



**BELIMO ENERGY VALVE™ RETROFIT**

## **Tennessee State Office Building Reduces District Energy Chilled Water Usage by 49%**

### **Belimo Energy Valve Provides Jones Lange LaSalle with Savings They Can See**

Founded in 1939, Jones Lang LaSalle (JLL) is one of the world's premier commercial real estate firms. The company is an industry leader in property and integrated facility management services, with a portfolio of 4.6 billion square feet [427.4 million square meters] worldwide.

Since its inception, JLL has been committed to delivering value to its occupants and stakeholders by putting sustainability at the heart of its services and operations. In Nashville, Tennessee, an example of this commitment produced positive results as the company endeavored to improve energy efficiency and reduce chilled water usage at multiple buildings by leveraging the advanced capabilities of the Belimo Energy Valve.

**TYPE OF BUILDING**

Class A Office

**PROJECT**

Retrofit

**SECTOR**

Commercial/Government

**PRODUCTS**

Belimo Energy Valve



# Low Delta T Solution Saves Thermal Inefficiency Charges

## Facilities and Project Overview

Citizens Plaza stands in the heart of Downtown Nashville. The Class A, 275,000 square foot [25,550 square meters], 15-story office building was constructed in 1984 and houses multiple Tennessee governmental agencies. During a typical workday, it has anywhere from 800 to 1,200 occupants.

Citizens Plaza receives its chilled water and steam from Metro Nashville District Energy System, which is located nearby on the Cumberland River. Chilled water from the plant enters the building at a temperature of 40°F [4.4°C]. As part of the contract, return water is to be no less than 54.5°F [12.5°C], or a Delta T of 14.5°F [8.1°C]. Any water that leaves Citizens Plaza below the contracted Delta T results in a thermal inefficiency charge. When JLL took over the management of building operations, the return water temperature was as low as 44°F [6.7°C], and this lingering problem needed a solution.

“At Citizens Plaza, we were experiencing high utility thermal inefficiency charges from Metro Nashville District Energy System due to low Delta T and over pumping,” said Chad Lovell, Operations and Safety Specialist at JLL. “We were pushing water too fast through the building and not getting sufficient thermal transfer. Initially, we saw poor Delta T performance between 4°F to 8°F [2.3°C to 4.5°C]. Before JLL took over the contract, there were monthly thermal inefficiency charges upwards of \$12,000 to \$13,000 for the building. It was obvious that we needed a strategy to increase Delta T to reduce our chiller water usage.”

## The Solution

To solve Citizens Plaza’s low Delta T syndrome and reduce thermal efficiency charges, JLL turned to Belimo.

“On our first visit to Citizens Plaza, we verified what we already knew, the structure was a Class A office building with air handlers on each floor,” said Kevin Leathers, District Sales Manager at Belimo. “As is often the case in older buildings, the air handlers, globe valves, and coils were oversized. We had all the original drawings and realized pretty quickly that the Energy Valve was a perfect candidate for lowering chilled water usage and optimizing flow through the coils and air handlers.”

After close communication between JLL and Belimo regional field consultants, Citizens Plaza underwent a pilot project installation with three 2-inch [DN 50] Energy Valves, one each on the 2nd floor, 5th floor, and 14th floor. The scope of work comprised a mechanical valve change-out without any control system modifications. The contractor removed the old globe valves and wired in the new Energy Valves with factory default settings.



“The installation of Energy Valves in Citizens Plaza, Rachel Jackson, and the Andrew Jackson building was a major success. The results exceeded my expectations. We now have savings that we can see.”

**Chad Lovell, Operations and Safety Specialist at Jones Lang LaSalle**



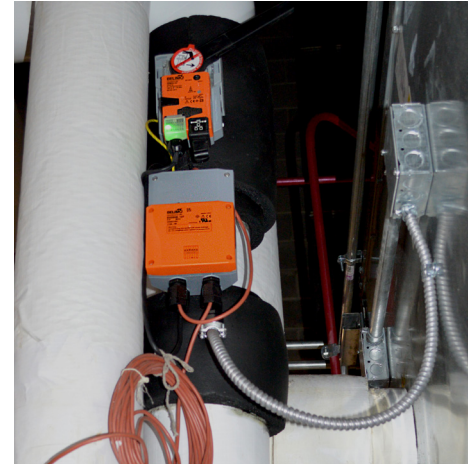
“Even without the Energy Valve’s patented Delta T Manager logic enabled, we were able to reduce flow through the coils while maintaining the same building temperature,” said Steve Rybka, Mechanical Contractor Consultant at Belimo. “The benefits kicked in when we initiated the Delta T Manager logic with refined setpoints for maximum flow and Delta T. The maximum design flow of the coils was 81.7 GPM [5.2 l/s]. With the Energy Valve, on the hottest day in August, flow peaked at 54 GPM [3.4 l/s] briefly. On average, coil flow was 30 to 35 GPM [1.9 to 2.2 l/s] for August and September.” Overall, through the installation of just three 2-inch [DN 50] valves, the entire building Delta T increased by 2°F [1.2°C] during the summer.

With positive results from the pilot project, JLL decided to install eleven additional Energy Valves on the remaining floors (ten 2-inch [DN 50] valves and one 2½-inch [DN 65] valve on the make-up air unit). Installation of the valves took place approximately eight months after the start of the pilot project.

## Savings and Benefits

After all 15 Energy Valves became operational in Citizens Plaza, the average flow through the building during full occupancy reduced by over 200 GPM [12.6 l/s] versus the previous year when the original globe valves were still in place. “As a result of the retrofit project, we were able to reduce chilled water pumping by 49%, which equated to about \$23,000 in annual savings”, said Chad Lovell. “The total cost of the project, including installation, was \$53,474. A simple financial calculation produced a payback in about 2.4 years.”

The district energy provider even noticed a substantial reduction in chilled water usage at Citizens Plaza. “Shortly after all the Energy Valves became operational, we got a call from Metro Nashville District Energy System stating that our chilled water usage had dropped significantly, and they were going to send out a technician to check on the problem,” added Lovell. “I informed them that there was no problem and that we had solved our low Delta T issue. It felt really good to get the confirmation from our chilled water provider that the building was performing better than they’d ever seen.”



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 Belimo Delta T Manager™ logic** monitors coil performance and optimizes the available energy of the coil by maintaining the Delta T.
- **Glycol monitoring** provides fluid concentration data to the building management system so operators can meet design requirements for pumping efficiency while reducing the risk of freezing and expensive repairs.
- **Cloud analytics** provide recommended Delta T and flow setpoints, which can be updated 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 MS/TP or IP, Modbus RTU or TCP/IP, MP-Bus, and one analog feedback signal for valve flow, power, temperature, or position.

# Commissioning Agency Documents Chilled Water Savings

## Customer Satisfaction

Building off the success of the Citizens Plaza retrofit project, JLL decided to install Energy Valves in the nearby Rachel Jackson and Andrew Jackson State Office buildings.

Rachel Jackson comprises eight floors where cooling and dehumidification is served by ten air handler units (AHU) recently retrofitted with 2-inch [DN 50] Energy Valves. Typical annual AHU chilled water flow savings from 40% to 65% resulted from effective Delta T Manager performance.

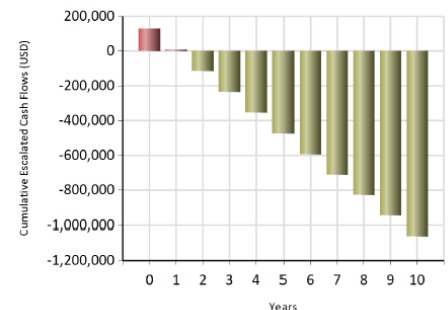
Andrew Jackson is an 18-story high-rise structure remodel project funded from the “EmPower Tennessee” program. It included the removal of existing architectural features, replacement of outdated mechanical systems, and switching out of all lights with LED fixtures. The total cost of the project was roughly \$1.5 million. Approximately \$35,000 of that went toward the purchase of 32 threaded Energy Valves.

Ten months after substantial completion of the upgrades to the Andrew Jackson building, a third-party commissioning agent, wrote an ENERGY STAR® Progress and Goals Report for the structure. The agent found total cumulative savings because of the building upgrades were approximately \$175,000. Of the three utilities that were evaluated in the report (electricity, chilled water, and steam), chilled water usage from the Energy Valve retrofits made up the most significant portion of savings in both the annual dollar and percentage amount, at \$120,000 and 69%, respectively.

The success of the retrofit projects in Nashville inspired JLL to write the Energy Valve into the company's best practices for energy conservation measures in a building.

“The installation of Energy Valves in Citizens Plaza, Rachel Jackson, and the Andrew Jackson building was a major success. The results exceeded my expectations,” Lovell said. “We now have savings that we can see. To be able to bring those savings back to my boss was a great feeling. It made her look good, it made me look good, and it made our entire team look good. It also made JLL look good within the state.”

Project 10 Year Cash Flow Estimate (Escalated)



## CUSTOMER BENEFITS

- **Payback in just 2.4 years** by optimizing coil heat transfer with Energy Valves reduced chilled water usage by 49% representing \$23,000 in annual savings at Citizens Plaza.
- **Increased Delta T** lowered the thermal inefficiency charges by up to \$13,000 after installing and adjusting Energy Valve settings to optimize chilled water coil flow.
- **Third-party consulting firm** documented Energy Valve retrofit savings in an ENERGY STAR progress and goals report. At the Andrew Jackson EmPower Tennessee project, the annual chilled water savings were \$120,000, which accounted for 69% of the project savings.

## Belimo Americas

USA, Latin America, and the Caribbean: [www.belimo.us](http://www.belimo.us)  
Canada: [www.belimo.ca](http://www.belimo.ca), Brazil: [www.belimo.com.br](http://www.belimo.com.br)  
Belimo Worldwide: [www.belimo.com](http://www.belimo.com)

