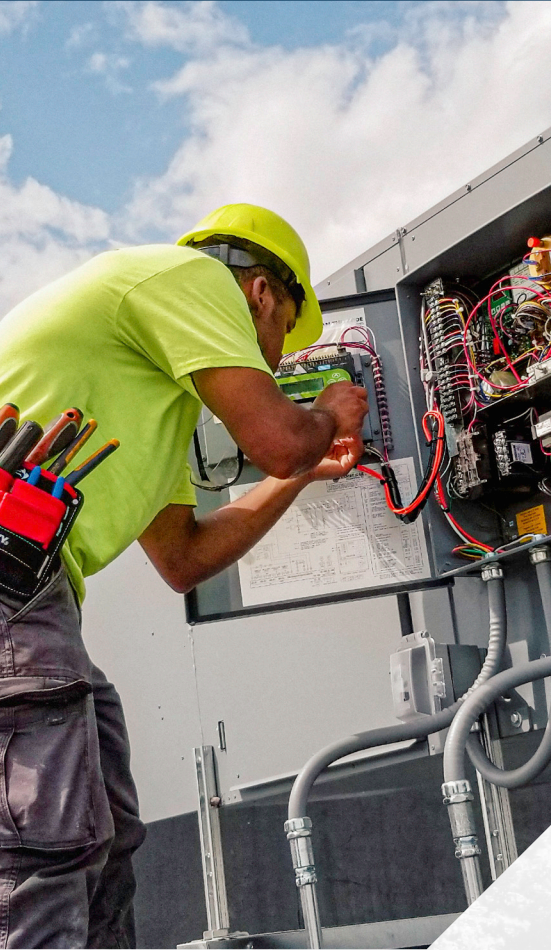


BEYOND HVAC:

HOW BUILDING MANAGEMENT SYSTEMS AND ENERGY
OPTIMIZATION TRANSFORM COMMERCIAL BUILDINGS



**MUHLENBERG COLLEGE
PARKWAY COMMUNITY BUILDING**



DUAL TEMP

BUILDING AUTOMATION

Dual Temp Company, based in Pennsylvania's Lehigh Valley, partnered with Whiting-Turner Contracting to complete construction of a new classroom and community building for Muhlenberg College. The project featured a next-generation Building Management System designed to enhance performance, efficiency, and occupant experience.

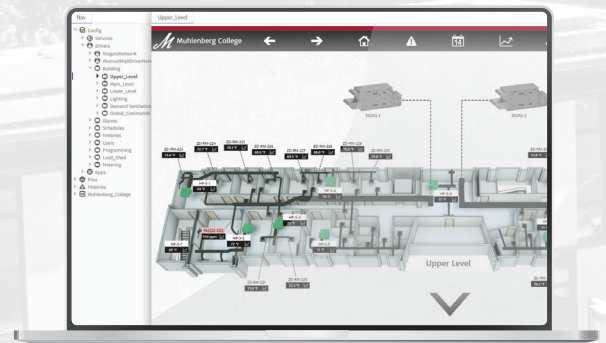
This complex undertaking required close collaboration between Dual Temp's design and installation teams and the college's facilities management staff to develop a solution aligned with the institution's specific operational goals. The result is an integrated building systems platform that delivers precise control of heating, ventilation, and air conditioning (HVAC), while also incorporating advanced sustainability features such as rainwater harvesting, photovoltaic panels, and intelligent lighting controls—each showcased through an interactive kiosk at the building entrance.

BUILDING MANAGEMENT SYSTEMS

Building Management Systems (BMS) were once limited to controlling and monitoring a facility's heating and air conditioning equipment. As technology has advanced—and building systems have become more interconnected—modern BMS platforms now serve as the central intelligence layer for building performance, efficiency, and sustainability.

In today's competitive commercial and institutional environments, efficient and sustainable building systems are essential for reducing energy consumption, lowering operating costs, and supporting long-term environmental goals. Muhlenberg College, a liberal arts institution in Allentown, Pennsylvania, recognized the value of investing in a modern Building Management System that could meet these objectives while maintaining a comfortable, healthy learning environment for students and staff.

The system integrates multiple building technologies—including rainwater harvesting, photovoltaic installation, and intelligent lighting controls—into a single, centralized platform. These systems are displayed through a lobby kiosk, providing transparency into building performance while enabling smarter temperature control, improved efficiency, and enhanced occupant comfort.



THE HVAC FOUNDATION

The base HVAC system utilizes a Variable Refrigerant Flow (VRF) simultaneous heating and cooling system designed to deliver precise comfort control throughout the building. This approach allows heating and cooling to respond dynamically to changing conditions across occupied spaces.

Micro-zone dampers were incorporated into the system design, enabling a single indoor unit to serve multiple rooms while maintaining tighter temperature control in each area. This strategy improves comfort, flexibility, and energy efficiency without increasing system complexity.

The VRF central controller and micro-zone thermostats are fully integrated into the Building Management System via BACnet MS/TP, giving building operators complete visibility into system operation and the ability to fine-tune performance as needed.



DEDICATED OUTDOOR AIR SYSTEMS

Multiple Dedicated Outdoor Air Systems (DOAS) deliver conditioned fresh air throughout the building using Direct Digital Control (DDC) dampers, variable fan speeds, and managed duct static pressure. This ensures consistent ventilation and improved indoor air quality across spaces.

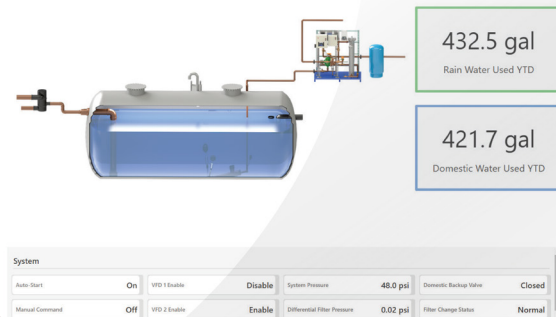
A demand-based ventilation strategy adjusts airflow on a room-by-room basis, reducing energy use while maintaining acceptable CO₂ levels and occupant comfort throughout the facility.

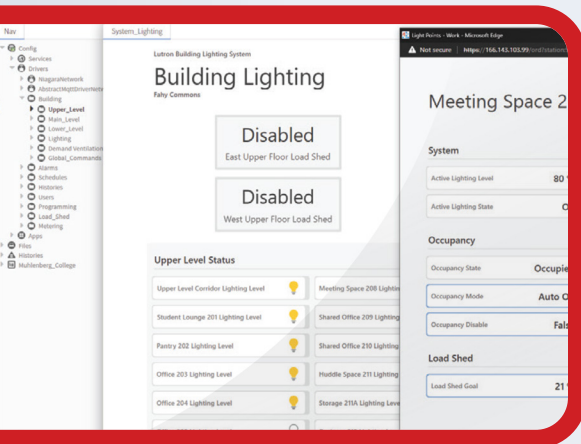
RAINWATER HARVEST SYSTEM

Beyond HVAC systems, the rainwater harvesting system is integrated into the building's infrastructure, providing visibility into operational savings and system health. Performance data allows facility staff to monitor usage and optimize operation.

Collected rainwater is reused for gray water applications, including water closets, urinals, and outdoor irrigation. This approach reduces potable water consumption and supports

Rain Water Management System
RMS-200
Fahy Commons - Lower Level





LIGHTING CONTROLS

Lighting control and monitoring are fully integrated into the Building Management System, providing centralized insight into lighting performance and energy use. Key parameters—including lumen output, scheduling, energy consumption, and ballast status—are continuously monitored through the BMS.

The Lutron Vive lighting system communicates with the BMS via BACnet IP, allowing lighting to be managed alongside HVAC,

PHOTOVOLTAIC SYSTEM

Photovoltaic generation and monitoring are fully integrated into the Building Management System, providing centralized insight into solar performance and energy production. Key metrics—including array input, inverter output, panel life, and maintenance indicators—are tracked through the BMS.

The photovoltaic installation communicates directly with the BMS, allowing solar performance to be centrally monitored.



INTELLIGENT DASHBOARD

Dual Temp Company, in collaboration with Cloud Gehshan Designs, delivered an interactive educational dashboard displayed on a lobby kiosk for building occupants. A peer-to-peer integration between the Building Management System and the Gehshan server provides real-time system data.

This dashboard translates complex building operations into an accessible, visual experience—allowing occupants to better

Despite the project's technical complexity, Dual Temp's design and implementation teams remained focused on delivering one of the most advanced and environmentally responsible facilities in the Lehigh Valley. The Muhlenberg College Parkway Community Building sets a new standard for building management, energy optimization, and sustainable campus design—benefiting both the institution and the environment.