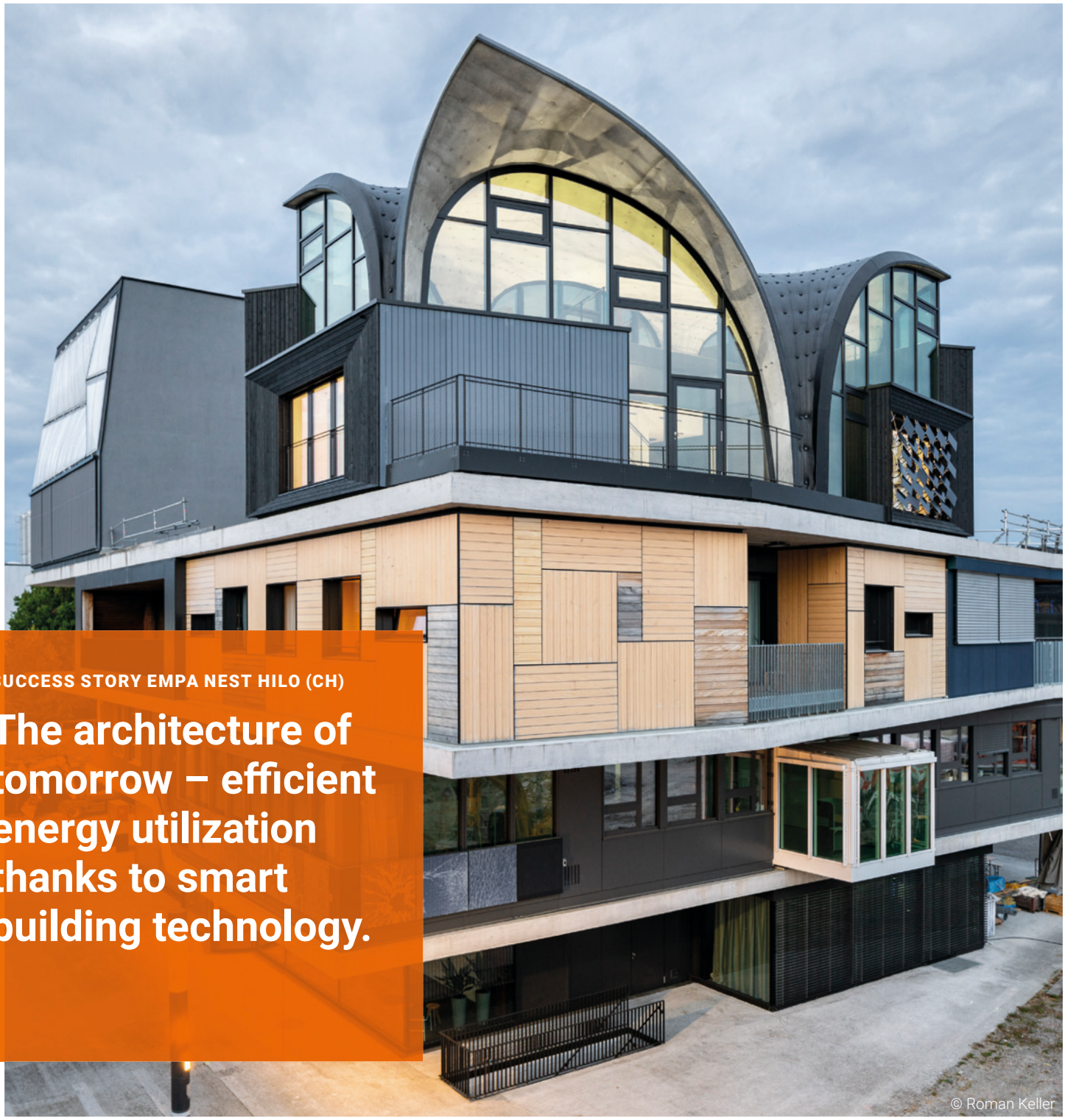


SUCCESS STORY EMPA NEST HILO (CH)

The architecture of tomorrow – efficient energy utilization thanks to smart building technology.

The future of construction is sustainable.

In order to test new technologies, materials and systems in the areas of construction and architecture, without risk and under real-life conditions, the Swiss research institutes Empa and Eawag founded «NEST» (Next Evolution in Sustainable Building Technologies), the modular research and innovation building, in 2016. At NEST, various partners in close cooperation with the fields of economics, research under continuous development resource-friendly and energy-efficient building construction and energy solutions.

The NEST unit «HiLo», which stands for «High Performance – Low Emissions», demonstrates how modern architecture can be combined with sustainable construction and operations and thereby brings together innovative planning and construction methods for efficient concrete structures with a self-learning and adaptive building technology. The objective here is, among other things, to use machine learning not only to optimize indoor air quality in buildings, but also to lower the energy consumption of HVAC systems.

TYPE OF BUILDING
Research building incl. residential unit

PROJECT
New building

TRADES
Heating and cooling system

PRODUCTS
Belimo Energy Valve™ with thermal energy meter, thermal energy meters, actuators, electronic pressure-independent 6-way control valves, sensors

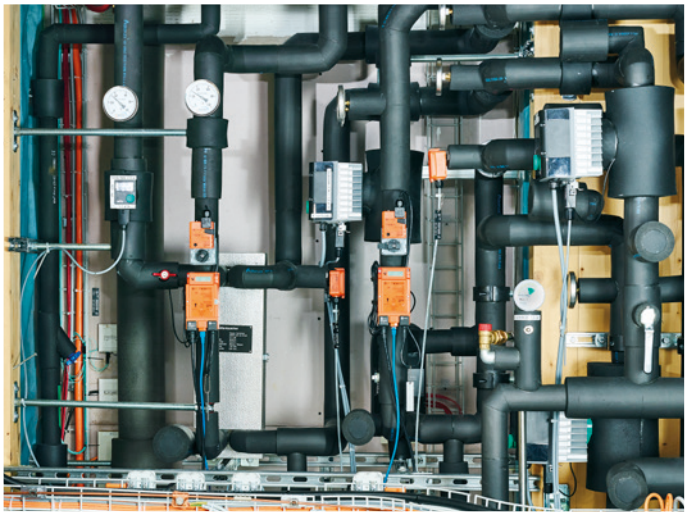
BELIMO

Using multifunctional solutions for more efficiency.

In order to implement this, all building technology components must be integrated into the building control and energy flows must be able to be recorded separately from one another. The new MID-certified Belimo Energy Valve™ with thermal energy meter meets these requirements in all respects. Additional Belimo control devices, including among them actuators, 6-way valves and sensors, supplement the HVAC system at the «HiLo» NEST unit.

This meant that a total of three partial air-conditioning systems were installed to supply the rooms with fresh air. Two Belimo full-rotation actuators were installed in each of the systems, as they are not equipped ex works with motorized outside and exhaust air dampers. The commissioning of the damper actuators proceeds via web interface, and their control via Modbus TCP.

Heating and cooling of the system proceeds via two plate heat exchangers which are connected to district heating and cooling. These provide the building with heating energy in winter and cooling energy in summer. The temperature is adjusted by changing the flow rate on the primary side. The latest MID-approved Belimo Energy Valves with thermal energy meter were used for this purpose. These fulfil several important tasks at once: In addition to transparent regulation and monitoring of the heating/cooling system, they also precisely record the energy consumed and, thanks to thermal energy meters, enable simple and reliable cost accounting. A further advantage of Belimo Energy Valves™ is rapid communication via Modbus TCP interface.



The latest generation of Belimo Energy Valves is used for the measurement, control and billing of heating and cooling energy.

«It is unusual to be able to meet such a large number of requirements simultaneously with just one product. Furthermore, the Modbus-TCP interface also provides robust and rapid communication with the Belimo Energy Valves.»

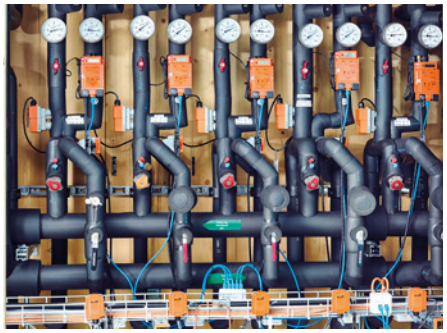
Reto Fricker, Empa

The heating/cooling distribution of the HiLo unit is a 4-pipe system which supplies a total of five zones. Pressure-independent electronic 6-way control valves from Belimo are used for this purpose. The advantage of these valves is that only one product is needed for switching between heating and cooling, for control and for hydronic balancing. The hydronic balance was implemented directly on the 6-way control valves, which not only saves time, but also enormously reduces the potential for errors at the time of commissioning. This can furthermore be monitored during operations, which is a huge advantage over static hydronic balancing instruments. Simple commissioning is possible per app via NFC interface. Condensate monitors are installed in the individual cooling circuits to ensure that no condensation water accumulates in the summer. Furthermore, thermal energy meters from Belimo are used to enable the individual measurement of single zones.

The offices in the HiLo Unit have a thin concrete ceiling which was produced with the aid of a plastic mould created in the 3D printer. The ceiling contains air ducts and can be used for heating, cooling and energy storage via thermal activation. Six passive Pt1000 temperature sensors from Belimo are located in the ceiling for recording and evaluation of the heat distribution in TABS.

Innovative together.

Belimo control devices were utilized during the construction of the NEST building. The Belimo Energy Valves of the previous generation were installed in 2016 in the Energy Hub of the building, which is responsible for the energy generation of the HiLo Unit, and then connected to the Cloud three years later. «We are happy to try out the latest products in the NEST with Belimo and thus work together hand in hand on innovative solutions to make our future more sustainable», says Reto Fricker.



Thermal energy meters enable the energy consumed in each zone to be invoiced separately.

Belimo energy valves of the third generation have been in use at NEST since 2016.

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 – 04.2022 – Subject to technical modifications

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