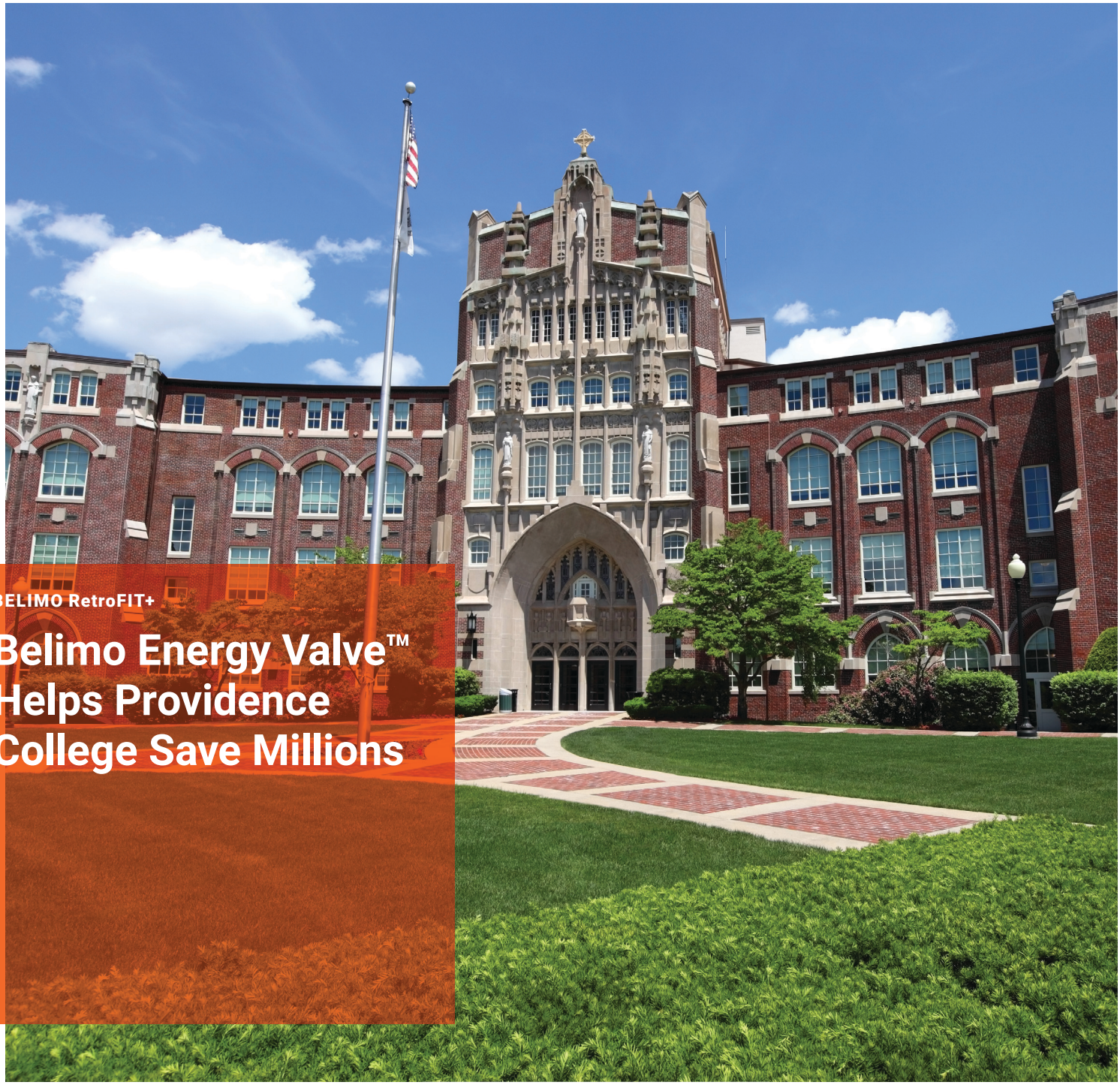


BELIMO RetroFIT+

Belimo Energy Valve™ Helps Providence College Save Millions

Energy Valve Retrofit Helps College Forgo Purchase of New Chiller

Founded in 1917, Providence College sits on an illustrious 105-acre campus in the heart of Providence, Rhode Island. Since its inception, the campus has evolved and expanded to meet the needs of its enrolled base, which has grown to more than 4,000 students. One example of this is the college's Campus Transformation initiative, which began in 2013 with the purchase of Huxley Avenue from the city of Providence. The goal of the project is to create a more unified, sustainable, functional campus, no longer bisected by a busy street, offering enhanced freedom of movement for both pedestrians and drivers.

TYPE OF BUILDING
Various

PROJECT
Retrofit

SECTOR
Education

PRODUCTS
Belimo Energy Valve™ with Cloud Connectivity

Learn more
www.belimo.com

BELIMO

Belimo RetroFIT+ uncovers energy savings in existing buildings.

Project Overview and Motivation

Running beneath one of the recently renovated sections of the school, 12-inch chilled water lines provide cooling to several buildings on the lower campus. With additional buildings set to come online in the next two years, these lines and the central chiller plant are inching closer to full capacity.

One solution discussed by Providence College and its main mechanical and controls contractor, Arden Engineering Constructors, involved adding more capacity with the installation of a new chiller. However, this would require increasing the size of the chilled water line to handle the higher flows. An alternative option was to reduce chilled water demand in the existing buildings so there would be sufficient capacity to accommodate new developments on the lower campus. Recognizing this as the more pragmatic of the two solutions, Arden and Providence College turned to the Belimo Energy Valve™.

Reducing demand for chilled water on the lower campus would effectively create spare capacity in the chiller plant and reduce water flow through the main line. In doing so, Providence College could forgo the installation of a fourth chiller (the plant already had three 1000-ton chillers running in parallel). Moreover, the main line would not have to be excavated and replaced, which would have been a significant undertaking.

With around 20 Energy Valves already installed on campus, Arden and Providence College had an established relationship with Belimo, and were familiar with the company's range of products.

"Our plan was to essentially pick off the sections of the lower campus where the demand for chilled water was highest," said Paul Carter, General Manager at Earthwise Energy Technologies, the controls contractor on the job. "Some of the technology in these buildings was very outdated and due for an upgrade. Having seen the advanced capabilities of the Energy Valve first-hand, we were confident it would be able to generate the flow savings we were looking for."

The Energy Valve is an IoT-enabled, pressure independent valve that measures and manages coil energy by using an embedded ultrasonic flow sensor, along with supply and return water temperature sensors. With built-in Power Control and Belimo Delta T Manager logic, the Energy Valve monitors coil performance and optimizes available energy by maintaining Delta T.

A key advantage of the Energy Valve is that the Delta T setpoint can be matched to the design Delta T of the coil. As the temperature sensors start to realize a lower differential temperature across the coil, the

"Every Energy Valve connected to the cloud and the campus central building management system (BMS) provides us transparency to the individual air handlers, crucial for troubleshooting and identifying opportunities for efficiency gains."

Matt Basile, Lead Design Engineer, Arden Engineering (right)

Paul Carter, General Manager, Earthwise Energy Technologies (left)

valve begins to close and the flow decreases, allowing for more efficient heat exchange and elimination of overflow. When Delta T begins to stabilize, the valve increases flow back through the coil, thus maintaining optimal heat transfer.

The Energy Valve comes equipped with a suite of cloud-based services that can be used to benchmark coil performance, analyze glycol concentration, store energy data, send alerts and commission for optimal performance. In addition to the standard analog signal and feedback wiring, the Energy Valve communicates its data to the Building Management System (BMS) via BACnet MS/TP or BACnet/IP as well as Modbus RTU and Modbus TCP/IP. The built-in web server collects up to 13 months of data that can be downloaded to external tools for further optimization.

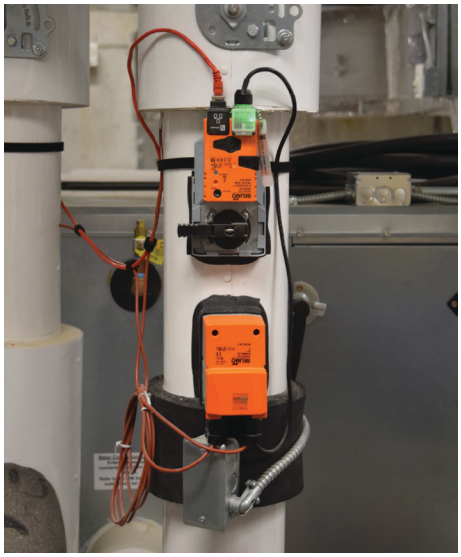
After careful evaluation, the decision was made to install 22 additional Energy Valves across the lower campus – with sizes ranging from ¾" to 2 ½".

Savings and Benefits from the Energy Valve

The retrofit project was completed in Spring 2023, and now Arden and Providence College plan to begin collecting data to quantify the actual flow reductions. The reduction in pumping will lead to decreased electricity usage, which is in line with the college's commitment to increase energy efficiency and improve environmental, social, and governance (ESG) performance.

Allowing their cooling needs to be met with the existing chiller plant configuration, the school saved the cost of buying and installing a new chiller, amounting to an estimated $500,000 - $1,000,000 in savings. This figure excludes the millions of additional funds and months of work that would have been needed to resize and replace the existing main chilled water line.

"While the construction of new buildings in the coming years may ultimately necessitate the installation of a new chiller, the Energy Valve will allow us to push that project further into the future and significantly increase the efficiency of the existing system," said Matt Basile, Lead Design Engineer for Arden. "Every Energy Valve we install gets a data connection to the cloud and to the campus central building management system (BMS). This provides us with visibility down to the individual air handlers, which is crucial for troubleshooting and identifying further opportunities for efficiency gains as we move forward with future capital improvement projects. It is now standard practice to flat spec the Energy Valve for any chilled water device over 10 gallons."



BELIMO ENERGY VALVE™

The Belimo Energy Valve™ is an IoT cloud-connected pressure independent valve that monitors coil performance and energy consumption while maintaining Delta T

- Patented Power Control and Delta T Manager logic monitors coil performance and optimizes the available energy of the coil by maintaining the Delta T.
- Glycol monitoring ensures glycol content meets design needs to provide optimum efficiency and safe operation.
- Cloud analytics provide recommended Delta T and flow setpoints with the ability to update remotely.
- Dynamic coil performance illustrates the operation of the coil in real-time, accurately providing transparency of power degradation and other operational issues.
- Expansive communication platform includes Cloud, BACnet MSTP and BACnet IP, Modbus, RTU and TCP/IP, Belimo MP-Bus, and one analog feedback signal for valve flow, power, temperature, or position.

Customer Satisfaction

The Energy Valve retrofit is one of several instances over the last three years where Belimo, Arden, and Providence College have worked collaboratively to conserve water usage and drive energy efficiency.

“Belimo has a long-standing relationship with both Arden and Providence College and is proud to once again be part of a project that will help the college achieve its goal of creating a more efficient and sustainable campus,” said PJ Qvarnstrom, RetroFIT+ Business Manager at Belimo. “We are eager to see the results of this Energy Valve retrofit and look forward to supplying cutting-edge technologies for future projects.”

In addition to the lower campus chilled water line, there are two other main lines that come from the central chiller plant and provide cooling to separate sections of the Providence College campus. With additional buildings planned for these sections, the lower campus retrofit will serve as a demonstration project and may potentially pave the way for additional Energy Valve installations in the coming years.

“Belimo’s track record of providing superior products and service has fortified our professional relationship and made them a preferred supplier to the college,” added Steve Basile, Supervisor of Engineering at Providence College. “We look forward to leveraging innovative products like the Energy Valve in the future as we drive to continuously improve the efficiency of our facilities across campus.”

CS_29 – 09.2023 – Subject to technical modifications

Belimo Americas
USA, Canada, Brazil, Latin America, and the Caribbean
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