

ENGINEERING
TOMORROW



Case story | AB-QM pressure independent control valves

A **win-win** project

At any hotel, guest satisfaction is a top priority, and ensuring that rooms are a comfortable temperature is key to keeping customers happy.

A 4-star resort in Southeast Europe wanted to renovate its water-based hotel room cooling system to deliver optimal temperatures for guests, and turned to Danfoss for support.

Danfoss provided the AB-QM pressure independent balancing control valve to improve performance, save energy, and cut running costs—with impressive results.

19.3%

average energy
saving in
3 months

The challenge

The hotel—run by Maistra hospitality group—was using a water-based constant flow system for cooling spaces and rooms. The system used variable fan speed to control room temperature. Maistra is always working to improve hotel guest experiences and decided to enhance its existing temperature regulation to utilize a more precise, modern solution.

A significant HVAC renovation was therefore a core part of Maistra's ongoing plan to optimize its services through new technologies as well as maximize cost and energy efficiency.

Guest satisfaction

was the top priority

“We wanted to improve our room cooling system to ensure better customer experiences. Danfoss showed us the potential energy savings the AB-QM could bring so we decided to increase the renovation budget for our Belvedere Resort in Croatia.”

Oliver Fatorić

Head of Technical Maintenance
at Maistra hospitality group



The solution

Danfoss investigated and recommended that the existing fan-coil units be fitted with AB-QM pressure independent balancing control valves (PICV) to establish a dynamic hydronic balance. This was the best solution for the partial load conditions that occur the majority of the time.

In addition, water flow through the valves is regulated with TWA-Q thermal actuators to enable more comfortable room temperatures.

The AB-QM valve has a built-in pressure controller that allows the flow to be precisely managed regardless of load and pressure fluctuations.

AB-QM valves were added to a total of 437 fan-coil units in winter 2019/2020 within 251 of the hotel's 310 rooms.

The new variable flow system facilitated optimal room temperature and guest comfort by removing the unnecessary circulation of chilled water from four 123kW heat pumps, which reduced the required flow and improved the delta T. This allowed the heat pumps to function even more effectively, with fewer start-stops and shorter working hours, which significantly reduced energy consumption and service costs, while increasing the seasonal energy efficiency rating (SEER).



TWA-Q
thermal actuator



AB-QM pressure
independent balancing
control valves

437

valves and
actuators installed

AB-QM

created a
dynamically
balanced,
hydronically
controlled cooling
system

“The AB-QM valve was the ideal addition to our system as it reduced the energy used by the heat pumps and, importantly, it enables optimal room temperature and comfort for our guests.”

Oliver Fatorić

Head of Technical Maintenance
at Maistra hospitality group

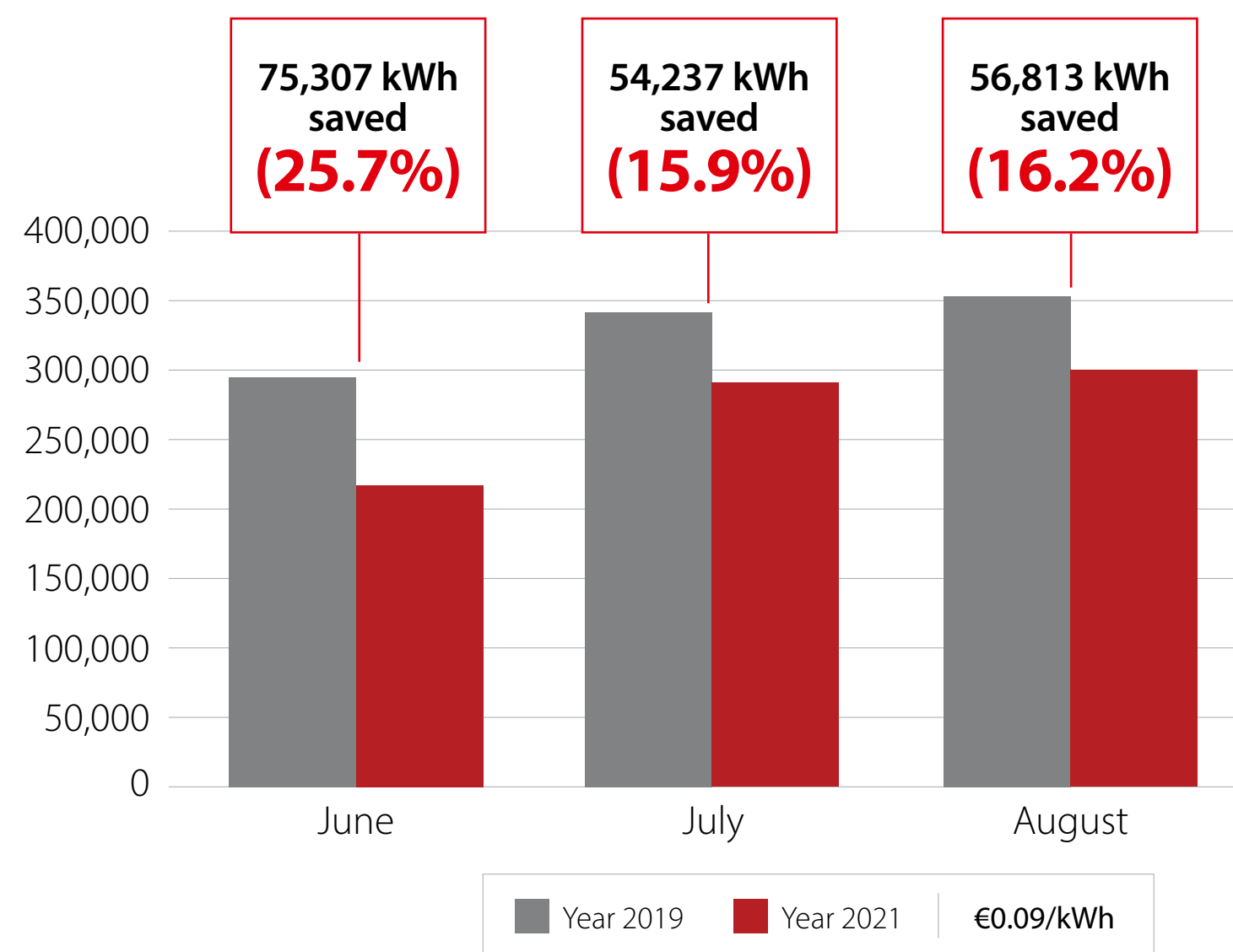
The result

Installing the on/off temperature controls for fan coils and AB-QM control valves limited flow and reduced energy consumption by 427kWh per fan coil, saving the hotel close to €40 per fan coil between June and August 2021.

Over those 3 months, the hotel reduced its electricity consumption by 19.3% overall, saving 186,400kWh of energy compared to the same period in the summer of 2019. This was based on similar occupancy rates.

The renovation costs were €66,800 (€153 per fan coil) in total. Based on the local energy price of €0.09/kWh and the 3-month energy saving, return on investment (ROI) is just over 4 years. If the same calculations are applied to a longer summer season, with increased partial load conditions comparable with the month of June (showing lower energy consumption and higher saving %), then energy savings can be estimated to be 20-30% higher, giving an ROI of approximately 3 years.

Energy consumption (kWh)



Data from 2020, as well as additional pre- and post-summer season months, could not be taken into account due to Covid-19 and an incomparable number of hotel visitors.

427kWh

energy saved
per fan coil over
3 months

19.3%

saving on electricity
costs resulting in

4 year

return on investment

“Since renovating the fan coils and adding the AB-QM control valve to the cooling system we have improved guest satisfaction, which is reflected in our positive hotel ratings, all while significantly reducing our energy consumption and operating costs. It’s a win-win for us and our guests.”

Oliver Fatorić

Head of Technical Maintenance
at Maistra hospitality group



Results based on energy prices in 2022

If the same renovation were to be executed based on energy prices valid per July 2022, results would be significantly different.

Due to price increases in material and labor the investment costs would be 15% higher at €76,820 (€176 per fan coil) in total.

Furthermore the calculation is based on identical energy consumption over a 3-month period and the increased price from €0.09 to €0.28/kWh.

With the above up-to-date figures, the ROI time would be 1.5 years. A longer summer period (with 20-30% higher savings) would lead to an ROI of approximately 1 year. The savings per fan coil would be close to €120 instead of almost €40 as per 2021.

If the Croatian government had not released financial compensation e.g. for hotel facilities, and the actual market price of €0.42 was used, then the ROI for the investment for the 3-month period would be as low as 1 year.

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2022

energy price increase results in shorter pay-back time and higher savings

1.5 year

return on investment time

€120

saving per fan coil during one 3-month high season period