SUCCESS STORY AUTOMOTIVE PLANT (TR)

Save 1,080 metric tons of CO_2 in three months

Looking to the future.

As part of a Belimo RetroFIT+ project, the plant of an international automotive manufacturer was retrofitted with Belimo Energy Valves to optimise interior comfort and to reduce the plant's CO_2 emissions. The first successes were achieved just three months after commissioning: Compared to the first three months of the previous year, 934,000 Sm^3 of natural gas were saved, and 1,080 metric tons of CO_2 emissions were avoided.

The plant was built in Turkey several decades ago and is one of the largest in Europe, covering a total area of 1,600,000 m^2 and employing 21,000 people. The renowned automotive manufacturer has more than 30 production locations worldwide. The plant has several production halls for manufacturing vehicle parts and motors and for vehicle assembly. The location also houses offices, a research and development centre and a company-owned cafeteria. The total internal area of the automotive plant is 340,000 m^2.

BUILDING TYPE
Automotive plant with offices

PROJECT
Retrofit

TRADES
Heating, cooling

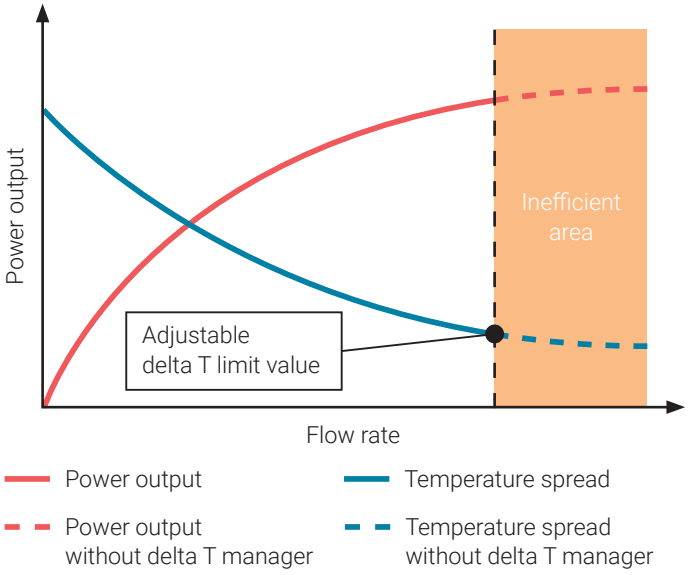
PRODUCTS
Belimo Energy Valves with thermal energy meter

BELIMO

Full refurbishment is not always necessary

Due to its age, the heating system at the automotive plant was outdated and could no longer provide satisfactory operation. "Facility management at the plant found that the heat distribution in the buildings was inadequate," recalls Hamit Mutlu, Lead Specialist Planner for the project. This resulted in unacceptably high heating costs due to excessive energy consumption and employee complaints regarding room comfort. The building owner decided to invest in targeted refurbishment measures to address the existing problems and at the same time to enable a more sustainable operation.

"During the property inspection, we noticed some problems: The heating system was not hydronically balanced. The building automation infrastructure was also inadequate. In addition, weak points were found in the operation of the circulation pumps and boilers," says Hamit Mutlu. Inefficient operation of the heating system also resulted in the so-called low delta T syndrome.



Visualization of the low delta T syndrome (example)

If a heating or chilling system is operated with too much water, this cannot be converted into higher heating or chilling capacity. This situation leads to a low temperature spread between supply and return at a practically constant power output, which then results in the low delta T syndrome. This reduces the entire system's efficiency and increases the energy requirements of the pumps and the generator. Monitoring the temperature spread (delta T) is necessary to ensure the efficient operation of the system over its entire life cycle. All in all, there is enormous potential for optimisation.

"By using the Energy Valves, we can now ensure optimum heating and cooling performance throughout the entire plant."

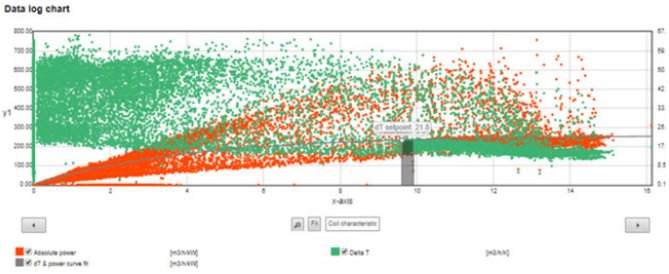
Hamit Mutlu
Lead Specialist Planner
Mekanik Proje

Time to act.

Prior to the refurbishment measures, the heating system output was controlled by constant-speed pumps and 3-way valves without the use of a balancing valve. Hamit Mutlu planned to use Belimo Energy Valves to distribute the heat correctly and achieve correct control at the end of use. "With a demo application on one of the existing ventilation systems in the plant, we were able to demonstrate the benefits of the Energy Valves to the customer in an impressive way," says the specialist planner.

As a result, a total of 200 Belimo Energy Valves were installed in the ventilation and air-conditioning systems and in the heat exchangers at the automotive plant. The Energy Valves replaced the original motorised 3-way valves and constant-speed circulation pumps at the endpoint.

The differential temperature between the supply and the return was increased from 15 °C to 22 °C, and the low delta T syndrome that previously occurred was eliminated thanks to the use of the Energy Valves.



Monitoring the temperature spread (delta T) is necessary to ensure efficient operation of a system over its entire life cycle. When activated, the Belimo Energy Valve™ carries out this function automatically.

Worth it in every way.

"The Energy Valves now provide the desired interior comfort and will pay for themselves in a very short time," is how Hamit Mutlu sums up the Belimo RetroFIT+ project. "I see huge potential in the use of valves in both new construction and existing buildings," he concludes.

Belimo Energy Valves™ are now optimising the operation of the automotive plant's air handling units.

BASES OF CALCULATION

The reported CO_2 and natural gas savings result from a detailed evaluation. The calculation methodology comprises several key steps:

CALCULATION OF THE CLIMATE TEMPERATURE

Average outdoor temperature data were collected and analysed to determine the climate temperature. The climate temperature is calculated as the absolute difference between the daily measured outside air temperature and the summer/winter temperature.

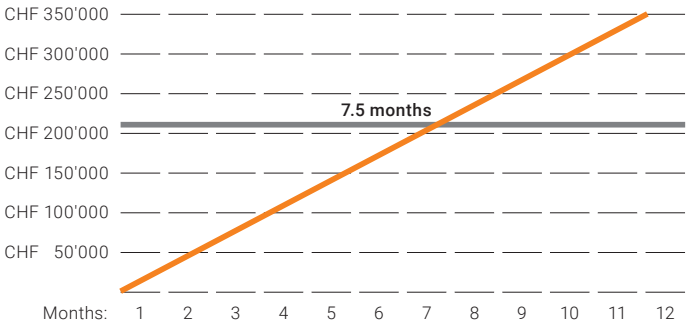
EVALUATION OF NATURAL GAS CONSUMPTION

Natural gas consumption data were analysed in standard cubic metres (Sm^3). These data were compared to obtain the capacity for 1 climate temperature as Sm^3/°C. The total value of the natural gas consumption was determined on the basis of climate temperature data.

NORMALISATION OF THE DATA TO 2021

For a fair comparison, 2022 data were converted to 2021 data. The final results of these calculations demonstrate significant environmental benefits with 1,080 metric tons of CO_2 savings and 934,000 Sm^3 of natural gas savings.

Return on investment



TOTAL INVESTMENTS FOR 154 AHUs

200 Belimo Energy Valves
Installation and System Adaptations
Planninng and System Integration

CHF 208'412.–

Annual savings	KWh	m^3	TL	CHF
Distribution pump performance (electric)	216'000	–	146'880	24'119
Main pump (electric)	182'000	–	123'760	20'323
Gas heating (biogas)	12'474'000	1'300'730	1'760'231	289'048
Total	**12'872'000**	**1'300'730**	**2'030'871**	**333'489**

Calculation bases (biogas)

KWh --> m^3: 9.59 m^3/KWh
KWh price: 0.68 TL/KWh
Biogas price: 1.353264 TL/m^3

Price from 17.1.2020
FX rate from Oanda: 0.16421

ROI

$$\frac{\text{Installation costs / CHF 208'412.–}}{\text{Savings per year / CHF 333'489.–}} = \textbf{0.6 years / 7.5 months}$$

All inclusive

Belimo is the global market leader in the development, production, and sales of field devices for the energy-efficient control of heating, ventilation and air-conditioning systems. The focus of our core business is on damper actuators, control valves, sensors and meters.

Always focusing on customer value, we deliver more than only products. We offer you the complete product range for the regulation and control of HVAC systems from a single source. At the same time, we rely on tested Swiss quality with a five-year warranty. Our worldwide representatives in over 80 countries guarantee short delivery times and comprehensive support through the entire product life. Belimo does indeed include everything.

The "small" Belimo devices have a big impact on comfort, energy efficiency, safety, installation and maintenance.

In short: Small devices, big impact.

- 5-year warranty
- On site around the globe
- Complete product range
- Tested quality
- Short delivery times
- Comprehensive support

EN – 10.2023 – Subject to technical modifications

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