-based system

AFTER THE INTERVENTION

37,62 kWh/m² year
Energy Class **A3**
Integrated electric system + photovoltaic

The result is not a single improvement, but a **transformation of the entire building-system relationship.**