Named for George V. LeyVa, superintendent of the Evergreen School District for 16 years, this 970-student middle school first opened its doors in 1973 as an elementary school serving students from grades K-6. Resembling a mini college campus on 23.4 acres, the school today has 12 separate classroom buildings, a baseball field, and track, tennis and basketball courts. The new 9,212-square-foot administration building was completed in time for the 2011-2012 school year.

In 2009, John Diffenderfer, AIA LEED® AP BD+C EBOM, principal at Aedis Architecture & Planning (Aedis), San Jose, Calif., received a call from the superintendent of the Evergreen School District. The LeyVa Middle School campus was growing exponentially, and Evergreen had chosen Aedis to design a separate administration building.

Facts About LeyVa Middle School
- The new administration building produces 108% of its own energy and saves the school district more than $9,000 each year in energy costs.

“With a nationwide focus on energy savings, we wanted Evergreen to focus on sustainable building practices,” Diffenderfer said. Working together with Aedis partner Capital Engineering Consultants, Inc., Rancho Cordova, Calif. (Capital), the LeyVa design team assembled a proposal based on energy modeling. The goal was to design an advanced energy-plus building.

**Profile of an Energy-plus School Building**

The team’s objective was to make the 9,212-square-foot administration building 41 percent more efficient than required by California’s Energy Code (Title 24). The team intended to make the building capable of generating up to 8 percent surplus energy.

Energy modeling told them the building’s sustainable technologies should include a 39 kW photovoltaic (PV) array on the roof, a highly efficient HVAC system, a super-insulated building envelope, extensive use of daylight harvesting (no lights needed during the day) and super-efficient windows. The PV array on the roof would deflect 70 percent of the sun’s heat back into the atmosphere, and the building’s super-insulated envelope would keep 90 percent of the sun’s heat from the interior, greatly reducing the need to cool it.

**Impressive Engineering, Quiet Comfort and Energy Savings**

Because cooling and heating typically require more than half a building’s energy use, the team knew LeyVa should have an HVAC system that would operate efficiently at partial-load conditions, which occur frequently in California’s mild climate.
Mitsubishi Electric VRF zoning system in operation. “Now that I have seen how the system works, I think it’s amazing,” Singleton said. “The variable speed compressors, simultaneous cooling and heating capability, the energy efficiency of heat transfer and intelligent controls are all very impressive engineering.”

The team presented its recommendations to the Evergreen School District’s administration. Diffenderfer reminded the administration that the severe economic trouble of the past few years had produced a revenue crisis for California schools. He said utility expenses are one of the last line items school administrations can directly control: “Creative thinking is desperately required, and we should make this installation a de facto standard for all Evergreen schools.”

The Mitsubishi Electric VRF zoning system contributed to reduced utility bills, helping the school system save money during a revenue crisis.

The team selected Mitsubishi Electric VRF zoning systems, because they operate efficiently at partial-load conditions, which occur frequently in California’s mild climate.

By operating efficiently at partial-load conditions, Mitsubishi Electric VRF zoning systems were able to optimize energy savings and provide zoned comfort, while keeping operating costs at a minimum.

“Steve Myers at Capital recommended the Mitsubishi Electric VRF [Variable Refrigerant Flow] system for LeyVa,” Singleton said. Myers took the team over to see a nearby Mitsubishi Electric VRF zoning system in operation. “Now that I have seen how the system works, I think it’s amazing,” Singleton said. “The variable speed compressors, simultaneous cooling and heating capability, the energy efficiency of heat transfer and intelligent controls are all very impressive engineering.”

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“We made a positive impression, and the District approved the Mitsubishi Electric VRF technology over all other feasible systems,” Myers said. “This system allows simultaneous cooling and heating with multiple indoor units,
LeyVa Middle School
Administration Building
San Jose, Calif.

served from a single outdoor unit. This optimizes energy savings by allowing the system to match capacity requirements in each zone. The office space, which typically would be controlled by a packaged air-conditioning system, realizes superior zone control with the VRF zoning system.

“We liked the fact that the system is able to transfer heat from warm spaces, such as the computer room, and distribute that heat to other rooms with minimal power consumption,” Myers continued. “The Mitsubishi Electric system provides excellent comfort while keeping running costs to a minimum.”

According to Rob Smiley, director of operations at the Evergreen School District, the system was easy to install and easy to maintain. “This system’s technology has contributed to saving us thousands of dollars this past year. And, because of its exceptional zoning capabilities, there are no more zoning wars, and each office has its own temperature setting. But, I think its greatest benefit is the indoor comfort it brings our students.”

Pivotal Moment: Future Standard for Evergreen
Singleton echoed Smiley’s observation. “With its many advancements, I believe the greatest overall benefit is the quiet [operation and] comfort the system delivers for the LeyVa staff.”

“The LeyVa project was actually a pivotal moment for me,” Diffenderfer said. “It proved to me that optimizing energy performance is key to the real success of a building design. To this end, I believe Mitsubishi Electric’s technology played a significant role in helping us achieve our energy goals.”

Through the BC Controller (pictured right), the system allows simultaneous cooling and heating with multiple indoor units, from a single outdoor unit. The zoning capability of the system enables each area to be controlled individually by its own controller (pictured left).